INSPIRE
Infrastructure for Spatial Information in Europe

INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119

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This version 1.3 of the Technical Guidelines clarifies some aspects of the implementation of the discovery metadata elements based on the experience built during the period of implementation 2010-13. It also includes an overview of the Metadata elements for Evaluation and Use defined in the INSPIRE Implementing Rules for the Interoperability of Spatial Datasets and Services

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Introduction

According to Article 5(1) of Directive 2007/2/EC, Member States shall ensure that metadata are created for the spatial data sets and services corresponding to the themes listed in Annexes I, II and III, and that those metadata are kept up to date. According to Article 5(4) of Directive 2007/2/EC, Implementing Rules shall be adopted taking account of relevant, existing international standards and user requirements. In the context of metadata for spatial data and spatial data services, the standards EN ISO 19115, EN ISO 19119, and ISO 15836 (Dublin Core) have been identified as important standards.

Commission Regulation (EC) No. 1205/2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata was adopted on of 3rd December 2008, and published on the Official Journal of the European Union on 4th December (*OJ L 326, 4.12.2008, p. 12–30)*. Any reference in this document to "Implementing Rules for Metadata" refers to the above-mentioned Regulation.

The Regulation sets out the requirements for the creation and maintenance of metadata for spatial data sets, spatial data set series and spatial data services corresponding to the themes listed in Annexes I, II and III to Directive 2007/2/EC. It defines a number of metadata elements, their multiplicities and the value domains to be used in the metadata.

NOTE 1 The metadata elements defined in the Implementing Rules for Metadata are usually called *discovery metadata.*

In addition to these requirements, Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services (OJ L 323, 08/12/2010, p. 11–102) and its sub-sequent amendments[1,2] define six additional *metadata elements for interoperability* as well as some theme-specific requirements for the discovery metadata elements. Any reference in this document to "Implementing Rules for interoperability of spatial data sets and services" refers to the above-mentioned Regulation.

NOTE 2 The metadata elements defined in the Implementing Rules for interoperability of spatial data sets and services are also sometimes referred to as *evaluation and use metadata.*

The aim of this document is to define how the requirements of the Implementing Rules for Metadata can be implemented using EN ISO 19115 and EN ISO 19119. The following subsections describe for each element of the Implementing Rules its relation with the mentioned European standards. Furthermore, Annex B provides an overview of the additional metadata elements and requirements defined in the Implementing Rules for interoperability of spatial data sets and services as well as pointers to the INSPIRE Data Specifications, which provide guidance and recommendations for their implementation.

The timelines relevant for the provision of discovery metadata are different from those for metadata for interoperability. The former need to be provided according to the deadlines specified in the INSPIRE Directive for the Implementing Rules for Metadata (2 years after adoption for Annex I and II and 5 years after adoption for Annex III), while the latter need to be provided according to the deadlines specified in the INSPIRE Directive for the Implementing Rules for interoperability of spatial data sets and services (2 years after adoption for newly created or extensively restructured data sets, and 7 years for all other data sets). Figure 1 gives an overview of the dates at which the requirements included in the two Implementing Rules for data sets related to Annex I, II or III have to be met.

[1] Commission Regulation (EU) No 102/2011 of 4 February 2011 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services (*OJ L 31, 05/02/2011, p. 13–34*)

[2] Commission Regulation (EU) No …/.. of XXX amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC as regards interoperability of spatial data sets and services (Annex II+III amendment).

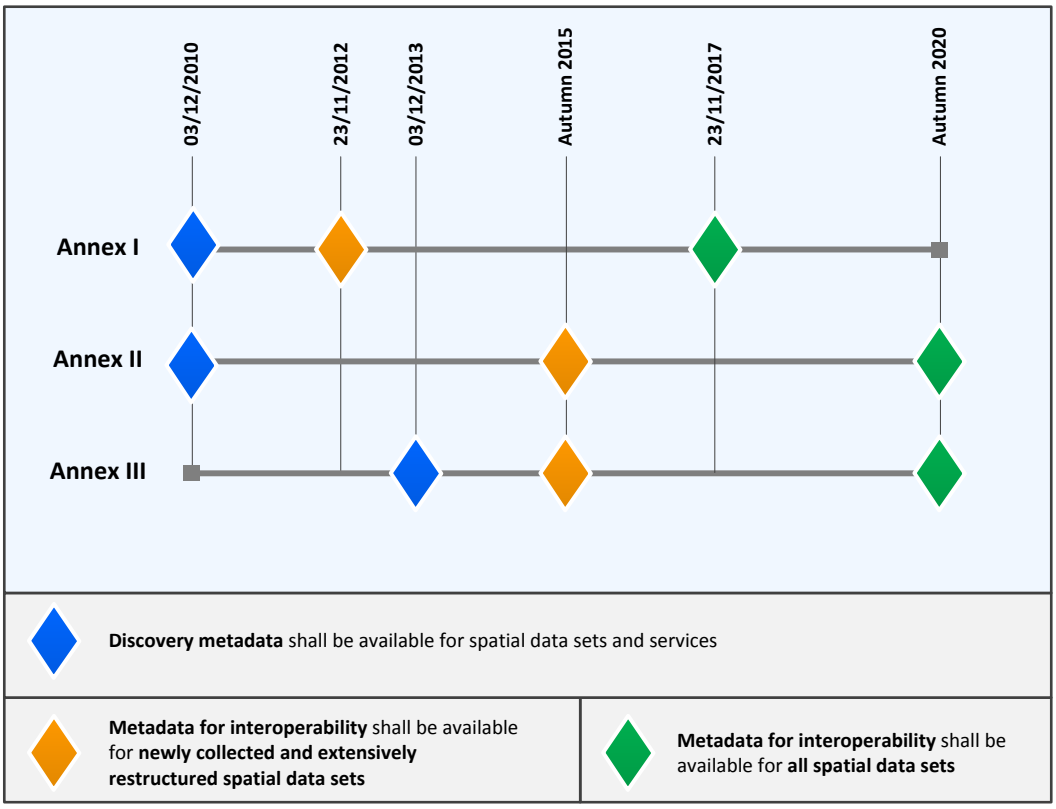


Figure 1. Illustration of Implementation Roadmap for discovery metadata and metadata for interoperability[3]

Note on Corrigenda to the Implementing Rules for Metadata

Regulation 1205/2008 has been amended with the corrigenda published in the OJ L 328/83 of 15.12.2009 as follows:

- On page 12 delete the subtitle "Text with EEA relevance" (European Economic Area)
- On page 20, Annex D, point 1.3 replace "Spatial data services (services)" with "Spatial data services (service)".

PLEASE NOTE that in the course of this revision, another typing error has come to light in the Regulation 1205/2008 which will need a further amendment. In Part D 4, the language neutral name for element 501: Geoparameter calculation service should be (thematic**Geo**parameterCalculationService) and not (thematic**Go**parameterCalculationService) (part in bold is added to put in evidence the typing error). Still in Part D 4, a number of typos have been detected in the language-independent values when comparing the English version with those in other languages. These will be corrected in an amendment of the Regulation.

Legal Notice

[3] Dates in this figure are accurate at the time of publication and are based on the assumption that the Annex II+III amendment of the Implementing Rules for interoperability of spatial data sets and services will be adopted in autumn 2013. For definitive dates refer to the roadmap published on the INSPIRE website (http://inspire.jrc.ec.europa.eu/index.cfm/pageid/44).

Changes from Version 1.2 of 2010-06-06

This document is Version 1.3. The changes introduced since Version 1.2 includes rewording to make the text clearer, inclusion of examples of good practice, recommendations on Conformity to include also conformity to INSPIRE Network Service, and an overview table of the elements of metadata for evaluation and use defined in the INSPIRE Implementing Rules for the Interoperability of Spatial Datasets and Services.

Throughout the document we have also corrected a typo from the previous version that referred to:

http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/**C**odelist/gmxCodelists.xml

Whereas the live path is:
http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/**c**odelist/gmxCodelists.xml

Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 19108] EN ISO 19108:2005, Geographic Information – Temporal Schema

[ISO 19108-c] ISO 19108:2002/Cor 1:2006, Geographic Information – Temporal Schema, Technical Corrigendum 1

[ISO 19115] EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003) [4]

[ISO 19119] EN ISO 19119:2005, Geographic information – Services (ISO 19119:2005)

[ISO 639-2] EN ISO 639-2:1998, Codes for the representation of names of languages – Part 2: Alpha-3 code

[ISO 8601] EN ISO 8601:2004, Data elements and interchange formats – Information interchange – Representation of dates and times

[ISO 19139] ISO/TS 19139:2007, Geographic information – Metadata – XML schema implementation

[CSW2 AP ISO] OpenGIS Catalogue Services Specification 2.0.2 - ISO Metadata Application Profile, Version 1.0.0, OGC 07-045, 2007

[ISO 10646-1] ISO/IEC 10646-1:2000, Information technology — Universal Multiple-Octet Coded Character Set (UCS) — Part 1: Architecture and Basic Multilingual Plane

[IR MDTG] INSPIRE Metadata Implementing Rules. Guidelines based on EN ISO 19115 and EN ISO 19119 for 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

[INSPIRE Directive] INSPIRE, Implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial datasets and services

[Regulation 1205/2008/EC] Regulation 1205/2008/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata

Verbal forms for expression of provisions

In accordance with the ISO rules for drafting, the following verbal forms shall be interpreted in the given way:

- “shall” / “shall not”: a requirement, mandatory to comply with the technical guidance
- “should” / “should not” : a recommendation, but an alternative approach may be chosen for a specific case if there are reasons to do so
- “may” / “need not” : a permission

Technical Guideline Requirements and Recommendations notation

[4] EN ISO 19115:2005 is the adoption by CEN of ISO 19115:2003

Requirements and the recommendations for INSPIRE Metadata Implementing Rules within this technical guideline are highlighted and numbered as shown below:

TG Requirement #requirements are shown using this style

TG Recommendation #recommendations are shown using this style.

It is important to note that, implementation requirements and implementation recommendations may refer to either data or services.

Note: It is worth noting that requirements as specified in the INSPIRE Regulations and Implementing Rules are legally binding, and that requirements and recommendations as specified in INSPIRE Technical Guideline are **not** legally binding. Therefore, within this technical guideline we have used the terms 'TG requirement' and 'TG recommendation' to indicate what is technically required or recommended to conform to the Technical Guidance.

XML Example notation
XML Examples are shown using Courier New on a grey background with yellow for emphasis as below:

```
<inspire:example>
      <inspire:highlight>
            Highlighted Text for emphasis
      </inspire:highlight>
</inspire:example>
```

Note: XML Examples are informative and are provided for information only and are expressly not normative.

1 INSPIRE profile of ISO 19115 and ISO 19119

1.1 ISO Core Metadata Elements

1.1.1 Spatial dataset and spatial dataset series

The table below compares the core requirements of ISO 19115 (see Table 3 in 6.5 of ISO 19115:2003) to the requirements of INSPIRE for spatial dataset and spatial dataset series as defined in the Implementing Rules for metadata.

ISO 19115 Core	INSPIRE Implementing Rules for Metadata	Comments
Dataset title (M)	Part B 1.1 Resource Title	-
Dataset reference date (M)	Part B 5 Temporal Reference	ISO 19115 is more demanding. The metadata shall contain a date of publication, revision or creation of the resource, while in INSPIRE the Temporal Reference can also be expressed through Temporal Extent.
Dataset responsible party (O)	Part B 9 Responsible organisation	INSPIRE is more demanding by mandating both the name of the organisation, and a contact e-mail address
Geographic location of the dataset (C)	Part B 4.1 Geographic Bounding Box	INSPIRE is more restrictive. A Geographic bounding box is mandated
Dataset language (M)	Part B 1.7 Resource Language	ISO 19115 is more demanding. It mandates the dataset language, even if the resource does not include any textual information. The ISO 19115 Dataset language is defaulted to the Metadata language.
Dataset character set (C)	-	ISO 19115 is more demanding. The dataset character set has to be documented in ISO 19115 when ISO 10646-1 is not used. The ISO 19115 element maps to the conditional “Character Encoding” metadata element defined in Art. 13(5) of the Implementing Rules on interoperability of spatial data sets and services. This element is mandatory only if an encoding is used that is not based on UTF-8 (the dominant encoding of ISO 10646-1).
Dataset topic category (M)	Part B 2.1 Topic Category	-
Spatial resolution of the dataset (O)	Part B 6.2 Spatial Resolution	-
Abstract describing the dataset (M)	Part B 1.2 Resource abstract	-
Distribution format (O)	-	The ISO 19115 element maps to the mandatory “Encoding” metadata element defined in Art. 13(3) of the Implementing Rules on interoperability of spatial data sets and services.
Additional extent information for the dataset (vertical and temporal) (O)	Part B 5.1 Temporal extent	INSPIRE is more demanding. A temporal reference is mandated, and can be expressed as a temporal extent.

ISO 19115 Core	INSPIRE Implementing Rules for Metadata	Comments
Spatial representation type (O)	-	The ISO 19115 element maps to the mandatory “Spatial Representation Type” metadata element defined in Art. 13(6) of the Implementing Rules on interoperability of spatial data sets and services[5].
Reference system (O)	-	The ISO 19115 element maps to the mandatory “Coordinate Reference System” and the conditional “Temporal Reference System” metadata elements defined in Art. 13(1) and (2) of the Implementing Rules on interoperability of spatial data sets and services set.
Lineage (O)	Part B 6.1 Lineage	INSPIRE is more demanding. A general lineage statement is mandated.
On-line resource (O)	Part B 1.4 Resource Locator	-
Metadata file identifier (O)	-	-
Metadata standard name (O)	-	-
Metadata standard version (O)	-	-
Metadata language (C)	Part B 10.3 Metadata Language	INSPIRE is more demanding. The metadata language is mandated even if it is defined by the encoding.
Metadata character set (C)	-	ISO 19115 is more demanding. The metadata character set has to be documented in ISO 19115 when ISO 10646-1 is not used.
Metadata point of contact (M)	Part B 10.1 Metadata point of contact	INSPIRE is more demanding by mandating both the name of the organisation, and a contact e-mail address.
Metadata date stamp (M)	Part B 10.2 Metadata Date	ISO is more restrictive because this element shall contain the “date that the metadata was created” and INSPIRE may contain the “date when the metadata record was created or updated
-	Part B 1.3 Resource Type	INSPIRE is more demanding
	Part B 1.5 Unique Resource Identifier	INSPIRE is more demanding
	Part B 3 Keyword	INSPIRE is more demanding
-	Part B 7 Conformity	INSPIRE is more demanding
-	Part B 8.1 Conditions for access and use	INSPIRE is more demanding
-	Part B 8.2 Limitations on public access	INSPIRE is more demanding

[5] This element will be introduced in the Annex II+III amendment to the Implementing Rules on interoperability of spatial data sets and services.

1.1.2 Services

The table below compares the core requirements of ISO 19115 (see Table 3 in 6.5 of ISO 19115:2003) to the requirements of INSPIRE for services as defined in the Implementing Rules for metadata. The greyed lines correspond to core metadata elements not applicable to services.

ISO 19115 Core	INSPIRE	Comments
Dataset title (M)	Part B 1.1 Resource Title	-
Dataset reference date (M)	Part B 5 Temporal Reference	ISO 19115 is more demanding. Despite its name, this ISO 19115 Core metadata element applies to services. A reference date of the service (date of publication, revision or creation …) is mandated.
Dataset responsible party (O)	Part B 9 Responsible organisation	-
Geographic location of the dataset (C)	-	See INSPIRE Geographic Bounding Box
-	Part B 4.1 Geographic Bounding Box	The Geographic Bounding Box is handled in ISO 19119 with a different metadata element from the one corresponding to “Geographic location of the dataset”
Dataset language (M)	-	Not applicable to services
Dataset character set (C)	-	Not applicable to services
Dataset topic category (M)	-	Not applicable to services
Spatial resolution of the dataset (O)	Part B 6.2 Spatial Resolution	In the current version of ISO 19119, it is not possible to express the restriction of a service concerning the spatial resolution
Abstract describing the dataset (M)	Part B 1.2 Resource abstract	-
Distribution format (O)	-	-
Additional extent information for the dataset (O)	-	-
Spatial representation type (O)	-	-
Reference system (O)	-	-
Lineage (O)	-	-
On-line resource (O)	Part B 1.4 Resource Locator	-
Metadata file identifier (O)	-	-
Metadata standard name (O)	-	-
Metadata standard version (O)	-	-
Metadata language (C)	Part B 10.3 Metadata Language	INSPIRE is more demanding. The metadata language is mandated.

ISO 19115 Core	INSPIRE	Comments
Metadata character set (C)	-	ISO 19115 is more demanding. The metadata character set has to be documented in ISO 19115 when ISO 10646-1 is not used.
Metadata point of contact (M)	Part B 10.1 Metadata point of contact	-
Metadata date stamp (M)	Part B 10.2 Metadata Date	ISO is more restrictive because this element shall contain the “date that the metadata was created” and INSPIRE may contain the “date when the metadata record was created or updated
-	Part B 1.3 Resource Type	INSPIRE is more demanding
-	Part B 1.6 Coupled Resource	Optional in INSPIRE
-	Part B 2.2 Spatial Data Service Type	INSPIRE is more demanding
	Part B 3 Keyword	INSPIRE is more demanding
-	Part B 7 Conformity	INSPIRE is more demanding
-	Part B 8.1 Conditions for access and use	INSPIRE is more demanding
-	Part B 8.2 Limitations on public access	INSPIRE is more demanding

1.1.3 Conclusion

- The conformance of an ISO 19115 metadata set to the ISO 19115 Core does not guarantee the conformance to INSPIRE;
- The use of these guideline to create INSPIRE metadata ensures that the metadata is not in conflict with ISO 19115. However, full conformance to ISO 19115 implies the provision of additional metadata elements which are not required by the INSPIRE Implementing Rule on Metadata. Additional metadata elements are required by the INSPIRE Implementing Rules for the Interoperability of Spatial Datasets and Services. An overview list of these additional elements is provided in Annex B.

Over the structural requirements formalised through the mappings, the conformance to INSPIRE is also a matter of semantic of the information provided. If it is acceptable that the ISO 19115/ISO 19119 contain information which are not strictly bounded to the definition of the corresponding INSPIRE metadata elements, the minimum requirements expressed in the implementing rules have also to be met semantically, i.e. with metadata contents strictly satisfying the INSPIRE requirements.

1.2 INSPIRE specific constraints (SC)

Here is an initial list of INSPIRE Regulation 1205/2008/EC constraints applicable to an ISO 19115/ISO 19119 metadata set (i.e. an instance of MD_Metadata) describing a resource:

SC1. MD_Metadata.language is mandatory;

SC2. MD_Metadata.hierarchyLevel is mandatory;

SC3. INSPIRE only considers the first instance of MD_Metadata.hierarchyLevel (i.e. MD_Metadata.hierarchyLevel[1]) when there are many;

SC4. If the value of MD_Metadata.hierarchyLevel[1] is not **service**, **dataset** or **series**, the metadata set is out of scope of the directive;

SC5. When there are many instances of MD_Metadata.identificationInfo, only the first one (i.e. MD_Metadata.identificationInfo[1]) concerns the current INSPIRE Resource;

SC6. INSPIRE only considers the instance of MD_Metadata.dataQualityInfo applicable to the whole resource;

SC7. There shall not be more than one instance of MD_Metadata.identificationInfo[1].MD_Identification.citation.CI_Citation.date declared as a creation date (i.e. CI_Date.dateType having the creation value);

SC8. MD_Metadata.identificationInfo[1].MD_DataIdentification.citation.CI_Citation.identifier is mandatory for metadata sets related to spatial dataset and spatial dataset series;

SC9. The data type of MD_Metadata.identificationInfo.MD_DataIdentification.language is the codelist LanguageCode from ISO/TS 19139;

SC10. There is at least one instance of MD_Metadata.identificationInfo[1].MD_DataIdentification.extent defining the geographic location of the resource as a geographic bounding box (i.e. an instance of EX_GeographicBoundingBox or one of its subclasses).

SC11. MD_Metadata.identificationInfo[1].SV_ServiceIdentification.operatesOn shall be instantiated by reference

SC12. There shall be at least one instance of MD_Metadata.identificationInfo[1].MD_Identification.resourceConstraints

SC13. The coordinates of the bounding boxes (instance of EX_GeographicBoundingBox) shall be expressed in any geodetic coordinate reference system with the **Greenwich Prime Meridian**

SC14. For datasets and series:
MD_Metadata.identificationInfo[1].MD_DataIdentification.pointOfContact[1].CI_ResponsibleParty.organisationName and
MD_Metadata.identificationInfo[1].MD_DataIdentification.pointOfContact[1].CI_ResponsibleParty.contactInfo.CI_Contact.address.CI_Address.electronicMailAddress are mandatory.
For services these elements are also mandatory but they are referred as follows:
MD_Metadata.identificationInfo[1].SV_ServiceIdentification.pointOfContact[1].CI_ResponsibleParty.organisationName and
MD_Metadata.identificationInfo[1].SV_ServiceIdentification.pointOfContact[1].CI_ResponsibleParty.contactInfo.CI_Contact.address.CI_Address.electronicMailAddress.

SC15. MD_Metadata.contact[1].CI_ResponsibleParty.organisationName and MD_Metadata.contact[1].CI_ResponsibleParty.contactInfo.CI_Contact.address.CI_Address.electronicMailAddress are mandatory.

SC16. The value of MD_Metadata.contact[1].CI_ResponsibleParty.role.CI_RoleCode shall be pointOfContact.

SC17. For datasets and series at least one keyword of GEMET thesaurus shall be documented using MD_Metadata.identificationInfo[1].MD_DataIdentification.descriptiveKeywords.

SC18. For services at least one keyword of Part D.4 of Commission Regulation (EC) No. 1205/2008 shall be documented using MD_Metadata.identificationInfo[1].SV_ServiceIdentification.descriptiveKeywords

1.3 Extensions

1.3.1 Spatial data service type

For spatial data service types, the INSPIRE Metadata Regulation 1205/2008/EC mandate the use of the value domain of Part D 3. This information is handled using the serviceType attribute (See 2.3.2) of the class SV_ServiceIdentification (See ISO 19119).

The Table below defines the values of the serviceType property. In brackets are the language neutral names to be used.

SPATIAL DATA SERVICE TYPE

SPATIAL DATA SERVICE TYPE
Discovery Service (discovery)
View Service (view)
Download Service (download)
Transformation Service (transformation)
Invoke Spatial Data Service (invoke)
Other Services (other)

1.3.2 Classification of spatial data services

For classification of spatial data services, the Implementing Rules mandate the use of the value domain of Part D 4 of Regulation 1205/2008/EC. In order to ensure a language independent expression of the classification of spatial data services, the language neutral name is to be used as the value of the ISO 19115 keywords (See 2.4).

2 Basic mapping

2.1 Introduction

The following tables describe the mapping between the metadata elements of INSPIRE, as defined in the INSPIRE implementing rules for metadata, and ISO 19115/ISO 19119. For each of the INSPIRE Metadata element, the mapping is composed of the main characteristics of the metadata element as they are defined[6] in the INSPIRE implementing rules (**IR**) for metadata and the main characteristics of the corresponding metadata element of **ISO 19115** or **ISO 19119**:

- The metadata element name as used in the INSPIRE implementing rules;
- The reference to the paragraph of the INSPIRE implementing rules describing the metadata element;
- The **definition**, which gives the current ISO 19115 or ISO 19119 terms for describing the metadata element (Annex B of ISO 19115 standard: Data Dictionary for geographic metadata or Annex C of ISO 19119: Data dictionary for geographic service metadata);
- The **number** and the **name** that identifies the metadata element inside tables in ISO 19115 (or ISO 19119) published standard;
- An **XPath** expression indicating the metadata element within the ISO 19115 / ISO 19119 UML model (see 2.1.1);
- The INSPIRE **obligation/condition** applicable to the metadata element;
- The INSPIRE **multiplicity** of the metadata element;
- The **Data Type** and the **Domain** required by the metadata element;
- An **example** that illustrates the description of the metadata element by providing a concrete case
- Some **comments**, which give more information about the metadata element

Apart from the tables collecting the main significant aspects, additional information is provided regarding: the description of the metadata element, advices on its fulfilment and important requirements and recommendations, as well as an example of XML encoding, i.e. a fragment of the XML of a metadata record created and validated with the INSPIRE Metadata Editor available from the EU Geoportal (http://inspire-geoportal.ec.europa.eu).

The overall structure of an ISO 19115/ISO 19119 metadata set supporting the requirements expressed in the INSPIRE Implementing rules for metadata is defined in Section 3 of this document.

[6] In case of discrepancy, the INSPIRE Implementing rules take precedence

2.1.1 Xpath expression

This compact notation allows many defaults and abbreviations for common cases. The simplest XPath takes a form such as `/A/B/C` which selects C elements that are children of B elements that are children of the A element that forms the outermost element of the model. More complex expressions can be constructed by specifying an axis other than the default 'child' axis, a node test other than a simple name, or predicates, which can be written in square brackets after any step. The main rules are the following ones:

- ***** selects all element children of the context node;
- **text()** selects all text node children of the context node;
- **@name** selects the name attribute of the context node;
- **@*** selects all the attributes of the context node;
- **.** selects the context node;
- **.//para** selects the para element descendants at any level of the context node;
- **..** selects the parent of the context node.

Hereafter, the root element of the XPath expression is an instance of MD_Metadata or one of its subclasses. The possible subelements of a class are its properties. The possible subelement of a property is its data type or a subtype of its data type. In order to manage the polymorphism, the XPath expression deals with the data type in a generic way (e.g., property_element_name/*/datatype_property_name).

2.1.2 ISO Schemas Location

Official ISO schemas (ISO AP or ISO 19139) are currently found in two separate locations:

1) ISO repository for public available standards. The ISO 19139 schemas can be found here:
http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/
Date of schemas: 2007-08-11.

2.) OGC Schema repository. The ISO 19139 schemas are located here:
http://schemas.opengis.net/iso/19139/20070417/
Date of schemas: 2007-04-17.
and here: http://schemas.opengis.net/iso/19139/20060504/
Date of schemas: 2006-06-04.

ISO AP schemas are located here: http://schemas.opengis.net/csw/2.0.2/profiles/apiso/
Date of schemas: 2007-07-19.

The ISO AP schemas are bound to http://schemas.opengis.net/iso/19139/20060504/

The difference in the schemas located in the OGC repository is the GML version. The version dated "2007-04-17" uses GML 3.2.1, the version dated "2006-06-04" use GML 3.2.0. The version "2006-06-04" provides gml in a separate directory (/gml) whereas the version "2007-04-17" directly refers to http://schemas.opengis.net/gml/3.2.1/. The major difference is that GML 3.2.0 schemas are defined in the namespace http://www.opengis.net/gml whereas GML 3.2.1 schemas are defined in the namespace http://www.opengis.net/gml/3.2.

The schemas located in the ISO repository for public available standards are comparable to OGC schemas located here: http://schemas.opengis.net/iso/19139/20070417/.

In conclusion:
To Validate XML against ISO AP 1.0:
http://schemas.opengis.net/csw/2.0.2/profiles/apiso/1.0.0/apiso.xsd

To Validate XML against ISO 19139 with GML 3.2.0:
http://schemas.opengis.net/iso/19139/20060504/gmd/gmd.xsd

To Validate XML against ISO 19139 with GML 3.2.1:
http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/gmd/gmd.xsd or
http://schemas.opengis.net/iso/19139/20070417/gmd/gmd.xsd

INSPIRE Validator Service: A RESTful Web service that can be invoked by http request to validate INSPIRE Metadata. The purpose of the INSPIRE Metadata Validator is to test compliance of INSPIRE metadata with the INSPIRE Metadata Regulation. The validator accepts metadata that follow the Metadata Technical Guidance encoded in EN ISO 19139 schema. The INSPIRE Metadata Validator is implemented by ISO Schematron (2006).

The web application and service are provided for testing. Please report any issues you find so that they can be improved at inspire-geoportal@jrc.ec.europa.eu

End point: http://inspire-geoportal.ec.europa.eu/validator2/
Supported method: POST
Supported response formats: XML, HTML (The response format is returned according to the Accept value of the http request header)
Request parameter: dataFile (This is the name of the parameter associated with the metadata record xml file that should be added to the request)

PLEASE NOTE: The validator is a proof of concept that has been developed to test these guidelines. It is not intended to be an operational tool, and at the present time works in English only. All the files of the Validator including documentation are available under EU Public License from the JoinUp Platform (https://joinup.ec.europa.eu/software/validator/home). Interested stakeholders are welcome to adapt the current Validator to their own language, and contribute it back through JoinUp to enrich the collective portfolio of tools supporting the implementation of INSPIRE, currently being explored by the ISA Action A Reusable INSPIRE Reference Platform (ARE3NA: https://joinup.ec.europa.eu/community/are3na/description). A new validator is being developed and will also be added to JoinUp.

2.2 Identification

2.2.1 Resource title

This is a characteristic, and often unique, name by which the resource is known. The title is the most informative element of a metadata record and usually the highest priority as search engines go to this element.

TG Recommendation 1	The Resource Title has to be concise and to the point. It should not contain unexplained acronyms or abbreviations. It is recommended a maximum length of 250 characters and keeping the similarity with the original title of the resource, in the sense of the 'official naming'.

TG Recommendation 2	If the data or service is part of a larger project, it is recommended to indicate the Project at the end of the title, in brackets. In case of Project names, abbreviations are allowed, as long as the rest of the title follows the guidelines above and the abbreviation is spelled out immediately in the abstract.

Metadata element name	**Resource title**
Reference	Part B 1.1
Definition	Name by which the cited resource is known
ISO 19115 number and name	360. title
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/title
INSPIRE obligation / condition	Mandatory

INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	**SPI: Standardized Precipitation Index**
Comments	

Example of XML encoding:

```
<gmd:MD_Metadata …
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
      <gmd:citation>
        <gmd:CI_Citation>
                <gmd:title>
                  <gco:CharacterString>SPI: Standardized
Precipitation Index</gco:CharacterString>
                </gmd:title>
        </gmd:CI_Citation>
      </gmd:citation>
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.2.2 Resource abstract

This is a brief narrative summary of the content of the resource. The abstract provides a clear and concise statement that enables the reader to understand the content of the data or service

Metadata element name	**Resource abstract**
Reference	Part B 1.2
Definition	Brief narrative summary of the content of the resource(s)
ISO 19115 number and name	25. abstract
ISO/TS 19139 path	identificationInfo[1]/*/abstract
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	**The Standardized Precipitation Index (SPI-n) is a statistical indicator comparing the total precipitation received at a particular location during a period of n months with the long-term rainfall distribution for the same period of time at that location. SPI is calculated on a monthly basis for a moving window of n months, where n indicates the rainfall accumulation period, which is typically 1, 3, 6, 9, 12, 24 or 48 months. The corresponding SPIs are denoted as SPI-1, SPI-3, SPI-6, etc. In order to allow for the statistical comparison of wetter and drier climates, SPI is based on a transformation of**

	the accumulated precipitation into a standard normal variable with zero mean and variance equal to one. SPI results are given in units of standard deviation from the long-term mean of the standardized distribution. In 2010 WMO selected the SPI as a key meteorological drought indicator to be produced operationally by meteorological services
Comments	

TG Recommendation 3 The resource abstract is a succinct description that can include:

- A brief summary with the most important details that summarise the data or service
- Coverage: linguistic transcriptions of the extent or location in addition to the bounding box
- Main attributes
- Data sources
- Legal references
- Importance of the work

TG Recommendation 4 Do not use unexplained acronyms.

TG Recommendation 5 Summarise the most important details in the first sentence or first 100 characters.

Example of XML encoding:

```
<gmd:MD_Metadata …
...
  <gmd:identificationInfo>
    <gmd:MD_DataIdentification>
...
            <gmd:abstract>
              <gco:CharacterString>The Standardized Precipitation
Index (SPI-n) is a statistical indicator comparing the total
precipitation received at a particular location during a period of n
months with the long-term rainfall distribution for the same period
of time at that location. SPI is calculated on a monthly basis for a
moving window of n months, where n indicates the rainfall
accumulation period, which is typically 1, 3, 6, 9, 12, 24 or 48
months. The corresponding SPIs are denoted as SPI-1, SPI-3, SPI-6,
etc.In order to allow for the statistical comparison of wetter and
drier climates, SPI is based on a transformation of the accumulated
precipitation into a standard normal variable with zero mean and
variance equal to one. SPI results are given in units of standard
deviation from the long-term mean of the standardized distribution.
In 2010 WMO selected the SPI as a key meteorological drought
indicator to be produced operationally by meteorological services.
              </gco:CharacterString>
            </gmd:abstract>
...
    </gmd:MD_DataIdentification>
  </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.2.3 Resource Type

This is the type of resource being described by the metadata and it is filled in with a value from a classification of the resource based on its scope. The choice of Resource Type will be probably the first decision made by the user and it will define the metadata elements that should be filled.

Metadata element name	**Resource type**
Reference	Part B 1.3
Definition	Scope to which metadata applies
ISO 19115 number and name	6. hierarchyLevel
ISO/TS 19139 path	hierarchyLevel
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	MD_ScopeCode
Domain	CodeList (see annex B.5.25 of ISO 19115)
Example	**dataset**
Comments	

TG Requirement 1 The hierarchyLevel property is not mandated by ISO 19115 but is mandated for conformance to the INSPIRE Metadata Regulation 1205/2008/EC (See SC2 in 1.2).

TG Requirement 2 The values of MD_ScopeCode in the scope of the INSPIRE Directive (See SC4 in 1.2) are:

- **dataset** for spatial datasets;
- **series** for spatial dataset series;
- **service** for spatial data services

TG Recommendation 6 The choice between the values should follow these recommendations

- **dataset**: is an identifiable data that can be accessed separately. A dataset can be a part of a whole (series) or a segregate resource
- **series**: is a collection of resources or related datasets that share the same product specification
- **service**: technologies providing availability and access to spatial information, for example, web map services, web feature services, web coverage services, web processing services, catalogue web services, etc

Example of XML encoding:

```
<gmd:MD_Metadata …
...
  <gmd:hierarchyLevel>
    <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/codelist/gmxCodelists.xml#MD_ScopeCode"
codeListValue="dataset">dataset</gmd:MD_ScopeCode>
  </gmd:hierarchyLevel>
...
</gmd:MD_Metadata>
```

2.2.4 Resource locator

2.2.4.1 Resource Locator for data sets and dataset series

The Resource Locator is the 'navigation section' of a metadata record which point users to the location (URL) where the data can be downloaded, or to where additional information about the resource may be provided.
Setting up the correct resource locators is important for the connection between the data and the services that provide access to them or for providing additional information concerning the resource.

Metadata element name	**Resource locator**
Reference	Part B 1.4
Definition	Location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme
ISO 19115 number and name	397. linkage
ISO/TS 19139 path	distributionInfo/*/transferOptions/*/onLine/*/linkage
INSPIRE obligation / condition	• Conditional for spatial dataset and spatial dataset series: Mandatory if a URL is available to obtain more information on the resources and/or access related services.
INSPIRE multiplicity	[0..*]
Data type (and ISO 19115 no.)	URL
Domain	URL (IETF RFC1738 and IETF RFC 2056)
Example	**http://edo.jrc.ec.europa.eu/chm/ows.php?VERSION=1.3.0&SERVICE=WMS&REQUEST=GetCapabilities**
Comments	A Resource Locator could be described, moreover, by other additional elements as a Title, a Description and a Function. In that case, the Title and the Description shall be free text and the Function shall be filled by the CI_OnLineFunctionCode (ISO 19115 codelist). Example of Resource Locator with these additional elements: • Linkage: http://edo.jrc.ec.europa.eu/chm/ows.php?VERSION=1.3.0&SERVICE=WMS&REQUEST=GetCapabilities • Title: JRC EDO (European Drought Observatory) - Drought Indexes WMS • Description: WMS delivering maps of drought indexes provided by the European Drought Observatory (EDO). • Function: information

TG Requirement 3	If a linkage for data is available, the Resource Locator shall be a valid URL providing one of the following: - a link to a web with further instructions - a link to a service capabilities document - a link to the service WSDL document (SOAP Binding) - a link to a client application that directly accesses the service

TG Recommendation 7	If no direct link to a resource is available, provide link to a contact point where more information about the resource is available.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:distributionInfo>
     <gmd:MD_Distribution>
…
        <gmd:transferOptions>
          <gmd:MD_DigitalTransferOptions>
            <gmd:onLine>
              <gmd:CI_OnlineResource>
                <gmd:linkage>
   <gmd:URL>http://edo.jrc.ec.europa.eu/chm/ows.php?VERSION=1.3.0&SER
VICE=WMS&REQUEST=GetCapabilities</gmd:URL>
                </gmd:linkage>
          <!—Name and description are optional elements not required
        by INSPIRE -->
                <gmd:name>
                  <gco:CharacterString>JRC EDO (European Drought
Observatory) - Drought Indexes WMS</gco:CharacterString>
                </gmd:name>
                <gmd:description>
                  <gco:CharacterString>WMS delivering maps of
drought indexes provided by the European Drought Observatory
(EDO)</gco:CharacterString>
                </gmd:description>
                <gmd:function>
                  <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/IS
O_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_OnLineFunct
ionCode"
codeListValue="information">information</gmd:CI_OnLineFunctionCode>
                </gmd:function>
              </gmd:CI_OnlineResource>
            </gmd:onLine>
          </gmd:MD_DigitalTransferOptions>
        </gmd:transferOptions>
     </gmd:MD_Distribution>
   </gmd:distributionInfo>
…
</gmd:MD_Metadata>
```

2.2.4.2 Resource Locator for Services

The Resource Locator for Services, if available, provides the access point of the service, that is an Internet address containing a detailed description of a spatial data service, including a list of endpoints to allow an automatic execution.

Metadata element name	Resource locator
Reference	Part B 1.4
Definition	Location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme
ISO 19115 number and name	397. linkage
ISO/TS 19139 path	distributionInfo/*/transferOptions/*/onLine/*/linkage
INSPIRE obligation / condition	• Conditional for services: Mandatory if linkage to the service is available
INSPIRE multiplicity	[0..*]
Data type (and ISO 19115 no.)	URL
Domain	URL (IETF RFC1738 and IETF RFC 2056)
Example	**http://www.dinoservices.nl/geo3dmodelwebservices-1/Geo3DModelService**
Comments	

TG Requirement 4 If a linkage for a service is available, the Resource Locator shall be a valid URL providing one of the following:

- a link to a web with further instructions
- a link to a service capabilities document
- a link to the service WSDL document (SOAP Binding)
- a link to a client application that directly accesses the service

TG Recommendation 8 If no direct link to a resource is available, provide link to a contact point where more information about the resource is available.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:distributionInfo>
      <gmd:MD_Distribution>
…
        <gmd:transferOptions>
          <gmd:MD_DigitalTransferOptions>
            <gmd:onLine>
              <gmd:CI_OnlineResource>
                <gmd:linkage>
                  <gmd:URL>
http://www.dinoservices.nl/geo3dmodelwebservices-1/Geo3DModelService
/</gmd:URL>
                </gmd:linkage>
              </gmd:CI_OnlineResource>
```

```
            </gmd:onLine>
          </gmd:MD_DigitalTransferOptions>
        </gmd:transferOptions>
      </gmd:MD_Distribution>
    </gmd:distributionInfo>
…
</gmd:MD_Metadata>
```

2.2.5 Unique resource identifier

This element is a value uniquely identifying the resource.

Metadata element name	**Unique resource identifier**
Reference	Part B 1.5
Definition	Value uniquely identifying an object within a namespace
ISO 19115 number and name	365. identifier
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/identifier
INSPIRE obligation / condition	Mandatory for dataset and dataset series
INSPIRE multiplicity	[1..*] for dataset and series
Data type (and ISO 19115 no.)	205. MD_Identifier
Domain	See B.2.7.3 of ISO 19115
Example	(unique identifier with code + codeSpace) code: **lakes** codeSpace: **urn:eu:europa:ec:jrc:rdsi:id:dataset:ccm2.1**
Comments	

TG Requirement 5 The code property is required (see B.2.7.3 of ISO 19115).

TG Requirement 6 If a value for codeSpace is provided, then the data type for the identifier shall be RS_Identifier, which is substitutable for the usual MD_Identifier.

TG Recommendation 9 Never delete an existing identifier for a resource. If a change in resource identification is needed, add a new identifier but also keep the old one.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification id="lakes" >
       <gmd:citation>
         <gmd:CI_Citation>
…
            <gmd:identifier>
              <gmd:RS_Identifier>
                <gmd:code>
   <gco:CharacterString>lakes</gco:CharacterString>
                </gmd:code>
                <gmd:codeSpace>
   <gco:CharacterString>
urn:eu:europa:ec:jrc:rdsi:id:dataset:ccm2.1</gco:CharacterString>
                </gmd:codeSpace>
              </gmd:RS_Identifier>
            </gmd:identifier>
         </gmd:CI_Citation>
       </gmd:citation>
…
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.2.6 Coupled resource

If the resource is a spatial data service, this metadata element refers to, where relevant, the target spatial data set(s) of the service. It is implemented by reference, i.e. through a URL that points to the metadata record of the data on which the service operates. It helps therefore linking services to the relevant datasets.

Metadata element name	**Coupled resource**
Reference	Part B 1.6
Definition	Provides information about the datasets that the service operates on.
ISO 19119 number and name	9 of table C.1. operatesOn
ISO/TS 19139 path	identificationInfo[1]/*/operatesOn
INSPIRE obligation / condition	• Not applicable to dataset and dataset series • Conditional to services: Mandatory if linkage to datasets on which the service operates are available.
INSPIRE multiplicity	[0] for datasets and series [0..*] for services
Data type (and ISO 19115 no.)	36. MD_DataIdentification
Domain	A unique resource identifier or locator (URL) of the MD_DataIdentification object
Example	**http://vap-xgeodev.jrc.ec.europa.eu/geonetwork/srv/eng/csw?SERVICE=CSW&VERSION=2.0.2&REQUEST=GetRecordById&ID=f9ee6623-cf4c-11e1-9105-0017085a97ab&OUTPUTSCHEMA=http://www.isotc211.org/2005/gmd&ELEMENTSETNAME=full#lakes**
Comments	

TG Requirement 7	The property shall be implemented by reference (see SC11 in 1.2).

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <srv:SV_ServiceIdentification>
…
        <srv:operatesOn xlink:href="http://vap-
xgeodev.jrc.ec.europa.eu/geonetwork/srv/eng/csw?SERVICE=CSW&amp;VERSI
ON=2.0.2&amp;REQUEST=GetRecordById&amp;ID=f9ee6623-cf4c-11e1-9105-
0017085a97ab&amp;OUTPUTSCHEMA=http://www.isotc211.org/2005/gmd&amp;EL
EMENTSETNAME=full#lakes"/>…
     </srv:SV_ServiceIdentification>
…
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.2.7 Resource language

It refers to the language(s) used within the resource (dataset, series, or service if relevant).

Metadata element name	**Resource language**
Reference	Part B 1.7
Definition	Language(s) used within the datasets
ISO 19115 number and name	39. language
ISO/TS 19139 path	identificationInfo[1]/*/language
INSPIRE obligation / condition	• Conditional for spatial dataset and spatial dataset series: Mandatory if the resource includes textual information. • Not applicable to services
INSPIRE multiplicity	[0..*] for datasets and series [0] for services
Data type (and ISO 19115 no.)	LanguageCode (ISO/TS 19139)
Domain	Codelist (See ISO/TS 19139) based on alpha-3 codes of ISO 639-2. Use only three-letter codes from in ISO 639-2/B (bibliographic codes), The list of codes for the 24 official EU languages is: Bulgarian – **bul** / Irish – **gle** Croatian – **hrv** / Italian – **ita** Czech – **cze** / Latvian – **lav** Danish – **dan** / Lithuanian – **lit** Dutch – **dut** / Maltese – **mlt** English – **eng** / Polish – **pol** Estonian – **est** / Portuguese – **por** Finnish – **fin** / Romanian – **rum** French – **fre** / Slovak – **slo** German – **ger** / Slovenian – **slv** Greek – **gre** / Spanish – **spa** Hungarian – **hun** / Swedish – **swe** The list of all the codes is defined at

	http://www.loc.gov/standards/iso639-2/ Regional languages also are included in this list.
Example	**eng**
Comments	There are two ways of inserting the language (see example XML encoding): • most compliant: the element value is the name of the codeListValue expressed in the default language of the metadata (ej: if the metadata is filled in English, the values should be *English*, *Spanish*, *French*…) most interoperable: the element value repeats the codeListValue (ej: *eng* for English, *spa* for Spanish, *fre* for French…)

TG Requirement 8 The resource language is mandated by ISO 19115.

TG Requirement 9 The resource language has to be filled with a value from the codelist ISO/TS 19139 based on alpha-3 codes of ISO 639-2.

TG Recommendation 10 If the resource does not contain any textual information (e.g. only codes and digits), the language should be defaulted to the value of the metadata language.

Examples of XML encoding:

1) Most interoperable: the element value repeats the codeListValue

```
   <gmd:language>
      <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/" codeListValue="eng">eng</gmd:LanguageCode>
   </gmd:language>
```

2) Most compliant: the element value is the name of the codeListValue expressed in the default language of the Metadata

```
   <gmd:language>
      <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-
2/ " codeListValue="eng">English</gmd:LanguageCode>
   </gmd:language>
```

2.3 Classification of spatial data and services

2.3.1 Topic category

The topic category is a high-level classification scheme to assist in the grouping and topic-based search of available spatial data resources.
A correct categorization is very important to help users to search and find the resources they are looking for.

Metadata element name	Topic category
Reference	Part B 2.1
Definition	Main theme(s) of the dataset
ISO 19115 number and name	41. topicCategory
ISO/TS 19139 path	identificationInfo[1]/*/topicCategory
INSPIRE obligation / condition	• Mandatory for datasets and dataset series • Not applicable to services
INSPIRE multiplicity	[1..*] for datasets and dataset series [0] for services
Data type (and ISO 19115 no.)	MD_TopicCategory
Domain	Enumeration (See B.5.27 of ISO 19115 or Part D 2 of the INSPIRE Metadata Regulation 1205/2008/EC)
Example	**climatologyMeteorologyAtmosphere**
Comments	The topic categories defined in Part D 2 of the INSPIRE Metadata Regulation 1205/2008/EC are derived directly from the topic categories defined in MD_TopicCategoryCode (B.5.27 of ISO 19115)

TG Requirement 10 The topic category has to be filled with a value from the enumeration MD_TopicCategoryCode (ISO 19115).

TG Requirement 11 The value saved in the XML metadata element shall be a language neutral name (see the value appearing in the “name” column of the table in B.5.27 of ISO 19115).

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
      <gmd:MD_DataIdentification>
…
         <gmd:topicCategory>
            <gmd:MD_TopicCategoryCode>climatologyMeteorologyAtmosphere
            </gmd:MD_TopicCategoryCode>
         </gmd:topicCategory>
…
      </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.3.2 Spatial data service type

This is a classification to assist in the search of available spatial data services. The list of language-neutral values as in Part D3 of the INSPIRE Metadata Regulation 1205/2008/EC includes: discovery, view, download, transformation, invoke and other.

If the service is also an INSPIRE Network Services, then it is necessary to include in the Metadata element 2.8.2 Specifications, reference to the relevant INSPIRE Network Service Implementing Rule or amendment (see also 2.8.2)

Metadata element name	**Spatial data service type**
Reference	Part B 2.2
Definition	A service type name from a registry of services
ISO 19119 number and name	1 of table C.1. serviceType
ISO/TS 19139 path	identificationInfo[1]/*/serviceType
INSPIRE obligation / condition	• Not applicable to datasets and dataset series • Mandatory for services
INSPIRE multiplicity	[1] for services [0] for datasets and dataset series
Data type (and ISO 19115 no.)	GenericName
Domain	List of values. See section 1.3.1 in this document
Example	**view**
Comments	

TG Requirement 12 Use language neutral name from table in 1.3.1.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <srv:SV_ServiceIdentification>
…
       <srv:serviceType>
         <gco:LocalName>view</gco:LocalName>
       </srv:serviceType>
…
     </srv:SV_ServiceIdentification>
   </gmd:identificationInfo>
</gmd:MD_Metadata>
```

2.4 Keyword

An INSPIRE Keyword is defined by:

- a keyword value (see 2.4.1), which in ISO standard is referred to as “Keyword”;
- an optional originating controlled vocabulary (see 2.4.2), which in ISO standard is referred to as “Thesaurus”.
- It is possible to add as many keywords as relevant to the resource.

TG Requirement 13	The INSPIRE Metadata Regulation 1205/2008/EC mandate the presence of **at least one keyword**.

TG Requirement 14	**If only one keyword is used, then for spatial dataset or spatial dataset series**, the keyword: - shall describe the relevant INSPIRE Spatial Data Theme (as defined in Annex I, II and III of the INSPIRE Directive) - shall be expressed in the language of the metadata for the 34 INSPIRE Spatial Data Themes (please use the terms in each of the official languages in which the INSPIRE Directive has been translated) or a neutral language values such as a URI.

The titles and definitions of all 34 INSPIRE Spatial Data Themes have been integrated into a dedicated branch of the General Environmental Multilingual Thesaurus (GEMET) in the 24 official Community languages (see http://www.eionet.europa.eu/gemet/inspire_themes). **This special branch is known as “GEMET - INSPIRE themes”.**

TG Requirement 15	**For spatial services**, the keyword: - shall at least define the category or subcategory of the service using its language neutral name as defined in Part D 4 of the INSPIRE Metadata Regulation 1205/2008/EC - shall be expressed as neutral language values such as the neutral language values defined in Part D.4 of the INSPIRE Metadata Regulation 1205/2008/EC for spatial data services)

In addition to the mentioned thesaurus also other keywords might be added. These may be described as a free text or may originate from any Controlled Vocabulary.

TG Requirement 16	If other keywords are added and they originate from a Controlled Vocabulary (thesaurus or ontology), for example GEMET - Concepts, EUROVOC or AGROVOC, then the citation of the originating Controlled Vocabulary shall be provided.

For example, a keyword that comes from GEMET - Concepts shall be cited as follows:

- keyword: freshwater
- thesaurus title: GEMET - Concepts, version 2.4
- thesaurus date: 2010-01-13
- thesaurus date type: publication

Or a keyword that comes from AGROVOC shall be cited as follows:

- keyword: water springs
- thesaurus title: AGROVOC
- thesaurus date: 2008-04-14
- thesaurus date type: publication

2.4.1 Keyword value

The keyword value is a commonly used word, formalised word or phrase used to describe the subject. While the topic category is too coarse for detailed queries, keywords help narrowing a full text search and they allow for structured keyword search

Metadata element name	**Keyword value**
Reference	Part B 3.1
Definition	Commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject
ISO 19115 number and name	53. keyword
ISO/TS 19139 path	identificationInfo[1]/*/descriptiveKeywords/*/keyword
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1..*]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	**Atmospheric conditions** (INSPIRE Spatial Data Theme) **humanCatalogueViewer** (spatial data service subcategory) **water springs** (AGROVOC) **rain water** (GEMET Concepts)
Comments	Each instance of ISO 19115 keyword may originate from a controlled vocabulary described through the thesaurusName property of the instance of descriptiveKeywords to which the keyword pertains

TG Recommendation 11 It is better to select keyword values from a collection of terms linked and predefined (controlled vocabularies).

TG Recommendation 12 It is suggested to choose a minimum of two keywords in addition to the required keyword from the GEMET - INSPIRE themes (for dataset and dataset series) or the categories from part D 4 of the INSPIRE Metadata Regulation 1205/2008/EC (for services).

TG Recommendation 13 Ideally, both a code (neutral language value) and a human-readable label (in any language) should be included in the metadata.

Here is an example of XML encoding of the keyword value for a spatial data services category or subcategory as defined in Part D.4 of the INSPIRE Metadata Regulation 1205/2008/EC.

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <srv:SV_ServiceIdentification >
…
        <gmd:descriptiveKeywords>
          <gmd:MD_Keywords>
             <gmd:keyword>
               <gco:CharacterString>
                humanCatalogueViewer
             </gco:CharacterString>
             </gmd:keyword>
             <gmd:thesaurusName>
             …(see 2.4.2)
             </gmd:thesaurusName>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
     </srv:SV_ServiceIdentification >
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

An INSPIRE aware tool is expected to manage the neutral language values (e.g. humanCatalogueViewer), of the service category or subcategory and eventually display the corresponding value in a language chosen by the user (e.g. *Visualiseur de catalogue* in French).

Here is an example of XML encoding for a keyword referring to a spatial data set. Whether the keyword refers to an INSPIRE spatial data theme or not, is defined by the originating controlled vocabulary (see 2.4.2)

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
…
        <gmd:descriptiveKeywords>
          <gmd:MD_Keywords>
             <gmd:keyword>
               <gco:CharacterString>Atmospheric conditions
</gco:CharacterString>
             </gmd:keyword>
             <gmd:thesaurusName>
             …(see 2.4.2)
             </gmd:thesaurusName>
          </gmd:MD_Keywords>
        </gmd:descriptiveKeywords>
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.4.2 Originating controlled vocabulary

TG Requirement 17 If the keyword value originates from a controlled vocabulary (thesaurus, ontology), for example GEMET - Concepts, the citation of the originating controlled vocabulary shall be provided.

TG Requirement 18 The thesaurusName identification shall include at least the title and a reference date (date of publication, date of last revision or of creation) of the originating controlled vocabulary.

Metadata element name	**Originating controlled vocabulary**
Reference	Part B 3.2
Definition	Name of the formally registered thesaurus or a similar authoritative source of keywords
ISO 19115 number and name	55. thesaurusName
ISO/TS 19139 path	identificationInfo[1]/*/descriptiveKeywords/*/thesaurusName
INSPIRE obligation / condition	Conditional: Mandatory if the keyword value originates from a controlled vocabulary
INSPIRE multiplicity	[0..1] relative to a single Keyword, but there may be many keywords originating from different controlled vocabularies
Data type (and ISO 19115 no.)	CI_Citation

Domain	The following properties are expected:
	• Title (characterString and free text)
	• Reference date (CI_Date):
	  ○ dateType: creation, publication or revision
	  ○ date: an effective date

Example	Identification for a keyword originating from GEMET- INSPIRE themes:
	• title: **GEMET - INSPIRE themes, version 1.0**
	• date:
	  ○ dateType: **publication**
	  ○ date: **2008-06-01**
	
	Identification for a keyword originating from GEMET - Concepts:
	• title: **GEMET - Concepts, version 2.4**
	• date:
	  ○ dateType: **publication**
	  ○ date: **2010-01-13**
	
	Identification for a keyword originating from AGROVOC:
	• title: **AGROVOC**
	• date:
	  ○ dateType: **publication**
	  ○ date: **2008-04-14**

Comments	

TG Requirement 19 In order to be consistent with ISO 19115, all the keyword values originating from a single version of a single controlled vocabulary shall be grouped in a single instance of the ISO 19115 descriptiveKeywords property. See also SC17 for datasets and series, and SC18 for Services.

TG Recommendation 14 It is important to specify which version of the thesaurus was used to take the keyword value from.

Example of XML encoding for keyword referring to an INSPIRE Spatial Data Theme

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
      <gmd:MD_DataIdentification>
…
         <gmd:descriptiveKeywords>
            <gmd:MD_Keywords>
               <gmd:keyword>
…(see 2.4.1)
               </gmd:keyword>
               <gmd:thesaurusName>
                  <gmd:CI_Citation>
                     <gmd:title>
                        <gco:CharacterString>GEMET - INSPIRE themes,
version 1.0</gco:CharacterString>
                     </gmd:title>
                     <gmd:date>
                        <gmd:CI_Date>
                           <gmd:date>
                              <gco:Date>2008-06-01</gco:Date>
                           </gmd:date>
                           <gmd:dateType>
                              <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCode" codeListValue="publication">publication</gmd:CI_DateTypeCode>
                           </gmd:dateType>
                        </gmd:CI_Date>
                     </gmd:date>
                  </gmd:CI_Citation>
               </gmd:thesaurusName>
            </gmd:MD_Keywords>
         </gmd:descriptiveKeywords>
      </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.5 Geographic location

2.5.1 Geographic bounding box

This is the extent of the resource in the geographic space, given as a bounding box. Defining the coordinates of a rectangle representing the resource area on a map allows the discovery by geographical area

Metadata element name	**Geographic bounding box**
Reference	Part B 4.1
Definition	Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east). Eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east) Northern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north) Southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north).
ISO 19115 number and name	344. westBoundLongitude 345. eastBoundLongitude 346. southBoundLatitude 347. northBoundLatitude
ISO/TS 19139 path	identificationInfo[1]/*/extent/*/geographicElement/*/westBoundLongitude identificationInfo[1]/*/extent/*/geographicElement/*/eastBoundLongitude identificationInfo[1]/*/extent/*/geographicElement/*/southBoundLatitude identificationInfo[1]/*/extent/*/geographicElement/*/northBoundLatitude
INSPIRE obligation / condition	• Mandatory for datasets and spatial dataset series • Conditional for spatial services: mandatory for services with an explicit geographic extent
INSPIRE multiplicity	[1..*] for spatial data sets and spatial dataset series [0..*] for spatial data services
Data type (and ISO 19115 no.)	Decimal
Domain	-180.00 ≤ westBoundLongitude ≤ 180.00 -180.00 ≤ eastBoundLongitude ≤ 180.00 -90.00 ≤ southBoundingLatitude ≤ 90.00 -90.00 ≤ northBoundingLatitude ≤ 90.00
Example	**-15.00** (westBoundLongitude) **45.00** (eastBoundLongitude) **35.00** (southBoundLatitude) **72.00** (northBoundLatitude)
Comments	• There may be as many bounding boxes defining the geographic location of the resource as instances of identificationInfo[1]/*/extent/*/geographicElement having the westBoundLongitude, eastBoundLongitude, southBoundLatitude and northBoundLatitude properties. The four coordinates of the bounding box originate from the same instance.

	• If the bounding box crosses the 180 meridian, then the value of the westBoundLongitude will be greater than the eastBoundLongitude value. • The coordinates of the bounding box are expressed in any geodetic coordinate reference system with a Greenwich Prime Meridian (See SC13 in 1.2).

TG Requirement 20 The bounding box shall be as small as possible.

TG Requirement 21 The bounding box shall be expressed in decimal degree with a precision of at least 2 decimals.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
…
        <gmd:extent>
          <gmd:EX_Extent>
            <gmd:geographicElement>
              <gmd:EX_GeographicBoundingBox>
                <gmd:westBoundLongitude>
                  <gco:Decimal>-15.00</gco:Decimal>
                </gmd:westBoundLongitude>
                <gmd:eastBoundLongitude>
                  <gco:Decimal>45.00</gco:Decimal>
                </gmd:eastBoundLongitude>
                <gmd:southBoundLatitude>
                  <gco:Decimal>35.00</gco:Decimal>
                </gmd:southBoundLatitude>
                <gmd:northBoundLatitude>
                  <gco:Decimal>72.00</gco:Decimal>
                </gmd:northBoundLatitude>
              </gmd:EX_GeographicBoundingBox>
            </gmd:geographicElement>
          </gmd:EX_Extent>
        </gmd:extent>
…
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.6 Temporal reference

TG Requirement 22 The INSPIRE Metadata Regulation 1205/2008/EC requires **at least one temporal reference chosen from one of these four categories**:

- temporal extent
- date of publication
- date of last revision
- date of creation

ISO 19115 is more demanding than INSPIRE. Therefore, whilst providing a temporal extent would suffice to satisfy the INSPIRE Metadata Regulation 1205/2008/EC it is not enough to be compliant with ISO 19115.

TG Requirement 23 To be compliant with ISO 19115 it is necessary to use at least one among date of publication, date of last revision, or the date of creation.

TG Recommendation 15 In case of spatial data set, report at least the date of the last revision of the spatial data set

TG Requirement 24 The default reference system shall be the Gregorian calendar, with dates expressed in accordance with ISO 8601 (yyyy-mm-dd where yyyy is the year, mm is the month and dd is the day).

2.6.1 Temporal extent

The temporal extent defines the time period covered by the content of the resource. This time period may be expressed as:

- an individual date
- an interval of dates (starting date and ending date)
- a mix of individual dates and intervals of dates

Metadata element name	**Temporal extent**
Reference	Part B 5.1
Definition	Time period covered by the content of the dataset
ISO 19115 number and name	351. extent
ISO/TS 19139 path	identificationInfo[1]/*/extent/*/temporalElement/*/extent
INSPIRE obligation / condition	Conditional: At least one temporal reference is required
INSPIRE multiplicity	[0..*] for temporal extent but at least one temporal reference is required

Data type (and ISO 19115 no.)	TM_Primitive[7]
Domain	As described in ISO 19108
Example	From **2008-01-01T11:45:30** to **2008-12-31T09:10:00**
Comments	The overall time period covered by the content of the resource may be composed of one or many instances

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
…
        <gmd:extent>
          <gmd:EX_Extent>
            <gmd:temporalElement>
              <gmd:EX_TemporalExtent>
                <gmd:extent>
                  <gml:TimePeriod gml:id="IDd2febbb4-e66f-4ac8-ba76-
                   8fd9bc7c8be6">
                    <gml:beginPosition>2008-01-01T11:45:30
                  </gml:beginPosition>
                  <gml:endPosition>2008-12-31T09:10:00
                   </gml:endPosition>
                  </gml:TimePeriod>
                </gmd:extent>
              </gmd:EX_TemporalExtent>
            </gmd:temporalElement>
          </gmd:EX_Extent>
        </gmd:extent>
…
     </gmd:MD_DataIdentification>
…
   </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.6.2 Date of publication

This is the date of publication of the resource when available, or the date of entry into force. There may be more than one date of publication.
Date of publication differs from the temporal extent. For example, a dataset might have been published in March 2009 (2009-03-15) but the covered information was collected over the year 2008 (temporal extent from 2008-01-01 to 2008-12-31)

Metadata element name	**Date of publication**
Reference	Part B 5.2
Definition	Reference date for the cited resource - publication
ISO 19115 number and name	392. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType/*/text()='publicatio

[7] ISO19108 describes other domains which might support the INSPIRE requirements for temporal metadata. There are no implementations currently known. ISO19108 allows ordinal temporal extents (TM_Position values of TM_OrdinalEras defined within a TM_OrdinalReferenceSystem) and an indeterminate value of “now” is valid under TM_Position. ISO 19108 TM_PeriodDuration also defines the distance in the temporal dimension

	n']/*/date
INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..*] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date
Domain	Described in ISO 19108 and ISO 8601
Example	**2009-03-15** **2009-03-15T11:15:00**
Comments	

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
       <gmd:citation>
         <gmd:CI_Citation>
…
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:Date>2009-03-15</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCode" codeListValue="publication">publication</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
…
         </gmd:CI_Citation>
       </gmd:citation>
…
     </gmd:MD_DataIdentification>
…
   </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.6.3 Date of last revision

This date describes when the resource was last revised, if the resource has been revised.
Date of revision differs from the temporal extent. For example, a dataset might have been revised in April 2009 (2009-04-15) but the covered information was collected over the year 2008 (temporal extent from 2008-01-01 to 2008-12-31)

Metadata element name	**Date of last revision**
Reference	Part B 5.3
Definition	Reference date for the cited resource - revision
ISO 19115 number and name	392. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType/*/text()='publication']/*/date
INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..1] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date
Domain	Described in ISO 19108 and ISO 8601
Example	**2009-04-15** **2009-04-15T11:15:00**
Comments	There may be more than one revision date provided in an ISO 19115 metadata, but INSPIRE will consider as date of last revision the more recent one

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
       <gmd:citation>
         <gmd:CI_Citation>
…
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:DateTime>2009-04-15T11:15:00</gco:DateTime>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCode" codeListValue="revision">revision</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
…
         </gmd:CI_Citation>
       </gmd:citation>
…
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.6.4 Date of creation

This date describes when the resource was created.
Date of creation differs from the temporal extent. For example, a dataset might have been created in February 2009 (2009-02-15) but the covered information was collected over the year 2008 (temporal extent from 2008-01-01 to 2008-12-31)

Metadata element name	**Date of creation**
Reference	Part B 5.4
Definition	Reference date for the cited resource - creation
ISO 19115 number and name	392. date
ISO/TS 19139 path	identificationInfo[1]/*/citation/*/date[./*/dateType/*/text()='publication']/*/date
INSPIRE obligation / condition	Conditional: at least one date of publication / date of creation / date of revision is required
INSPIRE multiplicity	[0..1] but at least one date of publication / date of creation / date of revision or one temporal extent is required
Data type (and ISO 19115 no.)	393. CI_Date
Domain	Described in ISO 19108 and ISO 8601
Example	**2009-02-15** **2009-02-15T11:15:00**
Comments	

TG Requirement 25 There shall be a single creation date for the resource (See SC7 in 1.2).

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
       <gmd:citation>
         <gmd:CI_Citation>
…
            <gmd:date>
              <gmd:CI_Date>
                <gmd:date>
                  <gco:Date>2009-02-15</gco:Date>
                </gmd:date>
                <gmd:dateType>
                  <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCode" codeListValue="creation">creation</gmd:CI_DateTypeCode>
                </gmd:dateType>
              </gmd:CI_Date>
            </gmd:date>
…
         </gmd:CI_Citation>
       </gmd:citation>
…
     </gmd:MD_DataIdentification>
…
   </gmd:identificationInfo>
...
</gmd:MD_Metadata>
```

2.7 Quality and validity

2.7.1 Lineage

According to the Implementing Rules for Metadata, Lineage is “a statement on process history and/or overall quality of the spatial data set. Where appropriate it may include a statement whether the data set has been validated or quality assured, whether it is the official version (if multiple versions exist), and whether it has legal validity. The value domain of this element is free text.”

The process history may be described by information on the source data used and the main transformation steps that took place in creating the current data set (series).

Metadata element name	**Lineage**
Reference	Part B 6.1
Definition	General explanation of the data producer’s knowledge about the lineage of a dataset
ISO 19115 number and name	83. statement
ISO/TS 19139 path	dataQualityInfo/*/lineage/*/statement
INSPIRE obligation / condition	• Mandatory for spatial dataset and spatial dataset series. • Not applicable to services.
INSPIRE multiplicity	[1] for datasets and data set series [0] for spatial data services
Data type (and ISO 19115 no.)	CharacterString

Domain	Free text
Example	**Computation of the SPI involves fitting a probability density function to a given frequency distribution of precipitation totals for a station or grid point and for an accumulation period. We use the gamma probability density function. The statistics for the frequency distribution are calculated on the basis of a reference period of at least 30 years. The parameters of the probability density function are then used to find the cumulative probability of the observed precipitation for the required month and temporal scale. This cumulative probability is then transformed to the standardised normal distribution with mean zero and variance one, which results in the value of the SPI. The SPI values are computed using the so-called MARS weather stations as rainfall input data. Refer the MARS weather catalogue for characteristics of the quality and quantity of these data. We only rely on the rainfall data input**
Comments	

A single ISO 19115 metadata set may comprise more than one set of quality information (*dataQualityInfo* elements), each of them having one or zero lineage elements.

TG Requirement 26 **There shall be one and only one set of quality information** scoped to the full resource and having a lineage statement (*dataQualityInfo* element). This element shall be scoped to the full data set (series) and have one *lineage* element (See SC6 in 1.2). The *statement* sub-element of the *lineage* element shall be used to implement the Lineage element defined in the Implementing Rules for Metadata.

TG Recommendation 16 If a data provider has a procedure for the quality management of their spatial data set (series) then the appropriate ISO data quality elements and measures should be used to evaluate and report (in the metadata) the results. If not, the Lineage metadata element (defined in the Implementing Rules for Metadata) should be used to describe the overall quality of a spatial data set (series).

TG Recommendation 17 The use of acronyms should be avoided. If used, their meaning should be explained.

NOTE: The INSPIRE data specifications contain further recommendations for documenting the sources and process steps used for the creation of the data set (series), including its transformation to make it compliant with the Implementing Rules on interoperability of spatial data sets and services (see Annex B).

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
...
   </gmd:identificationInfo>
   <gmd:dataQualityInfo>
     <gmd:DQ_DataQuality>
       <gmd:scope>
…
       </gmd:scope>
       <gmd:report>
…
       </gmd:report>
       <gmd:lineage>
         <gmd:LI_Lineage>
           <gmd:statement>
             <gco:CharacterString>Computation of the SPI involves
fitting a probability density function to a given frequency
distribution of precipitation totals for a station or grid point and
for an accumulation period. We use the gamma probability density
function. The statistics for the frequency distribution are
calculated on the basis of a reference period of at least 30 years.
The parameters of the probability density function are then used to
find the cumulative probability of the observed precipitation for the
required month and temporal scale. This cumulative probability is
then transformed to the standardised normal distribution with mean
zero and variance one, which results in the value of the SPI. The SPI
values are computed using the so-called MARS weather stations as
rainfall input data. Refer the MARS weather catalogue for
characteristics of the quality and quantity of these data. We only
rely on the rainfall data input</gco:CharacterString>
           </gmd:statement>
         </gmd:LI_Lineage>
       </gmd:lineage>
     </gmd:DQ_DataQuality>
   </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

2.7.2 Spatial resolution

Spatial resolution refers to the level of detail of the data set. It shall be expressed as a set of zero to many resolution distances (typically for gridded data and imagery-derived products) or equivalent scales (typically for maps or map-derived products).
An equivalent scale is generally expressed as an integer value expressing the scale denominador. A resolution distance shall be expressed as a numerical value associated with a unit of length

Metadata element name	**Spatial resolution**
Reference	Part B 6.2
Definition	• Equivalent scale: level of detail expressed as the scale denominator of a comparable hardcopy map or chart • Distance: ground sample distance
ISO 19115 number and name	• 60. equivalentScale • 61. distance
ISO/TS 19139 path	• identificationInfo[1]/*/spatialResolution/*/equivalentScale/*/denominator (equivalent scale)

	• identificationInfo[1]/*/spatialResolution/*/distance (distance)
INSPIRE obligation / condition	• Conditional: Mandatory if an equivalent scale or a resolution distance can be specified. • Conditional: Mandatory when there is a restriction on the spatial resolution for service.
INSPIRE multiplicity	[0..*]
Data type (and ISO 19115 no.)	• Integer (equivalent scale) • Distance (distance)
Domain	• positive integer (equivalent scale) • number expressing the distance value and a unit of measure of the distance value (distance)
Example	**50000** (e.g. 1:50000 scale map) **0.25** (degrees)
Comments	For services, it is not possible to express the restriction of a service concerning the spatial resolution in the current version of ISO 19119. While the problem is addressed by the standardization community, spatial resolution restrictions for services shall be expressed in the Abstract

TG Requirement 27 Each spatial resolution is either an equivalent scale OR a ground sample distance. Each spatialResolution element must contain either an equivalent scale or a distance but not both

TG Recommendation 18 When two equivalent scales or two ground sample distances are expressed, the spatial resolution is an interval bounded by these two values

Example of XML encoding (equivalentScale):

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
…
      <gmd:MD_DataIdentification>
…
         <gmd:spatialResolution>
            <gmd:MD_Resolution>
               <gmd:distance>
…(see next example)
               </gmd:distance>
            </gmd:MD_Resolution>
         </gmd:spatialResolution>
         <gmd:spatialResolution>
            <gmd:MD_Resolution>
               <gmd:equivalentScale>
                  <gmd:MD_RepresentativeFraction>
                     <gmd:denominator>
                        <gco:Integer>50000</gco:Integer>
                     </gmd:denominator>
                  </gmd:MD_RepresentativeFraction>
               </gmd:equivalentScale>
            </gmd:MD_Resolution>
         </gmd:spatialResolution>
…
      </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

Example of XML encoding (distance):

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
…
      <gmd:MD_DataIdentification>
…
         <gmd:spatialResolution>
            <gmd:MD_Resolution>
               <gmd:distance>
                  <gco:Distance uom="dd">0.25</gco:Distance>
               </gmd:distance>
            </gmd:MD_Resolution>
         </gmd:spatialResolution>
         <gmd:spatialResolution>
            <gmd:MD_Resolution>
               <gmd:equivalentScale>
…(see previous example)
               </gmd:equivalentScale>
            </gmd:MD_Resolution>
         </gmd:spatialResolution>
…
      </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.8 Conformity

TG Requirement 28 In conformance to INSPIRE Directive 2007/2/EC, the metadata shall include information on the degree of conformity with the implementing rules on interoperability of spatial data sets and services[8].

NOTE 1 All Data Specifications Technical Guidelines include an Abstract Test Suite (ATS) in Annex A describing through a number of tests how to evaluate conformity with the Implementing Rules on interoperability of spatial data sets and services.

NOTE 2 The ATS consists of several conformance classes that can be tested independently. This enables data providers to also report conformity to different aspects of the Implementing Rules in detail (see section 8 of the Data Specifications Technical Guidelines[9]).

TG Recommendation 19 If a spatial data service is also an INSPIRE Network Service, it is recommended to include in its metadata information on the degree of conformity with the implementing rules provided in Art 11 (Network Services).

ISO 19115 provides an element (DQ_ConformanceResult) for reporting about the evaluation of the conformity of the resource against a given specification. This element is used to handle the requirements to report on the conformity with the Implementing Rules on interoperability of spatial data sets and services or other specifications and standards.

TG Requirement 29 The INSPIRE Metadata Regulation 1205/2008/EC defines in Part D 5 When the conformity to any specification has been evaluated, it shall be reported as a domain consistency element (i.e. an instance of DQ_DomainConsistency) in ISO 19115 metadata

NOTE: The TG Requirement above applies to any specification against which the data has been tested, not just those established by INSPIRE. In other words, if a dataset is produced or transformed according to an external specification that includes specific quality assurance procedures, the conformity with this specification should be documented using the *Conformity* metadata element.

The Conformity element defined in section 7 of Part B of the INSPIRE Implementing Rules for metadata includes two sub-elements: the Specification (a citation of the specification against which conformity was tested), and the Degree of conformity. The Degree of conformity can take either of the following three values (see Part D.5 of the Implementing Rules):

i. conformant (if the dataset is fully conformant with the cited specification),
ii. not conformant (if the dataset does not conform to the cited specification)
iii. not evaluated (if the conformance has not been evaluated)

The case “not evaluated” was introduced as a transition measure because at the time of adoption of the Metadata Implementing Rules (2008) there were no INSPIRE specifications (Implementing rules on the interoperability of spatial datasets and services) against which conformance could be tested.

[8] Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services, OJ L 323, 08/12/2010, p. 11–102.
[9] See http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2

TG Recommendation 20 Now that the Implementing Rules on the interoperability of spatial datasets and services are in place, it is recommended to evaluate and declare the conformity of all data sets (i.e. as “conformant” or “not conformant”).

NOTE: It is still possible to declare in the metadata that the conformity with the Implementing Rules on interoperability of spatial data sets and services was “not evaluated”. This however is difficult to implement using ISO 19115 which has only two degrees of conformity: conformant (true) or not conformant (false). The previous version of these guidelines have recommended to represent the value “not evaluated” by leaving the Conformity element empty. This makes the metadata record compliant with ISO but not with INSPIRE as the multiplicity of the Conformity element in the Metadata Implementing Rules is (1..*).

ISO 19139 provides a mechanism to provide a null value with an explanation (using the nilReason attribute).

TG Recommendation 21 To declare that the conformity with the Implementing Rules on the interoperability of spatial datasets and services has not yet been evaluated, a null value should be provided with a nilReason of “unknown”.

NOTE: A metadata record containing a null value for the Boolean-typed Pass element is not compliant with ISO 19115. However, it is compliant with ISO 19139 and widely implemented. **In order to be sure to comply both with INSPIRE and ISO 19115, you are advised to follow TG Recommendation 22 above.**

2.8.1 Degree

This is the degree of conformity of the resource to the implementing rules adopted under Article 7(1) of INSPIRE Directive 2007/2/EC or other specification.

Metadata element name	**Degree**
Reference	Part B 7.2
Definition	Indication of the conformance result
ISO 19115 number and name	132. pass
ISO/TS 19139 path	dataQualityInfo/*/report/*/result/*/pass
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] understood in the context of a conformity statement when reported in the metadata – there may be more than one conformity statement
Data type (and ISO 19115 no.)	Boolean[10]
Domain	• **true** if conformant • **false** if not conformant • **null (with nilReason = “unknown”)** if not evaluated[11]
Example	**true**
Comments	

[11] ISO/TS 19103 defines Boolean as a value defining TRUE or FALSE (EXAMPLE: true or false), while ISO 19115:2003 clearly states that the domain of value of the Boolean properties is 0="no", 1="yes". In the meantime, ISO/TS 19139 implements the Boolean class using the XML build-in type xs:boolean (values are **true** or **false**), but allows the provision of **null** values (together with a **nilReason** explaining why the actual value cannot be provided) also for Boolean-type properties (see sections 8.4.1 and 9.7.3.4 in ISO 19139).

Example of XML encoding

```
…
<gmd:result>
   <gmd:DQ_ConformanceResult>
     <gmd:specification>
… <!-- See 2.8.2 -->
     </gmd:specification>
       <!-- gmd:explanation is mandated by ISO 19115. A default value
is proposed -->
     <gmd:explanation>
       <gco:CharacterString>See the referenced
specification</gco:CharacterString>
     </gmd:explanation>
       <!-- the value is false instead of true if not conformant -->
   <gmd:pass>
    <gco:Boolean>true<gco:Boolean>
   </gmd:pass>
   </gmd:DQ_ConformanceResult>
</gmd:result>
```

2.8.2 Specification

This is a citation of the implementing rules adopted under Article 7(1) of INSPIRE Directive 2007/2/EC or other specificationto which a particular resource conforms.

If a spatial data service is an INSPIRE Network service, use this element to report the relevant INSPIRE Network Implementing Rule to which it conforms.

A resource may conform to more than one implementing rules adopted under Article 7(1) of INSPIRE Directive 2007/2/EC or other specification.

Metadata element name	**Specification**
Reference	Part B 7.1
Definition	Citation of the product specification or user requirement against which data is being evaluated
ISO 19115 number and name	130. specification
ISO/TS 19139 path	dataQualityInfo/*/report/*/result/*/specification
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] understood in the context of a conformity statement when reported in the metadata – there may be more than one conformity statement
Data type (and ISO 19115 no.)	359. CI_Citation
Domain	The following properties are expected: • Title (characterString and free text) • Reference date (CI_Date): o dateType: creation, publication or revision date: an effective date
Example	• title: **COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services** • date: o dateType: **publication** o date: **2010-12-08**
Comments	

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:dataQualityInfo>
     <gmd:DQ_DataQuality>
       <gmd:scope>
         <gmd:DQ_Scope>
           <gmd:level>
             <gmd:MD_ScopeCode codeListValue="dataset"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/IS
O_19139_Schemas/resources/codelist/gmxCodelists.xml#MD_ScopeCode">dat
aset</gmd:MD_ScopeCode>
           </gmd:level>
         </gmd:DQ_Scope>
       </gmd:scope>
       <gmd:report>
         <gmd:DQ_DomainConsistency>
           <gmd:result>
             <gmd:DQ_ConformanceResult>
        <gmd:specification>
         <gmd:CI_Citation>
          <gmd:title>
           <gco:CharacterString>COMMISSION REGULATION (EU) No
1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the
European Parliament and of the Council as regards interoperability of
spatial data sets and services</gco:CharacterString>
          </gmd:title>
          <gmd:date>
           <gmd:CI_Date>
            <gmd:date>
             <gco:Date>2010-12-08</gco:Date>
            </gmd:date>
            <gmd:dateType>
             <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/IS
O_19139_Schemas/resources/codelist/ML_gmxCodelists.xml#CI_DateTypeCod
e" codeListValue="publication">publication</gmd:CI_DateTypeCode>
            </gmd:dateType>
           </gmd:CI_Date>
          </gmd:date>
         </gmd:CI_Citation>
        </gmd:specification>
               <gmd:explanation>
                 <gco:CharacterString>See the referenced
specification</gco:CharacterString>
               </gmd:explanation>
               <gmd:pass>
                 <gco:Boolean>true</gco:Boolean>
               </gmd:pass>
             </gmd:DQ_ConformanceResult>
           </gmd:result>
         </gmd:DQ_DomainConsistency>
       </gmd:report>
       <gmd:lineage>
…
       </gmd:lineage>
     </gmd:DQ_DataQuality>
   </gmd:dataQualityInfo>
</gmd:MD_Metadata>
```

2.9 Constraints related to access and use

ISO 19115 provides a general mechanism for documenting different categories of constraints applicable to the resource (or its metadata). This mechanism is supported by the class MD_Constraints and its subclasses:

- MD_LegalConstraints for legal constraints;
- MD_SecurityConstraints for security constraints.

There are two major requirements expressed in INSPIRE Directive 20007/2/EC in terms of documentation of the constraints as part of the metadata:

- The conditions applying to access and use of the resource, and where applicable, the corresponding fees as required by Articles 5-2(b) and 11-2(f).
- The limitations on public access: the Member States may limit public access to spatial datasets and spatial data services in a set of cases defined in Article 13. These cases include public security or national defence, i.e. more generally the existence of a security constraint.

Each instance of MD_Constraints expresses:

- Zero or One condition applying to access and use (see 2.9.2);
- Zero or More limitations on public access (see 2.9.1);
- Or, both one or more limitations on public access and a condition applying to access and use.

TG Requirement 30	There shall be at least one ISO 19115 metadata element representing a limitation on public access (see 2.9.1) and one ISO 19115 metadata element representing a condition applying to access and use (see 2.9.2) as part of the different instances of MD_Constraints and its subclasses.

TG Requirement 31	There shall be at least one instance of MD_Constraints or one of its subclasses (See SC12 in Section 1.2) even if there is no limitation on public access or no specific condition applies to access and use of the resource.

2.9.1 Limitations on public access

This metadata element shall provide information on the limitations and the reasons for them. If there are no limitations on public access, use the free text available in MD_LegalConstraints. otherConstraints to enter “No Limitations” in the language used for the metadata.

TG Requirement 32	Limitations on public access shall be represented by at least one of these metadata elements: - MD_LegalConstraints. accessConstraints - MD_LegalConstraints. otherConstraints - MD_SecurityConstraints. classification

Metadata element name	Limitations on public access (access constraints)
Reference	Part B 8.2
Definition	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource
ISO 19115 number and name	70. accessConstraints
ISO/TS 19139 path	identificationInfo[1]/*/resourceConstraints/*/accessConstraints
INSPIRE obligation / condition	Conditional: referring to limitations on public access. Mandatory if otherConstraints or classification are not documented
INSPIRE multiplicity	[0..*] for accessConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	MD_RestrictionCode
Domain	Codelist (strictly limited ti the value defined in B.5.24 of ISO 19115)
Example	**otherRestrictions** (limitation not listed).
Comments	

Metadata element name	Limitations on public access (other constraints)
Reference	Part B 8.2
Definition	Other restrictions and legal prerequisites for accessing and using the resource or metadata
ISO 19115 number and name	72. otherConstraints
ISO/TS 19139 path	identificationInfo[1]/*/resourceConstraints/*/otherConstraints
INSPIRE obligation / condition	Conditional: referring to limitations on public access. Mandatory if accessConstraints or classification are not documented
INSPIRE multiplicity	[0..*] for otherConstraints per instance of MD_LegalConstraints
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	**No limitations**
Comments	

Metadata element name	Limitations on public access (classification)
Reference	Part B 8.2
Definition	Name of the handling restrictions on the resource
ISO 19115 number and name	74. classification
ISO/TS 19139 path	identificationInfo[1]/*/resourceConstraints/*/classification
INSPIRE obligation / condition	Conditional: referring to limitations on public access. Mandatory if accessConstraints or otherConstraints are not documented
INSPIRE multiplicity	[1] for classification per instance of MD_SecurityConstraints
Data type (and ISO 19115 no.)	MD_ClassificationCode
Domain	Codelist (see B.5.11 of ISO 19115)
Example	**unclassified**
Comments	

In relation to MD_Constraints class, there may be three scenarios according to the tables above:

- There may be no limitation on public access;
- There may be only a classification property when expressing a security constraint (i.e., this is an instance of MD_SecurityConstraints or one of its subclasses);
- There may be one or more instances of the accessConstraints property, possibly associated with one or more instances of otherRestrictions property (i.e, this is an instance of MD_LegalConstraints);

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
…
       <gmd:resourceConstraints>
...(see next example)
…      </gmd:resourceConstraints>
       <gmd:resourceConstraints>
         <gmd:MD_LegalConstraints>
           <gmd:accessConstraints>
             <gmd:MD_RestrictionCode
             codeList="http://standards.iso.org/ittf/
             PubliclyAvailableStandards/ISO_19139_Schemas/
             resources/codelist/gmxCodelists.xml#MD_RestrictionCode"
             codeListValue="otherRestrictions">otherRestrictions
             </gmd:MD_RestrictionCode>
           </gmd:accessConstraints>
           <gmd:otherConstraints>
             <gco:CharacterString>no limitations
             </gco:CharacterString>
           </gmd:otherConstraints>
         </gmd:MD_LegalConstraints>
       </gmd:resourceConstraints>
       <gmd:resourceConstraints>
         <gmd:MD_SecurityConstraints>
           <gmd:classification>
             <gmd:MD_ClassificationCode
             codeList="./resources/codeList.xml#
             MD_ClassificationCode" codeListValue="unclassified">
             unclassified</gmd:MD_ClassificationCode>
           </gmd:classification>
         </gmd:MD_SecurityConstraints>
       </gmd:resourceConstraints>
…
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.9.2 Conditions applying to access and use

Conditions for access and use of spatial data sets and services, and where applicable, corresponding fees as required by Article 5(2)(b) and Article 11(2)(f) of INSPIRE Directive 2007/2/EC

Metadata element name	Conditions applying to access and use
Reference	Part B 8.1
Definition	Restrictions on the access and use of a resource or metadata
ISO 19115 number and name	68. useLimitation
ISO/TS 19139 path	identificationInfo[1]/*/resourceConstraints/*/useLimitation
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1..*]
Data type (and ISO 19115 no.)	CharacterString
Domain	Free text
Example	Example if no conditions apply: **no conditions apply** Example if there is information about restrictions: **Reproduction for non-commercial purposes is authorised, provided the source is acknowledged. Commercial use is not permitted without prior written consent of the JRC. Reports, articles, papers, scientific and non-scientific works of any form, including tables, maps, or any other kind of output, in printed or electronic form, based in whole or in part on the data supplied, must contain an acknowledgement of the form: Data re-used from the European Drought Observatory (EDO) http://edo.jrc.ec.europa.eu The SPI data were created as part of JRC's research activities. Although every care has been taken in preparing and testing the data, JRC cannot guarantee that the data are correct; neither does JRC accept any liability whatsoever for any error, missing data or omission in the data, or for any loss or damage arising from its use. The JRC will not be responsible for any direct or indirect use which might be made of the data. The JRC does not provide any assistance or support in using the data**
Comments	

TG Requirement 33 If no conditions apply to the access and use of the resource, 'no conditions apply' shall be used. If conditions are unknown, 'conditions unknown' shall be used.

TG Requirement 34 Descriptions of terms and conditions, including where applicable, the corresponding fees shall be provided through this element or a link (URL) where these terms and conditions are described.

TG Recommendation 22 For detailed information it is recommended to provide a link to a license type (e.g. http://creativecommons.org/licenses/by/3.0), a website or to a document containing the necessary information.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
     <gmd:MD_DataIdentification>
…
        <gmd:resourceConstraints>
          <gmd:MD_Constraints>
            <gmd:useLimitation>
              <gco:CharacterString>Reproduction for non-commercial
purposes is authorised, provided the source is acknowledged.
Commercial use is not permitted without prior written consent of the
JRC. Reports, articles, papers, scientific and non-scientific works
of any form, including tables, maps, or any other kind of output, in
printed or electronic form, based in whole or in part on the data
supplied, must contain an acknowledgement of the form: Data re-used
from the European Drought Observatory (EDO)
http://edo.jrc.ec.europa.eu The SPI data were created as part of
JRC's research activities. Although every care has been taken in
preparing and testing the data, JRC cannot guarantee that the data
are correct; neither does JRC accept any liability whatsoever for any
error, missing data or omission in the data, or for any loss or
damage arising from its use. The JRC will not be responsible for any
direct or indirect use which might be made of the data. The JRC does
not provide any assistance or support in using the data
</gco:CharacterString>
            </gmd:useLimitation>
          </gmd:MD_Constraints>
        </gmd:resourceConstraints>
        <gmd:resourceConstraints>
...(see previous example)
…       </gmd:resourceConstraints>
…
     </gmd:MD_DataIdentification>
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.10 Responsible organisation

Organisation responsible for the establishment, management, maintenance and distribution of spatial data sets and services. A responsible organisation is defined by:

- a responsible party (see 2.10.1);
- and a responsible party role (see 2.10.2).

There may be one to many responsible organisations for a single resource, but the multiplicity of the responsible and its role are expressed relative to a single responsible organisation.

2.10.1 Responsible party

This is the description of the organisation responsible for the establishment, management, maintenance or distribution of the resource

TG Requirement 35	This description shall include: name of the organisation and contact email address.

Metadata element name	Responsible party
Reference	Part B 9.1
Definition	Identification of, and means of communication with, person(s) and organization(s) associated with the resource(s)
ISO 19115 number and name	29. pointOfContact
ISO/TS 19139 path	identificationInfo[1]/*/pointOfContact
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] Relative to a responsible organisation, but there may be many responsible organisations for a single resource
Data type (and ISO 19115 no.)	374. CI_ResponsibleParty

Domain	The following properties are expected:
	• organisationName (characterString and free text)
	• contactInfo (CI_Contact):
	  ○ address:
	  ▪ electronicMailAddress [1..*] (characterString)

Example	• organisationName: **European Commission, Joint Research Centre**
	• contactInfo:
	  ○ address:
	  ▪ electronicMailAddress: **ies-contact@jrc.ec.europa.eu**

Comments	

TG Requirement 36 See SC14 for more information about elements required for data and services.

TG Recommendation 23 The name of the organization should be given in full, without abbreviations. It is recommended to use institutional email instead of personal emails.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
      <gmd:MD_DataIdentification>
…
         <gmd:pointOfContact>
            <gmd:CI_ResponsibleParty>
               <gmd:organisationName>
                  <gco:CharacterString>European Commission, Joint
Research Centre</gco:CharacterString>
               </gmd:organisationName>
               <gmd:contactInfo>
                  <gmd:CI_Contact>
                     <gmd:address>
                        <gmd:CI_Address>
                           <gmd:electronicMailAddress>
                           <gco:CharacterString>ies-contact@jrc.ec.europa.eu
                           </gco:CharacterString>
                              </gmd:electronicMailAddress>
                           </gmd:CI_Address>
                     </gmd:address>
                  </gmd:CI_Contact>
               </gmd:contactInfo>
               <gmd:role>
...(see next example)
               </gmd:role>
            </gmd:CI_ResponsibleParty>
         </gmd:pointOfContact>
…
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.10.2 Responsible party role

This is the role of the responsible organisation

Metadata element name	**Responsible party role**
Reference	Part B 9.2
Definition	Function performed by the responsible party
ISO 19115 number and name	379. role
ISO/TS 19139 path	identificationInfo[1]/*/pointOfContact/*/role
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1] relative to a responsible organisation, but there may be many responsible organisations for a single resource
Data type (and ISO 19115 no.)	CI_RoleCode
Domain	Codelist (see B.5.5 of ISO 19115)
Example	**custodian**
Comments	There is a direct mapping between the responsible party roles defined in Part D 6 of the INSPIRE Metadata Regulation 1205/2008/EC and the values of the CI_RoleCode codelist of ISO 19115

TG Recommendation 24 Select all roles that best represent the function performed by the responsible party.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:identificationInfo>
      <gmd:MD_DataIdentification>
…
        <gmd:pointOfContact>
          <gmd:CI_ResponsibleParty>
            <gmd:organisationName>
              <gco:CharacterString>European Commission, Joint
Research Centre</gco:CharacterString>
            </gmd:organisationName>
            <gmd:contactInfo>
…(see previous example)
            </gmd:contactInfo>
            <gmd:role>
              <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/IS
O_19139_Schemas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="custodian">custodian</gmd:CI_RoleCode>
            </gmd:role>
          </gmd:CI_ResponsibleParty>
        </gmd:pointOfContact>
…
   </gmd:identificationInfo>
…
</gmd:MD_Metadata>
```

2.11 Metadata on metadata

2.11.1 Metadata point of contact

This is the description of the organisation responsible for the creation and maintenance of the metadata. This refers to the metadata record and not to the resource responsible party; they will not necessarily be the same.

TG Requirement 37 This description shall include: name of the organization and contact email address.

Metadata element name	Metadata point of contact
Reference	Part B 10.1
Definition	Party responsible for the metadata information
ISO 19115 number and name	8. contact
ISO/TS 19139 path	contact
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1..*]

Data type (and ISO 19115 no.)	374. CI_ResponsibleParty

Domain	The following properties are expected:
	• organisationName (characterString and free text)
	• contactInfo (CI_Contact):
	  ○ address:
	  ▪ electronicMailAddress [1..*] (characterString)

Example	• organisationName: **European Commission, Joint Research Centre**
	• contactInfo:
	  ○ address:
	  ▪ electronicMailAddress: **ies-contact@jrc.ec.europa.eu**

Comments	

TG Requirement 38 The role of the responsible party serving as a metadata point of contact is out of scope of the INSPIRE Metadata Regulation 1205/2008/EC, but this property is mandated by ISO 19115. The default value is **pointOfContact**. See SC15 and SC16

TG Recommendation 25 The name of the organization should be given in full, without abbreviations. It is recommended to use institutional email instead of personal emails.

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:contact>
     <gmd:CI_ResponsibleParty>
       <gmd:organisationName>
         <gco:CharacterString>European Commission, Joint Research
Centre</gco:CharacterString>
       </gmd:organisationName>
       <gmd:contactInfo>
         <gmd:CI_Contact>
           <gmd:address>
             <gmd:CI_Address>
               <gmd:electronicMailAddress>
                 <gco:CharacterString>ies-contact@jrc.ec.europa.eu
                 </gco:CharacterString>
               </gmd:electronicMailAddress>
             </gmd:CI_Address>
           </gmd:address>
         </gmd:CI_Contact>
       </gmd:contactInfo>
       <gmd:role>
         <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/IS
O_19139_Schemas/resources/codelist/gmxCodelists.xml#CI_RoleCode"
codeListValue="pointOfContact">pointOfContact</gmd:CI_RoleCode>
       </gmd:role>
     </gmd:CI_ResponsibleParty>
   </gmd:contact>
…
</gmd:MD_Metadata>
```

2.11.2 Metadata date

The date which specifies when the metadata record was created or updated

Metadata element name	**Metadata date**
Reference	Part B 10.2
Definition	Date that the metadata was created
ISO 19115 number and name	9. dateStamp
ISO/TS 19139 path	dateStamp
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	Date
Domain	ISO 8601
Example	**2012-02-20**
Comments	

Example of XML encoding:

```
<gmd:MD_Metadata …
…
   <gmd:dateStamp>
     <gco:Date>2012-02-20</gco:Date>
   </gmd:dateStamp>
…
</gmd:MD_Metadata>
```

2.11.3 Metadata language

This is the language in which the metadata elements are expressed

Metadata element name	**Metadata language**
Reference	Part B 10.3
Definition	Language used for documenting metadata
ISO 19115 number and name	3. language
ISO/TS 19139 path	language
INSPIRE obligation / condition	Mandatory
INSPIRE multiplicity	[1]
Data type (and ISO 19115 no.)	LanguageCode (ISO/TS 19139)
Domain	Codelist (See ISO/TS 19139) based on alpha-3 codes of ISO 639-2. Use only three-letter codes from in ISO 639-2/B (bibliographic codes), The list of codes for the 24 official EU languages is: Bulgarian – **bul** Irish – **gle** Croatian – **hrv** Italian – **ita** Czech – **cze** Latvian – **lav**

	Danish – **dan** Dutch – **dut** English – **eng** Estonian – **est** Finnish – **fin** French – **fre** German – **ger** Greek – **gre** Hungarian – **hun** Lithuanian – **lit** Maltese – **mlt** Polish – **pol** Portuguese – **por** Romanian – **rum** Slovak – **slo** Slovenian – **slv** Spanish – **spa** Swedish – **swe** The list of all the codes is defined at http://www.loc.gov/standards/iso639-2/ Regional languages also are included in this list.
Example	**eng**
Comments	

TG Requirement 39	The language property is not mandated by ISO 19115, but is mandated for conformance to the INSPIRE Metadata Regulation 1205/2008/EC (See SC1 in 1.2).

Examples of XML encoding:

Please refer to the examples for Resource Language (section 2.2.7)

3 Detailed mapping

3.1 Introduction

This structure is presented as a set of template instances of ISO 19115 and ISO 19119 classes. The template instance of a class is defined by a set of property instances. The description of each property instance is composed of:

- A + sign starting the description of the property instance;
- The property label as appearing in ISO 19115 and ISO 19119 UML Models;
- A presence requirement expressed with a cardinality statement between square brackets. This cardinality statement expresses the INSPIRE requirements which implies possible differences with the ISO 19115 cardinality;
- A colon;
- The property type name. The property type is implemented as a sub element of the property. This sub element can be an instance of the property type or an instance of one of its derived types. In the latter case, the derived type is either an ISO type or an extension type defined in a profile.
- A property instance statement which describes how the property type is implemented.

Additional information is provided in a Note section, at the bottom of each table.

This hierarchical set of labels acts as an instance Template. This template only shows the properties in the scope of the INSPIRE metadata elements, which encompass the mandatory properties of ISO 19115 and ISO 19119. The other optional properties of ISO 19115 are not described, but can be present in a real instance.
Additional properties defined in a profile of ISO 19115 or ISO 19119 compliant with the INSPIRE metadata elements can be expressed but are not documented here.

3.2 Resource MetadataSet

An INSPIRE Metadata Set is an instance of:

- the class MD_Metadata (from ISO 19115),
- the class MI_Metadata (from ISO 19115-2),
- or, an instance of any community specialisation of one of these two classes.

This instance is composed at least of the following property instances:

+ language [1] : LanguageCode.....Metadata Language (See 2.11.3)
+ hierarchyLevel [1] : MD_ScopeCode .....Resource Type (See 2.2.3 and note 2)
+ contact [1..*] : CI_ResponsibleParty .....Metadata point of contact (See 2.11.1 and 3.5.2)
+ dateStamp [1] : Date.....Metadata date (See 2.11.2)
+ identificationInfo [1] : MD_Identification .....See 3.3 and note 3
+ distributionInfo [0..*] : MD_Distribution
  + transferOptions [0..*] : MD_Digital TransferOptions
    + online [0..*] : CI_OnlineResource
      + linkage [1]: URL ..... (See 2.2.4 and Note 1)
+ dataQualityInfo [0..*] : DQ_DataQuality .....See 3.4 and Note 4

Notes :

1. The linkage property is not multiple, but there may be many instances of distributionInfo, and for each many instances of transferOptions and for each many instances of online, implying multiple INSPIRE Resource Locator.
2. There may be many instances of hierarchyLevel, but the value of the INSPIRE Resource Type corresponds to the first instance (See SC3 in 1.2).
3. There may be many instances of identificationInfo, but only the first one will be considered (See SC5 in 1.2).
4. In case of datasets and dataset series at least an instance of dataQualityInfo is mandatory.

3.3 Identification Section

3.3.1 Sub-elements for spatial dataset and spatial dataset series

If the Resource Type (i.e., the value of metadata set hierarchyLevel) is dataset or series, the data type of identificationInfo instance will be MD_DataIdentification or a subclass of MD_DataIdentification. Its property instances are described hereafter.

+ citation [1] : CI_Citation
  + title [1] : CharacterString ..... Resource title (See 2.2.1)
  + date [0..*] : CI_Date ..... See note 1
    + date [1] : Date ..... Date of publication (See 2.6.2)
    + dateType [1] : CI_DateTypeCode ..... **publication**
  + date [0..1] : CI_Date ..... See notes 1 and 2
    + date [1] : Date ..... Date of last revision (See 2.6.3)
    + dateType [1] : CI_DateTypeCode ..... **revision**
  + date [0..1] : CI_Date ..... See Note 1 and 3
    + date [1] : Date ..... Date of creation (See 2.6.4)
    + dateType [1] : CI_DateTypeCode ..... **creation**
  + identifier [1..*] : MD_Identifier ..... Unique resource identifier (See 2.2.5 and SC8)
    + code [1] : CharacterString ..... This is the mandatory code of the identifier
    + codeSpace [0..1] : CharacterString ..... This is the optional namespace of the identifier
+ abstract [1] : CharacterString ..... Resource abstract (See 2.2.2)
+ pointOfContact [1..*] : CI_ResponsibleParty ..... Responsible Organization (See 2.10)
+ descriptiveKeywords [1..*] : MD_Keywords
  + keyword [1..*] : CharacterString ..... Keyword value (See 2.4.1)
  + thesaurusName [0..1] : CI_Citation ..... Originating controlled vocabulary (See 2.4.2)
+ resourceConstraints [1..*] : MD_Constraints ..... Constraints related to access and use (See 2.9 and 3.6).
+ spatialResolution [0..*] : MD_Resolution ..... Spatial resolution (2.7.2) – See Note 4
  + distance [0..1] : Distance ..... This is the ground distance
  + equivalentScale [0..1] : MD_RepresentativeFraction
    + denominator [1] : Integer ..... This is equivalent scale denominator
+ language [1..*] : LanguageCode ..... Resource language (See 2.2.7, SC9 in 1.2 and Note 5)
+ extent [1] : EX_Extent ..... See Note 6
  + geographicElement [1..*] : EX_GeographicBoundingBox ..... Geographic bounding box (See 2.5.1)
    + westBoundLongitude [1] : Decimal
    + eastBoundLongitude [1] : Decimal
    + southBoundLatitude [1] : Decimal
    + northBoundLatitude [1] : Decimal
  + temporalElement [0..*] : EX_TemporalExtent ..... See Note 7
    + extent [1] : TM_Primitive ..... Temporal extent (See 2.6.1)
+ topicCategory [1..*] : MD_TopicCategory ..... Topic category (2.3.1)

Notes:

1. There may be many instances of the date property with different date types including **publication**, **revision** or **creation**. The order of these instances is free. If no instance of this property has the **publication**, **revision** or **creation** date type, then the metadata set has to include the description of a temporal extent. For compliance with ISO 19115, there is necessarily one instance of the date property, whatever its date type, even if a temporal extent is provided in the metadata.
2. The only instance of date having the revision date type matching the INSPIRE last revision date is the one having the more recent date.
3. Even if ISO 19115 allows the presence of many dates having a creation date type, it is considered inconsistent to have more than one creation date (See SC7 in 1.2).
4. MD_Resolution is a union data type. Its content is either a distance property or an equivalent scale property. In case of an equivalent scale, the denominator of the equivalent scale is provided.
5. An instance of the language property is mandated by ISO 19115 ; it can be defaulted to the value of the Metadata Language when the dataset or the dataset series does not contain textual information.
6. There may be other instances, but at least one defining the bounding box is required (See SC10 in 1.2). This instance is not necessarily the first instance.
7. There may be different instances of temporalElement defining the temporal extent of the resource. These instances may be in different instances of extent, one of them possibly handling the geographic bounding box.

3.3.2 Sub-elements for service resources

If the Resource Type (i.e., the value of metadata set hierarchyLevel) is **service**, the data type of identificationInfo instance will be SV_ServiceIdentification or a subclass of SV_ServiceIdentification. Its property instances are described hereafter.

+ citation [1] : CI_Citation	
+ title [1] : CharacterString	Resource title (See 2.2.1)
+ date [0..*] : CI_Date	See note 1
+ date [1] : Date	Date of publication (See 2.6.2)
+ dateType [1] : CI_DateTypeCode	**publication**
+ date [0..1] : CI_Date	See notes 1 and 2
+ date [1] : Date	Date of last revision (See 2.6.3)
+ dateType [1] : CI_DateTypeCode	**revision**
+ date [0..1] : CI_Date	See Note 1 and 3
+ date [1] : Date	Date of creation (See 2.6.4)
+ dateType [1] : CI_DateTypeCode	**creation**
+ abstract [1] : CharacterString	Resource abstract (See 2.2.2)
+ pointOfContact [1..*] : CI_ResponsibleParty	Responsible party (See 2.10.1)
+ descriptiveKeywords [1..*] : MD_Keywords	
+ keyword [1..*] : CharacterString	Keyword value (See 2.4.1)
+ thesaurusName [0..1] : CI_Citation	Originating Controlled Vocabulary (See 2.4.2)
+ resourceConstraints [1..*] : MD_Constraints	See 3.6
+ serviceType [1] : GenericName	(See 2.3.2)
+ couplingType [1] : SV_CouplingType	Mandated by ISO 19119. See Note 8
+ containsOperations [1..*] : SV_OperationMetadata	Mandated by ISO 19119
+ operationName [1] : CharacterString	Mandated by ISO 19119. Default value is **unknown**
+ DCP [1..*] : DCPList	Mandated by ISO 19119. Default value is **WebServices**
+ connectPoint [1..*] : CI_OnlineResource	Mandated by ISO 19119.
+ linkage [1] : URL	Mandated by ISO 19119. See Note 5
+ extent [0..*] : EX_Extent	See Note 4
+ geographicElement [1..*] : EX_GeographicBoundingBox	Geographic bounding box (See 2.5.1)
+ westBoundLongitude [1] : Decimal	
+ eastBoundLongitude [1] : Decimal	
+ southBoundLatitude [1] : Decimal	
+ northBoundLatitude [1] : Decimal	
+ temporalElement [0..*] : EX_TemporalExtent	See Note 6
+ extent [1] : TM_Primitive	Temporal extent (See 2.6.1)
+ operatesOn [0..*] : MD_DataIdentification	Coupled resource (See 2.2.6 and Note 7)

Notes:

1. There may be many instances of the date property with different date types including **publication**, **revision** or **creation**. The order of these instances is free. If no instance of this property has the **publication**, **revision** or **creation** date type, then the metadata set has to include the description of a temporal extent. For compliance with ISO 19115, there is necessarily one instance of the date property, whatever its date type, even if a temporal extent is provided in the metadata.
2. The only instance of date having the revision date type matching the INSPIRE last revision date is the one having the more recent date.
3. Even if ISO 19115 allows the presence of many dates having a creation date type, it is considered inconsistent to have more than one creation date (See SC7 in 1.2).
4. There may be other instances, but at least one defining the bounding box is required (See SC10 in 1.2). This instance is not necessarily the first instance.
5. One of the value of the INSPIRE Metadata Element “Resource Locator” (See 2.2.4) can be used as a default value
6. There may be different instances of temporalElement defining the temporal extent of the resource. These instances may be in different instances of extent, one of them possibly handling the geographic bounding box.
7. This property has to be implemented by reference (See 2.2.6 and SC11 in 1.2)
8. The value is:
   a. **loose** if there is no coupled Resource (the operatesOn property of SV_ServiceIdentification is not instantiated);
   b. **tight** if the service only operates on the Coupled Resources
   c. **mixed** if the service operates on the Coupled Resources and external dataset and dataset series.

3.4 Data Quality Section

3.4.1 Lineage

This part is applicable only to spatial dataset and spatial dataset series. As defined in 3.2, a metadata set may contain different sets of quality information (i.e. instances of DQ_DataQuality or a subclass of DQ_DataQuality). The reason for this multiplicity is that each set is scoped to the whole or a part of the resource. Each of these sets of quality information may contain a lineage statement. INSPIRE only considers one lineage statement concerning the whole resource, i.e. scoped to the dataset or series without any restrictions on the resource extent.

There shall be a single instance of DQ_DataQuality (or one of its subtypes) scoped to the whole spatial dataset or spatial dataset series. This instance may be one also handling conformity statements (as defined in 2.8), but this is not illustrated in its property instances described below.

+ scope [1] : DQ_Scope	
+ level [1] : MD_ScopeCode	**series** for a spatial dataset series or **dataset** for a spatial dataset
+ extentI [0] : EX_Extent	There shall not be any restriction on the resource extent
+ lineage [1] : LI_Lineage	
+ statement [1] : CharacterString	Lineage (See 2.7.1)

3.4.2 Conformity

The general mechanism to handle the INSPIRE requirements relative to conformity is described in 2.8.

As defined in 3.2 a metadata set may contain different sets of quality information (i.e. instances of DQ_DataQuality or a subclass of DQ_DataQuality). Each set may contain conformity statements relative to one of the INSPIRE conformance specifications. The following property instances of the sets of quality information are involved, possibly with the property instance expressing a lineage statement as defined in 3.4.1.

+ report [0..*] : DQ_Element	See note 1 and 2
+ measureIdentification[1] : MD_Identifier	See note 3
+ result[1] : DQ_ConformanceResult	
+ specification [1] : CI_Citation	Specification (See 2.8.2)
+ explanation [1] : CharacterString	See Note 4
+ pass [1] : Boolean	Degree (See 2.8.1)

Notes:

1. ISO 19115 only reports the result of the conformance evaluation. There may be no information about the conformity to the INSPIRE Conformance specifications, if the conformance has not been evaluated.
2. DQ_Element is an abstract class. It has to be instantiated through one of its concrete subclasses. The appropriate subclass depends on the quality criteria concerned by the quality measure. DQ_DomainConsistency will be used when the conformance does not involve a more precise quality criterion.
3. This metadata element of ISO 19115 will contain the identifier of the conformity statement. This identifier will be used by the application to differentiate the conformance statement related to INSPIRE from others.
4. ISO 19115 mandates an explanation of the meaning of the conformance for this result. A default explanation such as "**See the referenced specification**" can be used.

3.5 Responsible Organisation

3.5.1 Resource responsible organisation

Each instance of CI_ResponsibleParty or one of its subclasses (see 3.3.2 for services and 3.3.1 for spatial datasets and spatial dataset series) describes a responsible organisation, i.e.:

- The name of the responsible party;
- A contact e-mail address of the responsible party;
- The responsible party role.

Here are the minimum property instances of CI_ResponsibleParty or one of its subclasses expected by INSPIRE:

+ organisationName[1] : CharacterString	The name of the Responsible party (See 2.10.1)
+ contactInfo[1] : CI_Contact	
+ address[1..*] : CI_Address	There may be more than one address, so more than one e-mail
+ electronicEmailAddress [1..*] : CharacterString	At least one e-mail addressof the Responsible party (See 2.10.1)
+ role[1] : CI_RoleCode	Responsible party role (See 2.10.2)

3.5.2 Metadata point of contact

The metadata points of contact are also described by instances of MD_ResponsibleParty:

+ organisationName[1] : CharacterString	The name of the Metadata point of contact (See 2.11.1)
+ contactInfo[1] : CI_Contact	
+ address[1..*] : CI_Address	There may be more than one address, so more than one e-mail
+ electronicEmailAddress [1..*] : CharacterString	At least one e-mail address of the Metadata point of contact (See 2.11.1)
+ role[1] : CI_RoleCode	See Note 1

Notes:

1. ISO 19115 mandates the definition of the role of the responsible party. The default role is pointOfContact.

3.6 Constraint section

Depending on the effective instance of MD_Constraints[12], the following properties may have to be considered:

+useLimitation [0..*] : CharacterString	Conditions applying to access and use (See 2.9.2)
+accessConstraints [0..*] : MD_RestrictionCode	Limitations on public access (See 2.9.1) –See Note 1
+otherConstraints [0..*] : CharacterString	Limitations on public access (See 2.9.1) –See Note 1
+classification [0..1] : MD_ClassificationCode	Limitations on public access (See 2.9.1) –See Note 2

Notes:

1. If the value of accessConstraints is otherRestrictions, then the instances of otherConstraints may be used to describe Limitations on public access (See 2.9.1).
2. If the value of classification is not unclassified, the classification has to be reported as a Limitation on Public Access.

[12] accessConstraints and otherConstraints are specific to instances of MD_LegalConstraints or one of its subclasses. classification is specific to instances of MD_SecurityConstraints and one of its subclasses.

3.7 Abbreviations

CEN	**C**omité **E**uropéen de **N**ormalisation
CSW	OGC **C**atalog **S**ervice **W**eb
EN	**E**uropean **N**orm by CEN
EU	**E**uropean **U**nion
GML	**G**eography **M**arkup **L**anguage
ID	**ID**entifier
IRs	**I**mplementing **R**ules
ISO	**I**nternational **O**rganisation for **S**tandardization
ISO/TS	ISO Technical Specification
OGC	**O**pen **G**eospatial **C**onsortium
UML	**U**nified **M**odelling **L**anguage
URL	**U**niform **R**esource **L**ocator
UUID	**U**niversally **U**nique **ID**entifier
XML	e**X**tensible **M**arkup **L**anguage

Annex A – ISO/TS 19139 encoding of the INSPIRE metadata elements

A.1 Introduction

This annex defines the XML ISO/TS 19139 encoding of the INSPIRE metadata elements. This XML encoding is based on XML Schemas derived from the UML models of ISO 19115 and ISO 19119 using the encoding rules defined in ISO/TS 19139 and:

- the XML Schema Implementation of ISO 19115 and the related standards defined in ISO/TS 19139;
- the XML Schema implementation of ISO 19119 defined in CSW2 AP ISO.

The XML encoding of the INSPIRE metadata elements shall follow the instance template defined in Section 3 and the instructions of Section 2 of this document with respect to the following instructions.

A.2 From the conceptual schema to XML File instances

The way in which the geographic metadata XML Schema is expected to be used makes it necessary to keep the organisation of the data, its associated metadata and the related information in very flexible files. Since the MD_Metadata XML element will rarely be the root element of an XML File, depending on the context, it may appear one or many times in a single XML File describing one or many different types of resources.

A.3 Polymorphism

It is possible to have an XML file containing a metadata set without containing a single MD_Metadata XML element. This is a consequence of polymorphism, which may imply that an XML element representing a subclass of MD_Metadata, potentially defined in a user community profile, occurs instead of the MD_Metadata XML element. This is true for MD_Metadata as well as for any of the concepts defined in the ISO 19100 series of International Standards.

A.4 Management of polymorphism

A.4.1 Management of community extensions

A.3 of ISO 19139 has a specific requirement to aid the understanding of user profiled metadata sets. The XML element of any new metadata element has to support a mandatory XML attribute called isoType that is expected to contain the name of the ISO class it derives from directly or indirectly.

```
<MY_Metadata gco:isoType="MD_Metadata">
  <!-- Standard properties not detailed here -->
  <myProperty>
    <gco:CharacterString>Whatever text</gco:CharacterString>
  </myProperty>
</MY_Metadata>
```

A.4.2 Parsing of metadata files

To accommodate polymorphism of the data types, parsing of metadata files has to be driven by the XML elements corresponding to the properties of the UML models (look rather for the metadata elements named identificationInfo, than the metadata elements named MD_DataIdentification or SV_ServiceIdentification). The elements corresponding to the data type can generally be skipped.

When it is necessary to evaluate the XML element representing data types (e.g., because the application needs to consider the data identification info, but not the service identification info), it is important to look for the XML element corresponding to the expected ISO data type (e.g., gmd:MD_DataIdentification) or the XML element for which the value of gco:isotype is the expected data type (e.g. MD_DataIdentification). There is no namespace indication in the value of the isoType attribute.

A.5 Management of containment by reference

Any instance of a UML property can be implemented:

- by value, i.e. the instance of its datatype is a subelement of the property instance;

```
<gmx:MX_Aggregate>
   <gmd:composedOf>
      <gmx:MX_Dataset>
      …
      </gmx:MX_Dataset>
  </gmd:composedOf>
   <gmd:seriesMetadata> … </gmd:seriesMetadata>
</gmx:MX_Aggregate>
```

- by reference, i.e. the property instance handles a xlink:href attribute which value is a reference (typically URL) to the instance of its datatype. In this case, the instance of the datatype handles an id XML attribute serving as an identifier.

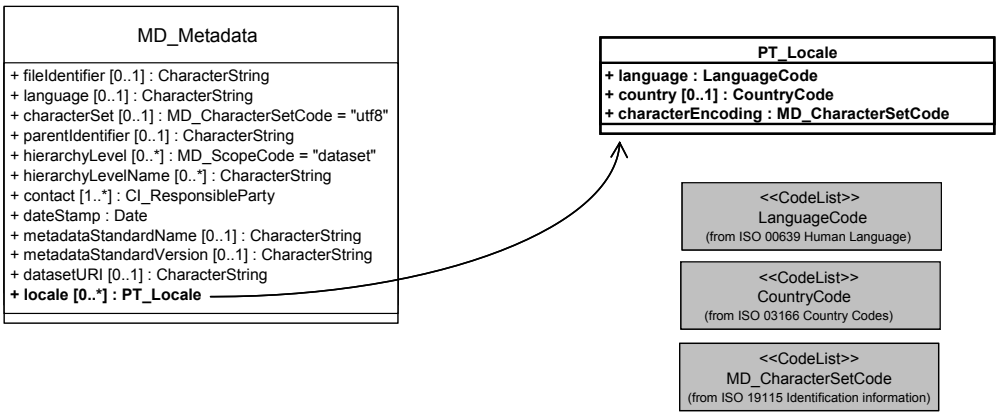
```
<gmx: MX_Aggregate>
   <gmd:composedOf xlink:href=”product1.xml”>
   <gmd:seriesMetadata> … </gmd:seriesMetadata>
</gmx:MX_Aggregate>
```

The use of containment by reference is of course a very good way to ensure the consistency of the XML data and to reduce the maintenance cost. However it complicates the parsing of the XML file. It is recommended that the parser use a generic mechanism to manage the containment by-reference.

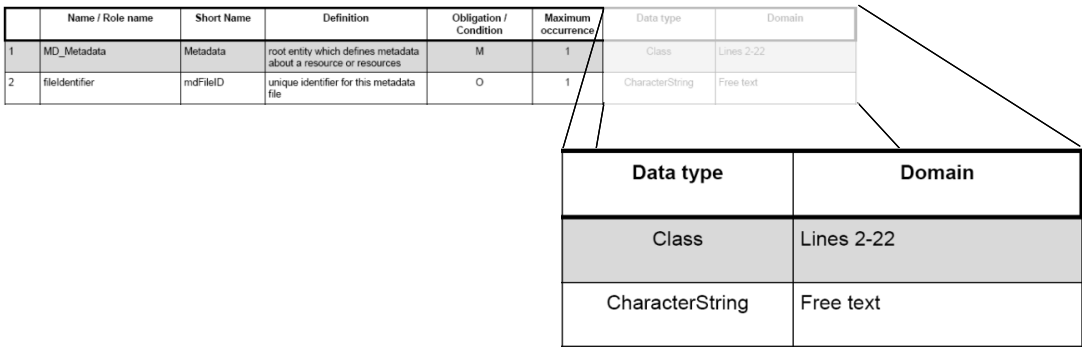
A.6 ISO 19139 and multilingual metadata

An optional but repeatable attribute “locale” has been added to the class MD_Metadata. Two cases are to be considered:

- When this attribute is not implemented, the metadata set is expected to be monolingual: the language of the metadata is defined by the language attribute of MD_Metadata.
- When this attribute is implemented, each instance represents a locale (language, country and character encoding) in which the metadata elements may be translated. The language attribute still defines the default language of the metadata, i.e. the language in which all the metadata elements are expressed. Then each metadata element can be translated in some of the locales define for the metadata set.



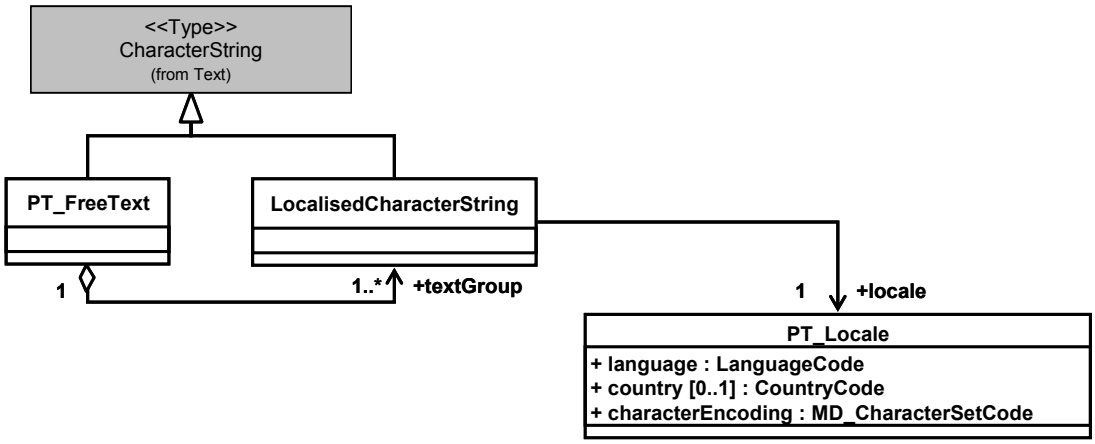
The metadata elements which may require translations are those of type CharacterString having a free text domain.



	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
1	MD_Metadata	Metadata	root entity which defines metadata about a resource or resources	M	1	Class	Lines 2-22
2	fileIdentifier	mdFileID	unique identifier for this metadata file	O	1	CharacterString	Free text

Data type	Domain
Class	Lines 2-22
CharacterString	Free text

Support of free text is enabled via a subtype of CharacterString called PT_FreeText which aggregates a set of localised character strings through its textGroup property. Each localised character string provides a translation of the character string in the related locale.



The following clauses define the way multilingual metadata are implemented.

A.6.1 The default language

The default language of a metadata set is defined by the language property of MD_Metadata while the characterSet property defines the corresponding character encoding. Here is a sample instance of the class MD_Metadata illustrating the use of both properties.

```
<MD_Metadata>
  <!-- portions of metadata not shown -->
  <language>
```

```
    <LanguageCode
       codeList="http://www.loc.gov/standards/iso639-2/"
       codeListValue="eng"> English </LanguageCode>
  </language>
  <characterSet>
    <MD_CharacterSetCode

codeList="resources/codelist/gmxcodelists.xml#MD_CharacterSetCode"
      codeListValue="utf8"> UTF-8 </MD_CharacterSetCode>
  </characterSet>
  <!-- portions of metadata not shown -->
</MD_Metadata>
```

A.6.2 Alternate languages

Each metadata alternate language of the metadata is defined through the locale property of MD_Metadata. In the following example, some of these metadata are translated into French[13]:

```
<MD_Metadata>
  <!-- portions of metadata not shown, particularly the language and
       characterSet properties which are not detailed -->
  <locale>
    <PT_Locale id="locale-fr">
      <languageCode>
        <LanguageCode
           codeList="http://www.loc.gov/standards/iso639-2/"
           codeListValue="fre"> French </LanguageCode>
      </languageCode>
      <characterEncoding>
        <MD_CharacterSetCode
         codeList="resources/codelist/gmxcodelists.xml#
MD_CharacterSetCode"
         codeListValue="utf8">UTF 8</MD_CharacterSetCode>
      </characterEncoding>
   </PT_Locale>
  </locale>
  <!-- portions of metadata not shown -->
</MD_Metadata>
```

A.6.3 Embedded translations

Any metadata element having a free text domain (e.g. the abstract property of MD_DataIdentification) can then be instantiated like this:

```
<abstract xsi:type="PT_FreeText_PropertyType">
  <gco:CharacterString>Brief narrative summary of the content of the
resource</gco:CharacterString>
  <!--== Alternative value ==-->
  <PT_FreeText>
    <textGroup>
      <LocalisedCharacterString locale="#locale-fr">Résumé succinct
du contenu de la ressource</LocalisedCharacterString>
    </textGroup>
  </PT_FreeText>
</abstract>
```

[13] Please note that both “fre” and “fra” are compatible with ISO 639-2 which distinguishes the bibliography codes (e.g. fre) from the terminology codes (e.g. fra). This issue concerns also any language having different codes for bibliography and terminology. The Drafting team has chosen the bibliography codes.

The xsi:type attribute indicates that this instance of the abstract property is not instantiated through a simple CharacterString, but rather as a free text. As a consequence, the element contains a complementary PT_FreeText subelement containing one or more textGroup elements (one per translation).

A.6.4 Use of translation files

In the preceding example, the definition of the locale property is provided by value which implies that the translations are embedded with default language metadata. It is also possible to store the translations corresponding to a given language into a translation file using the **PT_LocaleContainer** class. In such case, it is easier to define the locale within the translation file (e.g. `fr-fr.xml`) and to express the instance of the MD_Metadata locale property by reference.

```
<gmd:locale xlink:href="./fr-fr.xml#locale-fr"/>
```

The content of the `fr-fr.xml` file would look like this:

```
<PT_LocaleContainer>
  <!-- portions of metadata not shown -->
  <locale>
    <PT_Locale id="locale-fr">
      <languageCode>
        <LanguageCode
           codeList=”resources/codelist/gmxcodelists.xml#
LanguageCode”
           codeListValue="fre"> French </LanguageCode>
      </languageCode>
      <characterEncoding>
        <MD_CharacterSetCode
           codeList="../codelist/ML_gmxCodelists.xml#
MD_CharacterSetCode"
           codeListValue="utf8">UTF 8</MD_CharacterSetCode>
       </characterEncoding>
    </PT_Locale>
  </locale>
  <!-- portions of metadata not shown -->
  <localisedString>
     <LocalisedCharacterString locale="#locale-fr" id="#abstract-
fr"> Résumé succinct du contenu de la
ressource</LocalisedCharacterString>
  </localisedString>
  <!-- portions of metadata not shown -->
</PT_LocaleContainer>
```

The multilingual instance of the abstract property now implements the translation by reference to the translation file:

```
<abstract xsi:type="PT_FreeText_PropertyType">
  <gco:CharacterString>Brief narrative summary of the content of the
resource</gco:CharacterString>
  <!--== Alternative value ==-->
  <PT_FreeText>
    <textGroup xlink:href="fr-fr.xml#abstract-fr"/>
  </PT_FreeText>
</abstract>
```

A.7 Contexts of use

A.7.1 Use of ISO 19139 in the context of a Catalogue Service

When the data being passed through a cataloguing service is XML encoded, the catalogue service interface defines the different XML Schemas to be used as a response to the user queries. When the geographic metadata XML Schema is used, there should be one or many MD_Metadata instances in the returned XML File.

A.7.2 Use of ISO 19139 in the context of the standard interchange by transfer

The transfer aggregate and transfer dataset concepts are the two major components of an interchange by transfer. There may be one or many XML Files composing the interchange, but the root element of at least one of the files is an XML instance of MX_Dataset, MX_Aggregate or one of their extensions. From such an element, the parsing of the interchange is model driven and it follows the principles described in 7.4 of ISO 19139. See ISO 19139 for details about MX_Dataset and MX_Aggregate.

A.8 Character encoding

Character encoding is defined in MD_Metadata.characterEncoding and MD_Metadata.locale. Preferably this should be UTF-8 if the XML files contain multilingual metadata.

A.9 Temporal extent encoding

In ISO 19115, temporal extents are of type TM_Primitive (abstract type from ISO 19108). In ISO 19139, this type (and its sub-types) are mapped to ISO 19136 temporal types and W3C built-in types. In the INSPIRE Metadata Element Set for discovery, the concrete TM_Period subtype of TM_Primitive is used as type for the XML element temporalExtent. It is implemented as type TimePeriod from ISO 19136.

TimePeriod offers three options to express a time interval:

- Use two TimePosition elements for beginPosition and endPosition. Date and time information is contained in-line and cannot be referenced from another XML Element. Only the TimePeriod element can, through its gml:id.

```
<?xml version="1 0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:extent>
   <gmd:EX_Extent>
      <gmd:temporalElement>
         <gmd:EX_TemporalExtent>
            <gmd:extent>
               <gml:TimePeriod gml:id="extent">
                  <gml:beginPosition>1977-03-
                  10T11:45:30</gml:beginPosition>
                  <gml:endPosition>2005-01-
                  15T09:10:00</gml:endPosition>
               </gml:TimePeriod>
            </gmd:extent>
         </gmd:EX_TemporalExtent>
      </gmd:temporalElement>
   </gmd:EX_Extent>
  </gmd:extent>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

• Use two TimeInstant elements: Date and time information is here contained by reference and the TimeInstant elements can be re-used through a reference from another XML element in the XML file. The TimePeriod element can also be re-used.

```
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:extent>
   <gmd:EX_Extent>
      <gmd:temporalElement>
.........<gmd:EX_TemporalExtent>
............<gmd:extent>
..............<gml:TimePeriod gml:id="extent">
…..............<gml:begin>
.....................<gml:TimeInstant gml:id="t11">
                        <gml:timePosition>1977-03-
                        10T11:45:30</gml:timePosition>
.....................</gml:TimeInstant>
..................</gml:begin>
..................<gml:end>
.....................<gml:TimeInstant gml:id="t12">
                        <gml:timePosition>2005-01-
                        15T09:10:00</gml:timePosition>
.....................</gml:TimeInstant>
..................</gml:end>
..............</gml:TimePeriod>
............</gmd:extent>
.........</gmd:EX_TemporalExtent>
......</gmd:temporalElement>
...</gmd:EX_Extent>
</gmd:extent>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

• The two previous methods can be used in combination: one TimePeriod limit can be expressed as a TimePosition and the other as a TimeInstant:

```
<?xml version="1 0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:extent>
   <gmd:EX_Extent>
      <gmd:temporalElement>
         <gmd:EX_TemporalExtent>
            <gmd:extent>
               <gml:TimePeriod gml:id="extent">
              <gml:begin>
                    <gml:TimeInstant gml:id="t11">
                         <gml:timePosition>1977-03-
                         10T11:45:30</gml:timePosition>
                    </gml:TimeInstant>
                </gml:begin>
                         <gml:endPosition>2005-01-
                         15T09:10:00</gml:endPosition>
               </gml:TimePeriod>
            </gmd:extent>
         </gmd:EX_TemporalExtent>
      </gmd:temporalElement>
   </gmd:EX_Extent>
</gmd:extent>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

A.10 Spatial resolution encoding

The spatial resolution of a dataset or dataset series can be expressed as an equivalent scale or as a resolution distance:

- Expression as an equivalent scale:

```
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:identificationInfo>
<!-- Portions of metadata not shown -->
<gmd:spatialResolution>
   <gmd:MD_Resolution>
      <gmd:equivalentScale>
         <gmd:MD_RepresentativeFraction>
            <gmd:denominator>
               <gco:Integer>25000</gco:Integer>
            </gmd:denominator>
         </gmd:MD_RepresentativeFraction>
      </gmd:equivalentScale>
   </gmd:MD_Resolution>
</gmd:spatialResolution>
<!-- Portions of metadata not shown -->
</gmd:identificationInfo>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

In this case, the spatial resolution is expressed as the denominator of the scale of a comparable hardcopy map or chart.

- Expression as a resolution distance:

```
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:identificationInfo>
<!-- Portions of metadata not shown -->
<gmd:spatialResolution>
   <gmd:MD_Resolution>
      <gmd:distance>
..........<gco:Distance uom="#cm">25</gco:Distance>
      </gmd:distance>
   </gmd:MD_Resolution>
</gmd:spatialResolution>
<!-- Portions of metadata not shown -->
</gmd:identificationInfo>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

In this case, the spatial resolution is expressed as the ground sample distance, implemented through the gco:Distance type. The unit of measure is either a conventional unit of measure symbol or a link to a definition. The latter case is illustrated above.

- If needed, the two options can be used in conjunction:

```
<?xml version="1 0" encoding="UTF-8"?>
<gmd:MD_Metadata>
<!-- Portions of metadata not shown -->
<gmd:identificationInfo>
<!-- Portions of metadata not shown -->
<gmd:spatialResolution>
   <gmd:MD_Resolution>
      <gmd:distance>
          <gco:Distance uom="#cm">25</gco:Distance>
      </gmd:distance>
   </gmd:MD_Resolution>
</gmd:spatialResolution>
<gmd:spatialResolution>
   <gmd:MD_Resolution>
      <gmd:equivalentScale>
         <gmd:MD_RepresentativeFraction>
            <gmd:denominator>
               <gco:Integer>25000</gco:Integer>
            </gmd:denominator>
         </gmd:MD_RepresentativeFraction>
      </gmd:equivalentScale>
   </gmd:MD_Resolution>
</gmd:spatialResolution>
<!-- Portions of metadata not shown -->
</gmd:identificationInfo>
<!-- Portions of metadata not shown -->
</gmd:MD_Metadata>
```

N.B. In this case, the property spatialResolution needs to be instantiated twice.

A.11 Codelists

The two recommended ways to reference codelists are those expressed in the examples shown in 2.2.7 Resource Language.

A.12 Example of ISO 19139 XML Metadata Sets

A.12.1 Dataset

A.12.1.1 INSPIRE view

+ Part B 1 Identification:

+ Part B 1.1 Resource Title: SPI: Standardized Precipitation Index

+ Part B 1.2 Resource Abstract: The Standardized Precipitation Index (SPI-n) is a statistical indicator comparing the total precipitation received at a particular location during a period of n months with the long-term rainfall distribution for the same period of time at that location. SPI is calculated on a monthly basis for a moving window of n months, where n indicates the rainfall accumulation period, which is typically 1, 3, 6, 9, 12, 24 or 48 months. The corresponding SPIs are denoted as SPI-1, SPI-3, SPI-6, etc.In order to allow for the statistical comparison of wetter and drier climates, SPI is based on a transformation of the accumulated precipitation into a standard normal variable with zero mean and variance equal to one. SPI results are given in units of standard deviation from the long-term mean of the standardized distribution.In 2010 WMO selected the SPI as a key meteorological drought indicator to be producedoperationally by meteorological services

+ Part B 1.3 Resource Type: dataset

+ Part B 1.4 Resource Locator: http://edo.jrc.ec.europa.eu/chm/ows.php?VERSION=1.3.0&SERVICE=WMS&REQUEST=GetCapabilities

+ Part B 1.5 Resource Unique Identifier:

+ code: e24425e1-b073-11e1-9105-0017085a97ab

+ codeSpace: edo

+ Part B 1.7 Resource language: eng

+ Part B 2 Classification of data and services:

+ Part B 2.1 Topic category: climatologyMeteorologyAtmosphere

+ Part B 3 Keyword:

+ Part B 3.1 Keyword value: Atmospheric conditions

+ Part B 3.2 Originating Controlled Vocabulary:

+ title: GEMET - INSPIRE themes, version 1.0

+ reference date:

+ date: 2008-06-01

+ date type: publication

+ Part B 4 Geographic Location:

+ Part B 4.1 Bounding Box:

+ West: -15.00

+ East: 45.00

+ North: 35.00

+ South: 72.00

+ Part B 5 Temporal Reference:

+ Part B 5.2 Date of publication: 2012-02-20

+ Part B 6 Quality and validity:

+ Part B 6.1 Lineage: Computation of the SPI involves fitting a probability density function to a given frequency distribution of precipitation totals for a station or grid point and for an accumulation period. We use the gamma probability density function. The statistics for the frequency distribution are calculated on the basis of a reference period of at least 30 years.The parameters of the probability density function are then used to find the cumulative probability of the

observed precipitation for the required month and temporal scale. This cumulative probability is then transformed to the standardised normal distribution with mean zero and variance one, which results in the value of the SPI. The SPI values are computed using the so-called MARS weather stations as rainfall input Refer the MARS weather catalogue for characteristics of the quality and quantity of these data. We only rely on the rainfall data input.

+ Part B 6.2 Spatial Resolution: 0.25

+ Part B 7.1 Specification:

+ title: COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services

+ publication date: 2010-12-08

+ Part B 7.2 Degree: not evaluated

+ Part B 8 Constraints related to access and use:

+ Part B 8.2 Limitation on public access: no limitations

+ Part B 8 Constraints related to access and use:

+ Part B 8.1 Condition applying to access and use: Reproduction for non-commercial purposes is authorised, provided the source is acknowledged. Commercial use is not permitted without prior written consent of the JRC. Reports, articles, papers, scientific and non-scientific works of any form, including tables, maps, or any other kind of output, in printed or electronic form, based in whole or in part on the data supplied, must contain an acknowledgement of the form: Data re-used from the European Drought Observatory (EDO) http://edo.jrc.ec.europa.eu The SPI data were created as part of JRC's research activities. Although every care has been taken in preparing and testing the data, JRC cannot guarantee that the data are correct; neither does JRC accept any liability whatsoever for any error, missing data or omission in the data, or for any loss or damage arising from its use. The JRC will not be responsible for any direct or indirect use which might be made of the data. The JRC does not provide any assistance or support in using the data

+ Part B 9 Responsible Organisation:

+ Part B 9.1 Responsible party:

+ organisation: European Commission, Joint Research Centre

+ e-mail: ies-contact@jrc.ec.europa.eu

+ Part B 9.2 Responsible party role: custodian

+ Part B 10 Metadata on metadata:

+ Part B 10.1 Metadata point of contact:

+ organisation: European Commission, Joint Research Centre

+ e-mail: ies-contact@jrc.ec.europa.eu

+ Part B 10.2 Metadata date: 2012-02-20

+ Part B 10.3 Metadata language: eng

A.12.1.2 ISO/TS 19139 XML File

NOTE: This file is an ISO compliant metadata record extracted from the INSPIRE geo-portal and tested through the INSPIRE Validator. It may contain more elements than the minimum required to comply with the INSPIRE metadata Regulation.

```
<?xml version="1.0" encoding="UTF-8"?>
<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gmx="http://www.isotc211.org/2005/gmx" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:gml="http://www.opengis.net/gml" xmlns:gco="http://www.isotc211.org/2005/gco"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:geonet="http://www.fao.org/geonetwork"
xsi:schemaLocation="http://www.isotc211.org/2005/gmd
http://schemas.opengis.net/iso/19139/20060504/gmd/gmd.xsd http://www.isotc211.org/2005/gmx
http://schemas.opengis.net/iso/19139/20060504/gmx/gmx.xsd">
        <gmd:fileIdentifier>
                <gco:CharacterString>f9ee6623-cf4c-11e1-9105-0017085a97ab</gco:CharacterString>
        </gmd:fileIdentifier>
        <gmd:language>
                <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-2/" codeListValue="eng"/>
        </gmd:language>
        <gmd:characterSet>
                <gmd:MD_CharacterSetCode codeSpace="ISOTC211/19115"
codeListValue="MD_CharacterSetCode_utf8"
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#MD_CharacterSetCode"/>
        </gmd:characterSet>
        <gmd:hierarchyLevel>
                <gmd:MD_ScopeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#MD_ScopeCode" codeListValue="dataset"/>
        </gmd:hierarchyLevel>
        <gmd:contact>
                <gmd:CI_ResponsibleParty>
                        <gmd:organisationName>
                                <gco:CharacterString>European Commission, Joint Research
Centre</gco:CharacterString>
                        </gmd:organisationName>
                        <gmd:contactInfo>
                                <gmd:CI_Contact>
                                        <gmd:address>
                                                <gmd:CI_Address>
                                                        <gmd:electronicMailAddress>
                                                                <gco:CharacterString>alfred.de-
jager@jrc.ec.europa.eu</gco:CharacterString>
                                                        </gmd:electronicMailAddress>
                                                </gmd:CI_Address>
                                        </gmd:address>
                                </gmd:CI_Contact>
                        </gmd:contactInfo>
                        <gmd:role>
                                <gmd:CI_RoleCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#CI_RoleCode" codeListValue="pointOfContact"/>
                        </gmd:role>
                </gmd:CI_ResponsibleParty>
        </gmd:contact>
        <gmd:dateStamp>
                <gco:DateTime>2013-02-07T15:15:06</gco:DateTime>
        </gmd:dateStamp>
        <gmd:metadataStandardName>
                <gco:CharacterString>ISO19115</gco:CharacterString>
        </gmd:metadataStandardName>
        <gmd:metadataStandardVersion>
                <gco:CharacterString>2003/Cor.1:2006</gco:CharacterString>
        </gmd:metadataStandardVersion>
        <gmd:referenceSystemInfo>
                <gmd:MD_ReferenceSystem>
                        <gmd:referenceSystemIdentifier>
                                <gmd:RS_Identifier>
                                        <gmd:code>
                                                <gco:CharacterString>ETRS:89</gco:CharacterString>
                                        </gmd:code>
```

```
                                        </gmd:RS_Identifier>
                                </gmd:referenceSystemIdentifier>
                        </gmd:MD_ReferenceSystem>
                </gmd:referenceSystemInfo>
                <gmd:referenceSystemInfo>
                        <gmd:MD_ReferenceSystem>
                                <gmd:referenceSystemIdentifier>
                                        <gmd:RS_Identifier>
                                                <gmd:code>
                                                        <gco:CharacterString>WGS:84</gco:CharacterString>
                                                </gmd:code>
                                        </gmd:RS_Identifier>
                                </gmd:referenceSystemIdentifier>
                        </gmd:MD_ReferenceSystem>
                </gmd:referenceSystemInfo>
                <gmd:identificationInfo>
                        <gmd:MD_DataIdentification id="ccm2.1_lakes">
                                <gmd:citation>
                                        <gmd:CI_Citation>
                                                <gmd:title>
                                                        <gco:CharacterString>River and Catchment Database,
version 2.1 (CCM2) - Lakes</gco:CharacterString>
                                                </gmd:title>
                                                <gmd:date>
                                                        <gmd:CI_Date>
                                                                <gmd:date>
                                                                        <gco:Date>2007-06-01</gco:Date>
                                                                </gmd:date>
                                                                <gmd:dateType>
                                                                        <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#CI_DateTypeCode" codeListValue="publication"/>
                                                                </gmd:dateType>
                                                        </gmd:CI_Date>
                                                </gmd:date>
                                                <gmd:date>
                                                        <gmd:CI_Date>
                                                                <gmd:date>
                                                                        <gco:Date>2008-07-01</gco:Date>
                                                                </gmd:date>
                                                                <gmd:dateType>
                                                                        <gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#CI_DateTypeCode" codeListValue="revision"/>
                                                                </gmd:dateType>
                                                        </gmd:CI_Date>
                                                </gmd:date>
                                                <gmd:identifier>
                                                        <gmd:RS_Identifier>
                                                                <gmd:code>

<gco:CharacterString>http://rdsi.jrc.ec.europa.eu/id/dataset/ccm2.1/lakes</gco:CharacterString>
                                                                </gmd:code>
                                                                <gmd:codeSpace>

<gco:CharacterString>rdsi</gco:CharacterString>
                                                                </gmd:codeSpace>
                                                        </gmd:RS_Identifier>
                                                </gmd:identifier>
                                                <gmd:identifier>
                                                        <gmd:RS_Identifier>
                                                                <gmd:code>

<gco:CharacterString>ccm2.1_lakes</gco:CharacterString>
                                                                </gmd:code>
                                                                <gmd:codeSpace>

<gco:CharacterString>urn:eu:europa:ec:jrc:rdsi:id:dataset:ccm2.1</gco:CharacterString>
                                                                </gmd:codeSpace>
                                                        </gmd:RS_Identifier>
                                                </gmd:identifier>
                                        </gmd:CI_Citation>
                                </gmd:citation>
                                <gmd:abstract>
                                        <gco:CharacterString>The Catchment Characterisation Model (CCM2)
```

database covers the entire European continent, including the Atlantic islands, Iceland and Turkey. It allows for analysis from the regional to the continental scale, corresponding to traditional mapping scales of up to 1:500,000. CCM2 covers an area of about 12,000,000 square kilometres and includes more than 2,000,000 primary catchments. These can be aggregated to drainage basins at different hierarchical levels, forming, for example, about 650 river basins of more than 1000 square kilometres. CCM2 further includes a coastline, fully congruent with the river basins, and some 70,000 lakes. The layers are generated from a 100 metres resolution digital terrestrial elevation model. The following layers are available: Seaoutlets: the major river basins, Main drains: the major rivers, Lakes: all surface water larger than 25x25 metres, Coastlines: coast line extracted from Image2000 imagery, River segments: Drainage channels from the primary catchments, Catchments: Primary catchments. This dataset concerns the Lakes layers.</gco:CharacterString>
</gmd:abstract>
<gmd:pointOfContact>
<gmd:CI_ResponsibleParty>
<gmd:organisationName>
<gco:CharacterString>European Commission, Joint Research Centre</gco:CharacterString>
</gmd:organisationName>
<gmd:contactInfo>
<gmd:CI_Contact>
<gmd:address>
<gmd:CI_Address>
<gmd:electronicMailAddress>
<gco:CharacterString>juergen.vogt@jrc.ec.europa.eu</gco:CharacterString>
</gmd:electronicMailAddress>
</gmd:CI_Address>
</gmd:address>
</gmd:CI_Contact>
</gmd:contactInfo>
<gmd:role>
<gmd:CI_RoleCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodelists.xml#CI_RoleCode" codeListValue="author"/>
</gmd:role>
</gmd:CI_ResponsibleParty>
</gmd:pointOfContact>
<gmd:descriptiveKeywords>
<gmd:MD_Keywords>
<gmd:keyword>
<gco:CharacterString>Hydrography</gco:CharacterString>
</gmd:keyword>
<gmd:thesaurusName>
<gmd:CI_Citation>
<gmd:title>
<gco:CharacterString>GEMET - INSPIRE themes, version 1.0</gco:CharacterString>
</gmd:title>
<gmd:date>
<gmd:CI_Date>
<gmd:date>
<gco:Date>2008-06-01</gco:Date>
</gmd:date>
<gmd:dateType>
<gmd:CI_DateTypeCode codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmxCodelists.xml#CI_DateTypeCode" codeListValue="publication"/>
</gmd:dateType>
</gmd:CI_Date>
</gmd:date>
</gmd:CI_Citation>
</gmd:thesaurusName>
</gmd:MD_Keywords>
</gmd:descriptiveKeywords>
<gmd:descriptiveKeywords>
<gmd:MD_Keywords>
<gmd:keyword>
<gco:CharacterString>river basin development</gco:CharacterString>
</gmd:keyword>
<gmd:keyword>
<gco:CharacterString>river management</gco:CharacterString>
</gmd:keyword>
<gmd:keyword>
<gco:CharacterString>lake</gco:CharacterString>
</gmd:keyword>
<gmd:thesaurusName>

```
                                        <gmd:CI_Citation>
                                                <gmd:title>
                                                        <gco:CharacterString>GEMET -
Concepts, version 2.3</gco:CharacterString>
                                                </gmd:title>
                                                <gmd:date>
                                                        <gmd:CI_Date>
                                                                <gmd:date>
                                                                        <gco:Date>2009-07-
13</gco:Date>
                                                                </gmd:date>
                                                                <gmd:dateType>

<gmd:CI_DateTypeCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#CI_DateTypeCode" codeListValue="publication"/>
                                                                </gmd:dateType>
                                                        </gmd:CI_Date>
                                                </gmd:date>
                                        </gmd:CI_Citation>
                                </gmd:thesaurusName>
                        </gmd:MD_Keywords>
                </gmd:descriptiveKeywords>
                <gmd:descriptiveKeywords>
                        <gmd:MD_Keywords>
                                <gmd:keyword>
                                        <gco:CharacterString>Feature
coding</gco:CharacterString>
                                </gmd:keyword>
                                <gmd:keyword>
                                        <gco:CharacterString>River network</gco:CharacterString>
                                </gmd:keyword>
                        </gmd:MD_Keywords>
                </gmd:descriptiveKeywords>
                <gmd:resourceConstraints>
                        <gmd:MD_Constraints>
                                <gmd:useLimitation>
                                        <gmx:Anchor
xlink:href="http://ccm.jrc.ec.europa.eu/php/index.php?action=view&amp;id=26">License conditions apply, please
consult http://ccm.jrc.ec.europa.eu/php/index.php?action=view&amp;id=26</gmx:Anchor>
                                </gmd:useLimitation>
                        </gmd:MD_Constraints>
                </gmd:resourceConstraints>
                <gmd:resourceConstraints>
                        <gmd:MD_LegalConstraints>
                                <gmd:accessConstraints>
                                        <gmd:MD_RestrictionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#MD_RestrictionCode" codeListValue="otherRestrictions"/>
                                </gmd:accessConstraints>
                                <gmd:otherConstraints>
                                        <gco:CharacterString>(e) intellectual property
rights</gco:CharacterString>
                                </gmd:otherConstraints>
                        </gmd:MD_LegalConstraints>
                </gmd:resourceConstraints>
                <gmd:spatialResolution>
                        <gmd:MD_Resolution>
                                <gmd:equivalentScale>
                                        <gmd:MD_RepresentativeFraction>
                                                <gmd:denominator>
                                                        <gco:Integer>500000</gco:Integer>
                                                </gmd:denominator>
                                        </gmd:MD_RepresentativeFraction>
                                </gmd:equivalentScale>
                        </gmd:MD_Resolution>
                </gmd:spatialResolution>
                <gmd:spatialResolution>
                        <gmd:MD_Resolution>
                                <gmd:distance>
                                        <gco:Distance uom="metres">100</gco:Distance>
                                </gmd:distance>
                        </gmd:MD_Resolution>
                </gmd:spatialResolution>
                <gmd:language>
```

```
                        <gmd:LanguageCode codeList="http://www.loc.gov/standards/iso639-2/"
codeListValue="eng"/>
                    </gmd:language>
                    <gmd:topicCategory>
                        <gmd:MD_TopicCategoryCode>inlandWaters</gmd:MD_TopicCategoryCode>
                    </gmd:topicCategory>
                    <gmd:topicCategory>
                        <gmd:MD_TopicCategoryCode>elevation</gmd:MD_TopicCategoryCode>
                    </gmd:topicCategory>
                    <gmd:topicCategory>
                        <gmd:MD_TopicCategoryCode>oceans</gmd:MD_TopicCategoryCode>
                    </gmd:topicCategory>
                    <gmd:extent>
                        <gmd:EX_Extent>
                            <gmd:geographicElement>
                                <gmd:EX_GeographicBoundingBox>
                                    <gmd:westBoundLongitude>
                                        <gco:Decimal>-
31.269538</gco:Decimal>
                                    </gmd:westBoundLongitude>
                                    <gmd:eastBoundLongitude>
                                        <gco:Decimal>60.607986</gco:Decimal>
                                    </gmd:eastBoundLongitude>
                                    <gmd:southBoundLatitude>
                                        <gco:Decimal>27.63664</gco:Decimal>
                                    </gmd:southBoundLatitude>
                                    <gmd:northBoundLatitude>
                                        <gco:Decimal>71.185654</gco:Decimal>
                                    </gmd:northBoundLatitude>
                                </gmd:EX_GeographicBoundingBox>
                            </gmd:geographicElement>
                        </gmd:EX_Extent>
                    </gmd:extent>
                </gmd:MD_DataIdentification>
            </gmd:identificationInfo>
            <gmd:distributionInfo>
                <gmd:MD_Distribution>
                    <gmd:distributionFormat>
                        <gmd:MD_Format>
                            <gmd:name>
                                <gco:CharacterString>ESRI File Geodatabase (proprietary
format)</gco:CharacterString>
                            </gmd:name>
                            <gmd:version>
                                <gco:CharacterString>9.2</gco:CharacterString>
                            </gmd:version>
                        </gmd:MD_Format>
                    </gmd:distributionFormat>
                    <gmd:transferOptions>
                        <gmd:MD_DigitalTransferOptions>
                            <gmd:onLine>
                                <gmd:CI_OnlineResource>
                                    <gmd:linkage>
                                    <gmd:URL>http://ccm.jrc.ec.europa.eu</gmd:URL>
                                    </gmd:linkage>
                                    <gmd:name>
                                        <gco:CharacterString>CCM web
page</gco:CharacterString>
                                    </gmd:name>
                                    <gmd:description>
                                        <gco:CharacterString>Catchment
Characterisation and Modelling (CCM) web site</gco:CharacterString>
                                    </gmd:description>
                                    <gmd:function>
                                        <gmd:CI_OnLineFunctionCode
codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19139_Schemas/resources/Codelist/ML_gmx
Codelists.xml#CI_OnLineFunctionCode" codeListValue="information"/>
                                    </gmd:function>
                                </gmd:CI_OnlineResource>
                            </gmd:onLine>
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(WFD). In order to study the underlying processes and cause-effect relationships at regional to European scales,
comprehensive digital data of river networks, drainage basins (catchments) and their characteristics are required.
```

JRC's Catchment Characterisation and Modelling (CCM) activity responded to this need through the development of a pan-European database of river networks and catchments. Version 1.0 of CCM has been published in 2003. In July 2007 an geographically extended and substantially improved CCM Version 2.0 has been released. The current Version 2.1 of July 2008 is an update of version 2.0. It includes the correction of noted errors as well additional functionality. Lakes is one of the five main feature classes in which CCM 2 is structured. A detailed report on the development of CCM 2.0 as well Release Notes for CCM 2.1 are provided at http://ccm.jrc.ec.europa.eu/documents/CCM2-Report_EUR-22920-EN_2007_STD.pdf.</gco:CharacterString>
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A.12.2 Dataset series

There is no significant difference between the metadata of a dataset and the metadata of a dataset series. See A.11.1.

A.12.3 Service

A.12.3.1 INSPIRE view

+ **Part B 1 Identification:**
  + **Part B 1.1 Resource Title:** Catchment Characterisation Model (CCM) - Demo INSPIREView Service
  + **Part B 1.2 Resource Abstract:** Demonstrates implementation of the View Service according to the INSPIRE technical guidelines for the Catchment Characterisation Model (CCM) database. Drainage networks and associated drainage basins form complex functional entities not only for hydrological processes but also for environmental processes at large. This has been recognised in recent European legislation such as the Water Framework Directive (WFD). In order to study the underlying processes and cause-effect relationships at regional to European scales, comprehensive digital data of river networks, drainage basins (catchments) and their characteristics are required. JRC's Catchment Characterisation and Modelling (CCM) activity responded to this need through the development of a pan-European database of river networks and catchments. Version 1.0 of CCM has been published in 2003. In July 2007 an geographically extended and substantially improved CCM Version 2.0 has been released. The current Version 2.1 of July 2008 is an update of version 2.0. It includes the correction of noted errors as well additional functionality. A detailed report on the development of CCM 2.0 as well Release Notes for CCM 2.1 are provided on the CCM website.
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  + **Part B 1.4 Resource Locator:** http://ags-sdi-public.jrc.ec.europa.eu/arcgis/services/CCM_WGS84/MapServer/WMSServer?request=GetCapabilities&service=WMS
  + **Part B 1.4 Resource Locator:**
  + **Part B 1.6 Coupled Resource:**
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+ **Part B 2 Classification of data and services:**
  + **Part B 2.2 Spatial data service type:** View Service
+ **Part B 3 Keyword:**
  + **Part B 3.1 Keyword value:** Geographic viewer (humanGeographicViewer)
+ **Part B 3 Keyword:**
  + **Part B 3.1 Keyword value:** river basin development
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+ **Part B 4 Geographic Location:**
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  + **Part B 5.2 Date of publication:** 2007-06-01
+ **Part B 6 Quality and validity:**
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    + **title:** COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services
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  + **Part B 7.1 Specification:**
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    + **publication date:** 2009-10-19
  + **Part B 7.2 Degree:** true
+ **Part B 8 Constraint related to access and use:**
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    + **publication date:** 2011-11-07
  + **Part B 7.2 Degree:** true
  + **Part B 8.1 Condition applying to access and use:** no condition apply
  + **Part B 8.2 Limitation on public access:** no limitations
+ **Part B 9 Responsible Organisation:**
  + **Part B 9.1 Responsible party:**
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    + **e-mail:** Rdsi-team@jrc.ec.europa.eu
  + **Part B 9.2 Responsible party role:** custodian
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A.12.3.2 ISO/TS 19139 XML File

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Water Framework Directive (WFD). In order to study the underlying processes and cause-effect relationships at
regional to European scales, comprehensive digital data of river networks, drainage basins (catchments) and their
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through the development of a pan-European database of river networks and catchments. Version 1.0 of CCM has
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Annex B
(informative)

Metadata elements for interoperability

This Annex gives an overview of the additional metadata elements defined in the INSPIRE Implementing Rules on the Interoperability of Spatial Datasets and Services (Commission Regulation (EU) No 1089/2010) and in the Data Specifications Technical Guidelines for the Annex I-III spatial data themes.

For further details, see the Data Specifications Technical Guidelines[14].

B.1. Metadata elements required by the INSPIRE Implementing Rules on the Interoperability of Spatial Datasets and Services

The following metadata elements are defined as "metadata required for interoperability" in Article 13 of the Implementing Rules on the Interoperability of Spatial Datasets and Services. They are applicable to all Spatial Data Themes from Annexes I, II and III.

Metadata element	Definition	Multiplicity	Condition
Coordinate reference system	Description of the coordinate reference system(s) used in the data set.	1..*	
Temporal reference system	Description of the temporal reference systems used in the dataset.	0..*	Mandatory, if the spatial data set or one of its feature types contains temporal information that does not refer to the Gregorian Calendar or the Coordinated Universal Time.
Encoding	Description of the computer language construct(s) specifying the representation of data objects in a record, file, message, storage device or transmission channel.	1..*	
Character encoding	The character encoding used in the data set.	0..*	Mandatory if an encoding is used that is not based on UTF-8.
Spatial representation type	The method used to spatially represent geographic information.	1..*	
Data Quality – Logical consistency – Topological consistency	Correctness of the explicitly encoded topological characteristics of the data set as described by the scope.	0..*	Mandatory if the data set includes types from the Generic Network Model and does not assure centreline topology (connectivity of centrelines) for the network.

[14] Please note that the implementation guidelines for the common metadata elements have been revised during the work on the Annex II+III data specifications. The current guidelines are available in the common data specification document template (available in the "Framework Documents" section on http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2). At the time of writing (October 2013), the Annex I data specifications are being updated to be consistent with this document template and the updated guidelines.

B.2. Metadata elements recommended in the INSPIRE Data Specifications Technical Guidelines

The following metadata elements are recommended as common metadata elements for all Spatial Data Themes from Annexes I, II and III.

Metadata element	**Multiplicity**
Data Quality – Logical Consistency – Conceptual Consistency	0..*
Data Quality – Logical Consistency – Domain Consistency	0..*
Maintenance information	0..1

The following tables give an overview of additional metadata elements that are recommended for specific Spatial Data Themes from Annex II and III.

	THEMES FROM ANNEX II			
	Elevation	**Geology**	**Land cover**	**Orthoimagery**
Metadata element	**Multiplicity**			
Data Quality – Completeness - Commission	0..*		0..*	
Data Quality – Completeness - Ommission	0..*		0..*	0..*
Data Quality – Logical Consistency – Format Consistency	0..*		0..1	
Data Quality – Positional accuracy – Absolute or external accuracy	0..*		0..*	
Data Quality – Positional accuracy – Gridded data position accuracy	0..* (C)			0..*
Data Quality –Thematic accuracy – Classification Correctness			0..*	
Data Quality – Positional accuracy – Relative or Internal Accuracy			0..*	
Data Quality – Temporal quality – Temporal Consistency			0..*	
Data Quality – Temporal quality – Temporal Validity			0..*	
Data Quality – Temporal quality – Accuracy of a time measurement				
Data Quality – Thematic accuracy – Non-quantitative Attribute Accuracy			0..*	
Data Quality – Thematic accuracy – Quantitative Attribute Accuracy			0..*	
Data Quality – DQ_UsabilityElement				
Spatial representation information	0..*			
Supplemental information	0..1			
Process step	0..*			0..*
Data source	0..*			0..*

Browse graphic information	0..*			0..*
Digital transfer options information	0..*			0..*
Image description				0..*
Content Information				

	THEMES FROM ANNEX III (table 1/2)								
	Agricultural and aquaculture facilities	Area management /restriction/regulation zones and reporting units	Atmospheric Conditions-Meteorological geographical features	Bio-geographical regions	Buildings	Energy Resources	Environmental monitoring Facilities	Habitats and biotopes	Human health and safety
Metadata element	**Multiplicity**								
Data Quality – Completeness - Commission					0..*				
Data Quality – Completeness - Ommission	0..*				0..*				
Data Quality – Logical Consistency – Format Consistency									
Data Quality – Positional accuracy – Absolute or external accuracy	0..*				0..*				0..*
Data Quality – Positional accuracy – Gridded data position accuracy									
Data Quality –Thematic accuracy – Classification Correctness	0..*								
Data Quality – Positional accuracy – Relative or Internal Accuracy									
Data Quality – Temporal quality – Temporal Consistency									
Data Quality – Temporal quality – Temporal Validity	0..*								0..*
Data Quality – Temporal quality – Accuracy of a time measurement									
Data Quality – Thematic accuracy – Non-quantitative Attribute Accuracy									
Data Quality – Thematic accuracy – Quantitative Attribute Accuracy									0..*
Data Quality – DQ_UsabilityElement					0..*				
Spatial representation information									
Supplemental information									
Process step									
Data source									
Browse graphic information									
Digital transfer options information									
Image description									
Content Information					0..1				

	THEMES FROM ANNEX III (table 2/2)										
	Land use	**Mineral Resources**	**Natural risk zones**	**Oceanographic geographical features**	**Population distribution - demography**	**Production and Industrial Facilities**	**Sea Regions**	**Soil**	**Species distribution**	**Statistical units**	**Utility and governmental services**
Metadata element	**Multiplicity**										
Data Quality – Completeness - Commission	0..*				---					0..1	0..*
Data Quality – Completeness - Ommission	0..*			0..*	---	0..*		0..*		0..1	0..*
Data Quality – Logical Consistency – Format Consistency					---						0..*
Data Quality – Positional accuracy – Absolute or external accuracy	0..*			0..*	---	0..*	0..*			0..1	0..*
Data Quality – Positional accuracy – Gridded data position accuracy					---						
Data Quality –Thematic accuracy – Classification Correctness	0..*				---	0..*				0..1	0..*
Data Quality – Positional accuracy – Relative or Internal Accuracy					---						0..*
Data Quality – Temporal quality – Temporal Consistency					---						0..*
Data Quality – Temporal quality – Temporal Validity					---	0..*				0..1	
Data Quality – Temporal quality – Accuracy of a time measurement					---						0..*
Data Quality – Thematic accuracy – Non-quantitative Attribute Accuracy	0..*				---						0..*
Data Quality – Thematic accuracy – Quantitative Attribute Accuracy					---						0..*
Data Quality – DQ_UsabilityElement				0..*	---		0..*				
Spatial representation information					---						
Supplemental information					---						
Process step					---						
Data source					---						
Browse graphic information					---						
Digital transfer options information					---						
Image description					---						
Content Information					---						