

# Open GIS Consortium

35 Main Street, Suite 5

Wayland, MA 01778

Telephone: +1-508-655-5858

Facsimile: +1-508-655-2237

Editor:

Telephone: +1-703-830-6516

Facsimile: +1-703-830-7096

[ckottman@opengis.org](mailto:ckottman@opengis.org)

**The OpenGIS™ Abstract Specification**

**Topic 11: OpenGIS(tm) Metadata**

**(ISO/TC 211 DIS 19115)**

**Version 5**

OpenGIS™ Project Document Number 01-111.doc

Copyright © 2001, Open GIS Consortium, Inc.

## NOTICE

The information contained in this document is subject to change without notice.

The material in this document details an Open GIS Consortium (OGC) specification in accordance with the license and notice set forth on this page. This document does not represent a commitment to implement any portion of this specification in any companies' products.

While the information in this publication is believed to be accurate, the Open GIS Consortium makes no warranty of any kind with regard to this material including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The Open GIS Consortium shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material. The information contained in this document is subject to change without notice.

The Open GIS Consortium is and shall at all times be the sole entity that may authorize developers, suppliers and sellers of computer software to use certification marks, trademarks, or other special designations to indicate compliance with these materials.

This document contains information which is protected by copyright. All Rights Reserved. Except as otherwise provided herein, no part of this work may be reproduced or used in any form or by any means (graphic, electronic, or mechanical including photocopying, recording, taping, or information storage and retrieval systems) without the permission of the copyright owner. All copies of this document must include the copyright and other information contained on this page.

The copyright owner grants member companies of the OGC permission to make a limited number of copies of this document (up to fifty copies) for their internal use as a part of the OGC Technology Development process.



# Revision History

Date	Description
30 March 1999	Previous version (ver 4) found on the OGC website as 99-111r1.doc
30 May 2001	A reworked version of AS11 + 9 (Quality), to be voted on at the June or September 2001 TC meeting. This reworked version adopts ISO DIS 19115 as OGC Topic 11. (which now includes Quality material from AS9). DTDs to be revised before formal acceptance.



**ISO TC 211/**

Date: 2000-12-12

**ISO/DIS 19115**

ISO TC 211/WG 3

Secretariat: NSF

## **Geographic information — Metadata**

*Information géographique — Métadonnées*

### **Warning**

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Document type: International Standard  
Document subtype:  
Document stage: (40) Enquiry  
Document language: E

### Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to ISO at the address below or ISO's member body in the country of the requester.

*Copyright Manager  
ISO Central Secretariat  
1 rue de Varembé  
1211 Geneva 20 Switzerland  
tel. + 41 22 749 0111  
fax + 41 22 734 1079  
internet: [iso@iso.ch](mailto:iso@iso.ch)*

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.



## Contents

<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Conformance .....</b>	<b>1</b>
2.1	Conformance requirements .....	1
2.2	Metadata Profiles .....	1
2.3	Obligation and condition .....	2
<b>3</b>	<b>Normative references .....</b>	<b>2</b>
<b>4</b>	<b>Terms and definitions .....</b>	<b>3</b>
<b>5</b>	<b>Symbols and abbreviated terms .....</b>	<b>4</b>
5.1	Abbreviations .....	4
5.2	UML notations .....	4
5.3	UML model relationships .....	5
5.3.1	Associations .....	5
5.3.2	Generalization .....	5
5.3.3	Instantiation / Dependency .....	5
5.3.4	Roles .....	6
5.4	UML model stereotypes .....	6
5.5	Package abbreviations .....	7
5.6	UML model / data dictionary relationships .....	8
<b>6</b>	<b>Requirements .....</b>	<b>8</b>
6.1	Metadata for geographic data requirement .....	8
6.2	Metadata application information .....	8
6.3	Metadata packages .....	10
6.3.1	Metadata package and entity relationship .....	10
6.3.2	Package descriptions .....	11
6.4	Metadata datatypes .....	14
6.4.1	Extent information (EX_Extent) .....	14
6.4.2	Citation and responsible party information (CI_Citation and CI_ResponsibleParty) .....	14
6.5	Core metadata for geographic datasets .....	14
6.6	Unified Modelling Language (UML) diagrams .....	16
6.7	Data dictionary .....	16
6.8	Metadata extensions and profiles .....	16
6.9	Abstract test suite .....	16
6.10	Comprehensive dataset metadata application profile .....	16
6.11	Dataset metadata – XML DTD .....	16
6.12	Metadata extension methodology .....	16
6.13	Metadata implementation .....	16
6.14	Hierarchical levels of metadata .....	16
6.15	Implementation examples .....	17
6.16	Multi-lingual support for free text fields .....	17
<b>Annex A</b>	<b>(normative) Metadata schemas .....</b>	<b>18</b>
A.1	Metadata UML models .....	18
A.2	Metadata package UML diagrams .....	19
A.2.1	Metadata entity set information .....	19
A.2.2	Identification information .....	20
A.2.3	Constraint information .....	21
A.2.4	Data quality information .....	22
A.2.5	Maintenance information .....	25
A.2.6	Spatial representation information .....	26
A.2.7	Reference system information .....	27

A.2.8	Content information .....	28
A.2.9	Portrayal catalogue information .....	29
A.2.10	Distribution information .....	30
A.2.11	Metadata extension information .....	31
A.2.12	Application schema information .....	32
A.3	Metadata data types .....	33
A.3.1	Extent information .....	33
A.3.2	Citation and responsible party information .....	34
Annex B	(normative) Data dictionary for geographic metadata .....	35
B.1	Data dictionary overview .....	35
B.1.1	Introduction .....	35
B.1.2	Name/role name .....	35
B.1.3	Short name and domain code .....	35
B.1.4	Definition .....	35
B.1.5	Obligation/Condition .....	36
B.1.6	Maximum occurrence .....	36
B.1.7	Data type .....	36
B.1.8	Domain .....	36
B.2	Metadata package data dictionaries .....	39
B.2.1	Metadata entity set information .....	39
B.2.2	Identification information (includes data and service identification) .....	40
B.2.3	Constraint information (includes legal and security) .....	44
B.2.4	Data quality information .....	45
B.2.5	Maintenance information .....	51
B.2.6	Spatial representation information (includes grid and vector representation) .....	53
B.2.7	Reference system information (includes temporal, coordinate and geographic identifiers) .....	56
B.2.8	Content information (includes Feature catalogue and Coverage descriptions) .....	60
B.2.9	Portrayal catalogue information .....	63
B.2.10	Distribution information .....	63
B.2.11	Metadata extension information .....	66
B.2.12	Application schema information .....	68
B.3	Data type information .....	69
B.3.1	Extent information .....	69
B.3.2	Citation and responsible party information .....	72
B.4	Externally referenced entities .....	77
B.4.1	Introduction .....	77
B.4.2	Date and DateTime information .....	77
B.4.3	Distance, angle, measure, number, record, recordType, scale and UoMLength information .....	77
B.4.4	Feature type, property type, feature attribute type and attribute type information .....	77
B.4.5	PeriodDuration and primitive information .....	77
B.4.6	Point and Object information .....	78
B.4.7	Set and Sequence information .....	78
B.4.8	Type name information .....	78
B.4.9	Vertical datum information .....	78
B.5	CodeLists and enumerations .....	78
B.5.1	Introduction .....	78
B.5.2	CI_DateTypeCode <<CodeList>> .....	78
B.5.3	CI_OnLineFunctionCode <<CodeList>> .....	78
B.5.4	CI_PresentationFormCode <<CodeList>> .....	79
B.5.5	CI_RoleCode <<CodeList>> .....	79
B.5.6	DQ_EvaluationTypeMethodCode <<CodeList>> .....	79
B.5.7	DS_AssociationTypeCode <<CodeList>> .....	79
B.5.8	DS_InitiativeTypeCode <<CodeList>> .....	80
B.5.9	MD_CellGeometryCode <<CodeList>> .....	80
B.5.10	MD_CharacterSetCode <<CodeList>> .....	80
B.5.11	MD_ClassificationCode <<CodeList>> .....	81
B.5.12	MD_CoverageContentTypeCode <<CodeList>> .....	81
B.5.13	MD_DatatypeCode <<CodeList>> .....	81
B.5.14	MD_DimensionNameTypeCode <<CodeList>> .....	81

B.5.15	MD_GeometricObjectTypeCode <<CodeList>> .....	82
B.5.16	MD_ImagingConditionCode <<CodeList>> .....	82
B.5.17	MD_KeywordTypeCode <<CodeList>> .....	82
B.5.18	MD_MaintenanceFrequencyCode <<CodeList>> .....	82
B.5.19	MD_MediumFormatCode <<CodeList>> .....	83
B.5.20	MD_MediumNameCode <<CodeList>> .....	83
B.5.21	MD_ObligationCode <<enumeration>> .....	83
B.5.22	MD_PixelOrientationCode <<Enumeration>> .....	83
B.5.23	MD_ProgressCode <<CodeList>> .....	83
B.5.24	MD_RestrictionCode <<CodeList>> .....	84
B.5.25	MD_ScopeCode <<CodeList>> .....	84
B.5.26	MD_SpatialRepresentationTypeCode <<CodeList>> .....	84
B.5.27	MD_TopicCategoryCode <<CodeList>> .....	85
B.5.28	MD_TopologyLevelCode <<CodeList>> .....	86
<b>Annex C</b>	<b>(normative) Metadata extensions and profiles .....</b>	<b>87</b>
C.1	Background .....	87
C.2	Types of extensions.....	87
C.3	Creating an extension .....	87
C.4	Rules for creating an extension .....	87
C.5	Community profile .....	88
C.6	Rules for creating a profile .....	89
<b>Annex D</b>	<b>(normative) Abstract test suite.....</b>	<b>91</b>
D.1	Abstract test suite .....	91
D.2	Metadata test suite.....	91
D.2.1	Test case identifier: Completeness test .....	91
D.2.2	Test case identifier: Maximum occurrence test.....	91
D.2.3	Test case identifier: Short name test .....	92
D.2.4	Test case identifier: Data type test.....	92
D.2.5	Test case identifier: Domain test.....	92
D.2.6	Test case identifier: Schema test .....	92
D.3	User-defined extension metadata test suite .....	92
D.3.1	Test case identifier: Exclusiveness test.....	92
D.3.2	Test case identifier: Definition test .....	93
D.3.3	Test case identifier: Standard metadata test .....	93
D.4	Metadata profiles.....	93
D.4.1	Test case identifier: Metadata profiles .....	93
<b>Annex E</b>	<b>(normative) Comprehensive dataset metadata application profile.....</b>	<b>94</b>
E.1	Comprehensive dataset metadata application schema .....	94
E.2	Comprehensive dataset metadata profile – UML model.....	94
<b>Annex F</b>	<b>(informative) Dataset metadata – XML DTD.....</b>	<b>96</b>
F.1	Comprehensive dataset metadata profile – XML DTD .....	96
F.2	ISO 19115 – Metadata DTD (19115-DatasetMetadata.dtd).....	96
F.3	ISO TS 19103 – Conceptual Schema Language DTD (19103-CSL.dtd).....	114
<b>Annex G</b>	<b>(informative) Metadata extension methodology.....</b>	<b>118</b>
G.1	Metadata extensions methodology .....	118
G.2	Review of existing metadata elements (Stage 1).....	118
G.3	Definition of a new metadata section (Stage 2) .....	119
G.4	Definition of a new metadata codelist (Stage 3) .....	119
G.5	Definition of a new metadata codelist element (Stage 4).....	119
G.6	Definition of a new metadata element (Stage 5) .....	120
G.7	Definition of a new metadata entity (Stage 6) .....	120
G.8	Definition of a more stringent metadata obligation (Stage 7) .....	121
G.9	Definition of more restrictive metadata codelist (Stage 8) .....	121
G.10	Documentation of metadata extensions (Stage 9) .....	121
<b>Annex H</b>	<b>(informative) Metadata implementation .....</b>	<b>123</b>
H.1	Background .....	123
H.1.1	Problem statement.....	123

H.1.2	Scope and objectives .....	123
H.1.3	Granularity of spatial data supported .....	123
H.2	Metadata hierarchy levels .....	124
H.2.1	Data series metadata (optional) .....	124
H.2.2	Dataset metadata .....	124
H.2.3	Feature type metadata (optional) .....	125
H.2.4	Feature instance metadata (optional) .....	125
H.2.5	Attribute type metadata (optional) .....	125
H.2.6	Attribute instance metadata (optional) .....	125
Annex I	(informative) Hierarchical levels of metadata .....	126
I.1	Levels of metadata .....	126
I.2	Example .....	126
Annex J	(informative) Implementation examples .....	131
J.1	Core metadata examples .....	131
J.2	Example 1 – Exploration Licences for Minerals .....	131
J.3	Example 2 – Digital chart of the world (vmap0.xml) .....	133
J.4	Example 3 – Example of extended metadata .....	137
J.5	Data dictionary for the extended elements .....	139
J.6	MD_KeywordType (Modified) .....	145
Annex K	(informative) Multi-lingual support for free text metadata element .....	146
K.1	Free text metadata elements .....	146
K.2	Data structure for handling multi-languages support in free text metadata elements .....	147
K.3	Example of multi-languages free text in a metadata element .....	148

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 19115 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

This document contains 11 annexes. Annexes A to E are normative, annexes F to K are informative.

## Introduction

A revival in the awareness of the importance of geography and how things relate spatially, combined with the advancement of electronic technology, have caused an expansion in the use of digital geographic information and geographic information systems worldwide. Increasingly, individuals from a wide range of disciplines outside of the geographic sciences and information technologies are capable of producing, enhancing, and modifying digital geographic information. As the number, complexity, and diversity of geographic datasets grow, a method for providing an understanding of all aspects of this data grows in importance.

Digital geographic data is an attempt to model and describe the real world for use in computer analysis and graphic display of information. Any description of reality is always an abstraction, always partial, and always just one of many possible "views". This "view" or model of the real world is not an exact duplication; some things are approximated, others are simplified, and some things are ignored. There is seldom perfect, complete, and correct data. To ensure that data is not misused, the assumptions and limitations affecting the creation of data must be fully documented. Metadata allows a producer to describe a dataset fully so that users can understand the assumptions and limitations and evaluate the dataset's applicability for their intended use.

Typically, geographic data is used by many people other than the producer. It is often produced by one individual or organization and used by another. Proper documentation will provide those unfamiliar with the data with a better understanding, and enable them to use it properly. As geographic data producers and users handle more and more data, proper documentation will provide them with a keener knowledge of their holdings and will allow them to better manage data production, storage, updating, and reuse.

The objective of this International Standard is to provide a structure for describing digital geographic data. This International Standard is intended to be used by information system analysts, program planners, and developers of geographic information systems, as well as others in order to understand the basic principles and the overall requirements for standardization of geographic information. This International Standard defines metadata elements, provides a schema and establishes a common set of metadata terminology, definitions, and extension procedures. When implemented by a data producer, this International Standard will:

- 1) Provide data producers with appropriate information to characterize their geographic data properly.
- 2) Facilitate the organization and management of metadata for geographic data.
- 3) Enable users to apply geographic data in the most efficient way by knowing its basic characteristics.
- 4) Facilitate data discovery, retrieval and reuse. Users will be better able to locate, access, evaluate, purchase and utilize geographic data.
- 5) Enable users to determine whether geographic data in a holding will be of use to them.

This International Standard defines general-purpose metadata, in the field of geographic information. More detailed metadata for geographic datatypes and geographic services are defined in other ISO 19100 series standards and user extensions.

# Geographic information — Metadata

## 1 Scope

This International Standard defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.

This International Standard is applicable to:

- the cataloguing of datasets, clearinghouse activities, and the full description of datasets;
- geographic datasets, dataset series, and individual geographic features and feature properties.

This International Standard defines:

- mandatory and conditional metadata sections, metadata entities, and metadata elements;
- the minimum set of metadata required to serve the full range of metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data);
- optional metadata elements – to allow for a more extensive standard description of geographic data, if required;
- a method for extending metadata to fit specialized needs.

Though this International Standard is applicable to digital data, its principles can be extended to many other forms of geographic data such as maps, charts, and textual documents as well as non-geographic data.

NOTE Certain mandatory metadata elements may not apply to these other forms of data.

## 2 Conformance

### 2.1 Conformance requirements

Metadata shall be provided as specified in clause 6 and annexes A and B.

User-defined metadata shall be defined and provided as specified in annex C.

Any metadata claiming conformance with this International Standard shall pass the requirements described in the abstract test suite presented in annex D.

### 2.2 Metadata Profiles

Any profile conforming to this International Standard shall conform to the rules in annex C, clause C.6.

## 2.3 Obligation and condition

For the purposes of conformance testing using the abstract test suite in annex D, metadata entities and elements shall be considered to be mandatory, conditional or optional as specified in the applicable profile.

## 3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties involved in agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 639 (all parts), *Code for the representation of names of languages*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

ISO 4217:1995, *Codes for the representation of currencies and funds*

ISO 8859 (parts 1 to 15), *Information technology — 8 bit single byte coded graphic character sets*

ISO 8879, *Information processing — Text and office systems — Standard Generalized Markup Language (SGML)*

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

ISO/IEC 11179 (all parts), *Information technology — Specification and standardization of data elements*

ISO TS 19103:—<sup>1)</sup>, *Geographic information — Conceptual schema language*

ISO 19104:—<sup>1)</sup>, *Geographic information — Terminology*

ISO 19106:—<sup>1)</sup>, *Geographic information — Profiles*

ISO 19107:—<sup>1)</sup>, *Geographic information — Spatial schema*

ISO 19108:—<sup>1)</sup>, *Geographic information — Temporal schema*

ISO 19109:—<sup>1)</sup>, *Geographic information — Rules for application schema*

ISO 19110:—<sup>1)</sup>, *Geographic information — Feature cataloguing methodology*

ISO 19111:—<sup>1)</sup>, *Geographic information — Spatial referencing by coordinates*

ISO 19112:—<sup>1)</sup>, *Geographic information — Spatial referencing by geographic identifiers*

ISO 19113:—<sup>1)</sup>, *Geographic information — Quality principles*

ISO 19114:—<sup>1)</sup>, *Geographic information — Quality evaluation procedures*

ISO 19117:—<sup>1)</sup>, *Geographic information — Portrayal*

---

<sup>1)</sup> To be published.



ISO 19118:—<sup>1)</sup>, *Geographic information — Encoding*

## 4 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

NOTE The terms and definitions used in conjunction with the UML models are addressed in clause 5.

### 4.1

#### **data type**

specification of the legal value domain and legal operations allowed on values in this domain

EXAMPLE Integer, Real, Boolean, String, Date, and SG\_Point

NOTE A data type is identified by a term, e.g. Integer

### 4.2

#### **dataset**

identifiable collection of data

NOTE A dataset may be a smaller grouping of data which, though limited by some constraint such as spatial extent or feature type, is located physically within a larger dataset. Theoretically, a dataset may be as small as a single feature or feature attribute contained within a larger dataset. A hardcopy map or chart may be considered a dataset.

### 4.3

#### **dataset series**

collection of datasets sharing the same product specification

### 4.4

#### **grid**

network composed of two or more sets of curves in which the member of each set intersect the members of the other sets in a systematic way that divides a space

### 4.5

#### **metadata**

data about data

### 4.6

#### **metadata element**

discrete unit of metadata

NOTE 1 Equivalent to an attribute in UML terminology.

NOTE 2 Metadata elements are unique within a metadata entity.

### 4.7

#### **metadata entity**

set of metadata elements describing the same aspect of data

NOTE 1 May contain one or more metadata entities.

NOTE 2 Equivalent to a class in UML terminology.

### 4.8

#### **metadata section**

subset of metadata which consists of a collection of related metadata entities and metadata elements

**4.9**

**model**

abstraction of some aspects of reality

**4.10**

**resource**

asset or means that fulfils a requirement

EXAMPLE        Dataset, service, document, person or organization.

**4.11**

**temporal reference system**

reference system against which time is measured

## **5 Symbols and abbreviated terms**

### **5.1 Abbreviations**

DTD	Document Type Definition
IDL	Interface Definition Language
OCL	Object Constraint Language
SGML	Standard Generalized Markup Language
UML	Unified Modelling Language
XML	Extensible Markup Language

### **5.2 UML notations**

The diagrams that appear in this International Standard are presented using the Unified Modelling Language (UML) static structure diagram with the ISO Interface Definition Language (IDL) basic type definitions and the UML Object Constraint Language (OCL) as the conceptual schema language. The UML notations used in this International Standard are described in the Figure 1 below.

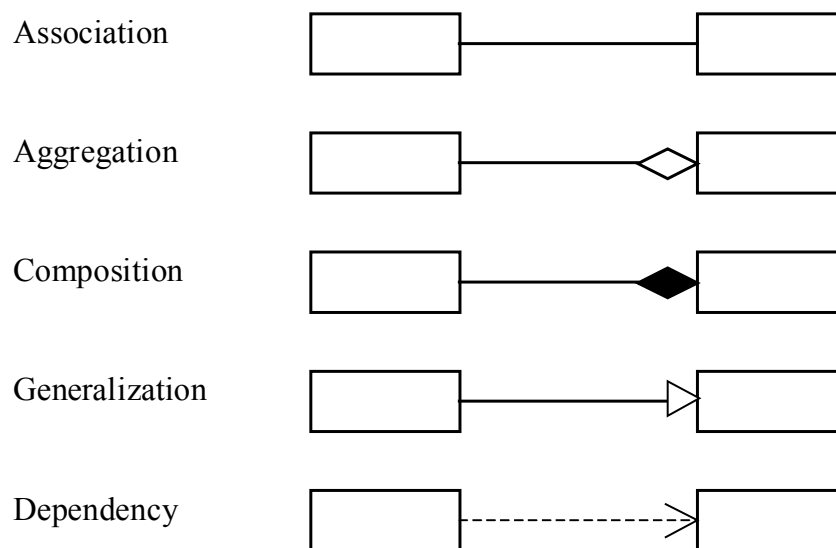


Figure 1 — UML notation

## 5.3 UML model relationships

### 5.3.1 Associations

An association is used to describe a relationship between two or more classes. UML defines three different types of relationships, called association, aggregation and composition. The three types have different semantics. An ordinary association shall be used to represent a general relationship between two classes. The aggregation and composition associations shall be used to create part-whole relationships between two classes. The direction of an association must be specified. If the direction is not specified, it is assumed to be a two-way association. If one-way associations are intended, the direction of the association can be marked by an arrow at the end of the line.

An aggregation association is a relationship between two classes in which one of the classes plays the role of container and the other plays the role of a containee.

A composition association is a strong aggregation. In a composition association, if a container object is deleted, then all of its containee objects are deleted as well. The composition association shall be used when the objects representing the parts of a container object cannot exist without the container object.

### 5.3.2 Generalization

A generalization is a relationship between a superclass and the subclasses that may be substituted for it. The super-class is the generalized class, while the subclasses are specified classes.

### 5.3.3 Instantiation / Dependency

A dependency relationship shows that the client class depends on the supplier class/interface to provide certain services, such as:

- Client class accesses a value (constant or variable) defined in the supplier class/interface
- Operations of the client class invoke operations of the supplier class/interface
- Operations of the client class have signatures whose return class or arguments are instances of the supplier class/interface

An instantiated relationship represents the act of substituting actual values for the parameters of a parameterized class or parameterized class utility to create a specialized version of the more general item.

### 5.3.4 Roles

If an association is navigable in a particular direction, the model shall supply a “role name” that is appropriate for the role of the target object in relation to the source object. Thus in a two-way association, two role names will be supplied.

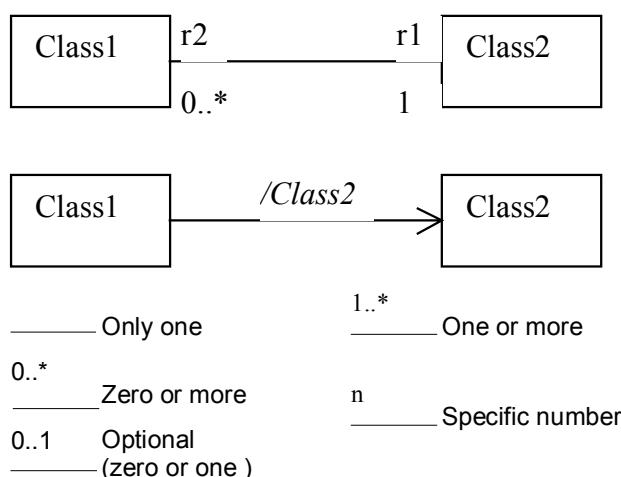


Figure 2 — UML roles

Figure 2 represents how role names and cardinalities are expressed in UML diagrams. The role name “r1” is Class1’s relationship to Class2. The role name “r2” is Class2’s relationship to Class1. The cardinalities show that “zero or many” Class1s are related to “exactly one” Class2.

Figure 2 also shows how derived classes will be expressed. The diagram indicates that Class1 is a derived class of Class2. Any attributes and aggregates of Class1 are also derived from Class2.

## 5.4 UML model stereotypes

A UML stereotype is an extension mechanism for existing UML concepts. It is a model element that is used to classify (or mark) other UML elements so that they in some respect behave as if they were instances of new virtual or pseudo metamodel classes whose form is based on existing base metamodel classes. Stereotypes augment the classification mechanisms on the basis of the built-in UML metamodel class hierarchy. Below are brief descriptions of the stereotypes used in this International Standard, for more detailed descriptions consult ISO 19103.

In this International Standard the following stereotypes are used:

- <<Type>> class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A type may have attributes and associations.
- <<Enumeration>> data type whose instances form a list of named literal values. Both the enumeration name and its literal values are declared. Enumeration means a short list of well-understood potential values within a class.
- <<DataType>> descriptor of a set of values that lack identity (independent existence and the possibility of side effects). Data types include primitive predefined types and user-definable types. A DataType is thus a class with few or no operations whose primary purpose is to hold the abstract state of another class.

- d) <<CodeList>> used to describe a more open enumeration. <<CodeList>> is a flexible enumeration. Code lists are useful for expressing a long list of potential values. If the elements of the list are completely known, an enumeration should be used; if the only likely values of the elements are known, a code list should be used.
- e) <<Union>> describes a selection of one of the specified types. This is useful to specify a set of alternative classes/types that can be used, without the need to create a common super-type/class.
- f) <<Abstract>> class (or other classifier) that cannot be directly instantiated. UML notation for this to show the name in italics.
- g) <<Metaclass>> class whose instances are classes. Metaclasses are typically used in the construction of meta-models. A metaclass is an object class whose primary purpose is to hold metadata about another class.
- h) <<Interface>> named set of operations that characterize the behaviour of an element.
- i) <<Package>> cluster of logically related components, containing sub-packages.
- j) <<Leaf>> package that contains definitions, without any sub-packages.

## 5.5 Package abbreviations

Two letter abbreviations are used to denote the package that contains a class. Those abbreviations precede class names, connected by a “\_”. The standard that those classes are located in is indicated in parentheses. A list of those abbreviations follows.

CC	Changing Coordinates (ISO 19111)
CI	Citation (ISO 19115)
CV	Coverages (ISO 19123)
DQ	Data quality (ISO 19115)
DS	Dataset (ISO 19115)
EX	Extent (ISO 19115)
FC	Feature Catalogue (ISO 19110)
FE	Feature (ISO 19109)
FT	Feature Topology (ISO 19107)
GF	General Feature (ISO 19109)
GM	Geometry (ISO 19107)
GR	Graph (ISO 19107)
LI	Lineage (ISO 19115)
MD	Metadata (ISO 19115)
PF	Feature Portrayal (ISO 19117)
PS	Positioning Services (ISO 19116)
RS	Reference System (ISO 19115)

SC	Spatial Coordinates (ISO 19111)
SI	Spatial Identification (ISO 19112)
SV	Services (ISO 19119)
TM	Temporal (ISO 19108)
TP	Topology (ISO 19107)
TS	Simple Topology (ISO 19107)

## 5.6 UML model / data dictionary relationships

Table 1 illustrates the relationship between the terminology of the UML models and the data dictionary.

**Table 1 — Relationship between UML model and data dictionary**

UML Model	Data Dictionary
Package	Section
Generalized Class	Entity
Specified Class	Entity
Class	Entity
Attribute	Element
Association	Element

## 6 Requirements

### 6.1 Metadata for geographic data requirement

This International Standard identifies the metadata required to describe digital geographic data. Metadata is applicable to independent datasets, aggregations of datasets, individual geographic features, and the various classes of objects that compose a feature. Metadata shall be provided for geographic datasets and may, optionally, be provided for aggregations of datasets, features, and attributes of features. Metadata is composed of one or more Metadata Sections (UML Packages) containing one or more Metadata Entities (UML classes).

### 6.2 Metadata application information

Figure 3 is a UML class diagram defining the classes of geographic information to which metadata applies. It specifies that a dataset (DS\_DataSet) must have one or more related Metadata entity sets (MD\_Metadata). Metadata may optionally relate to a Feature, Feature Attribute, Feature Type, Feature Property Type (a Metaclass instantiated by Feature association role, Feature attribute type, and Feature operation), and aggregations of datasets (DS\_Aggregate). Dataset aggregations may be specified (subclassed) as a general association (DS\_OtherAggregate), a dataset series (DS\_Series), or a special activity (DS\_Initiative). MD\_Metadata also applies to other classes of information and services not shown in this diagram (see MD\_ScopeCode, B.5.25).

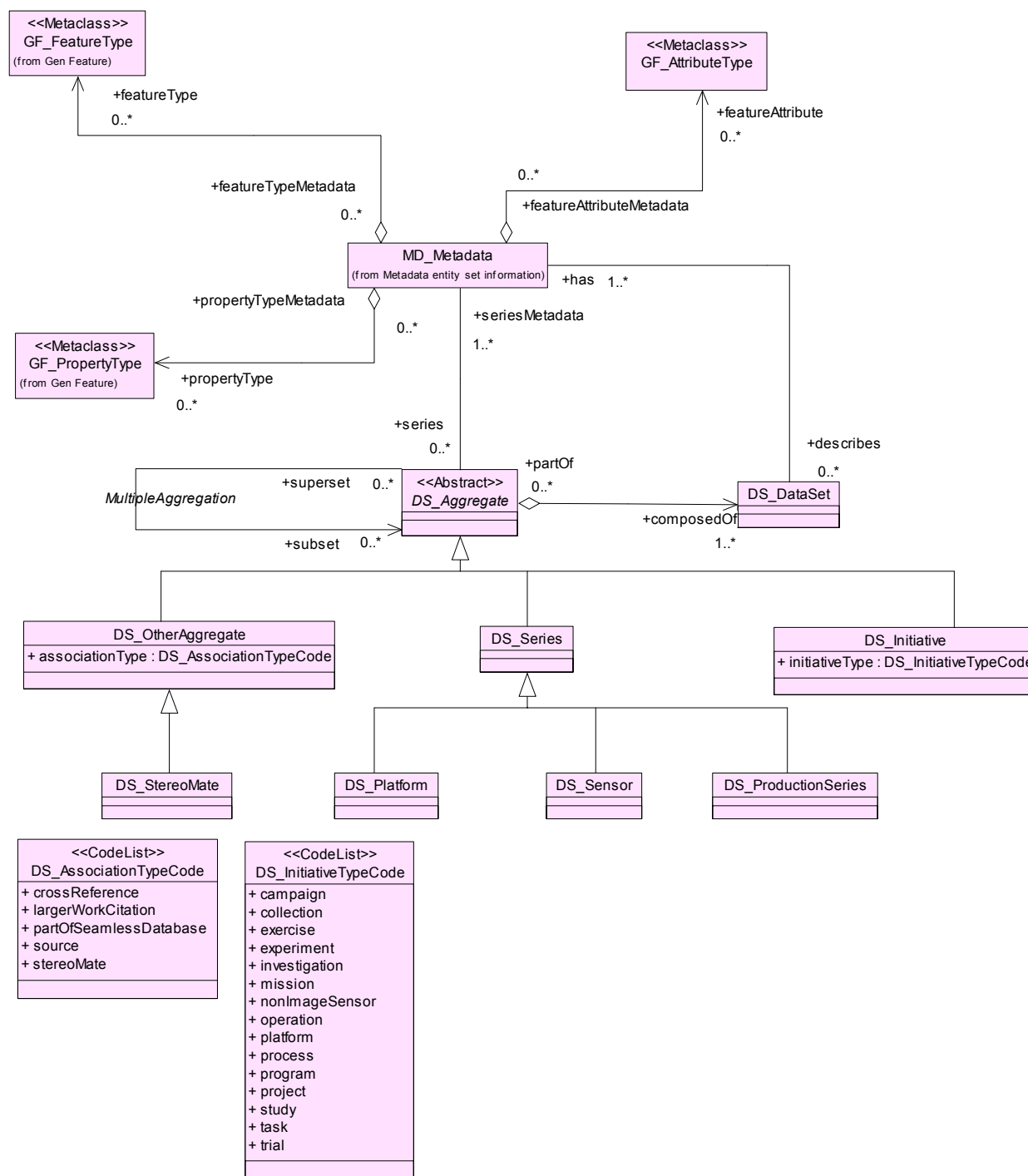


Figure 3 — Metadata application

6.3 Metadata packages

6.3.1 Metadata package and entity relationship

In this International Standard, metadata for geographic data is presented in UML Packages. Each package contains one or more entities (UML Classes), which can be specified (subclassed) or generalized (superclassed). Entities contain elements (UML class attributes) which identify the discrete units of metadata. Entities may be related to one or more other entities. Entities can be aggregated and repeated as necessary to meet: (1) the mandatory requirements stated in this International Standard; (2) additional user requirements. Figure 4 illustrates the layout of the packages. The metadata is fully specified in the UML model diagrams and data dictionary for each package, which can be found in annexes A and B respectively. If a discrepancy between the two annexes exists, annex A shall be considered authoritative.

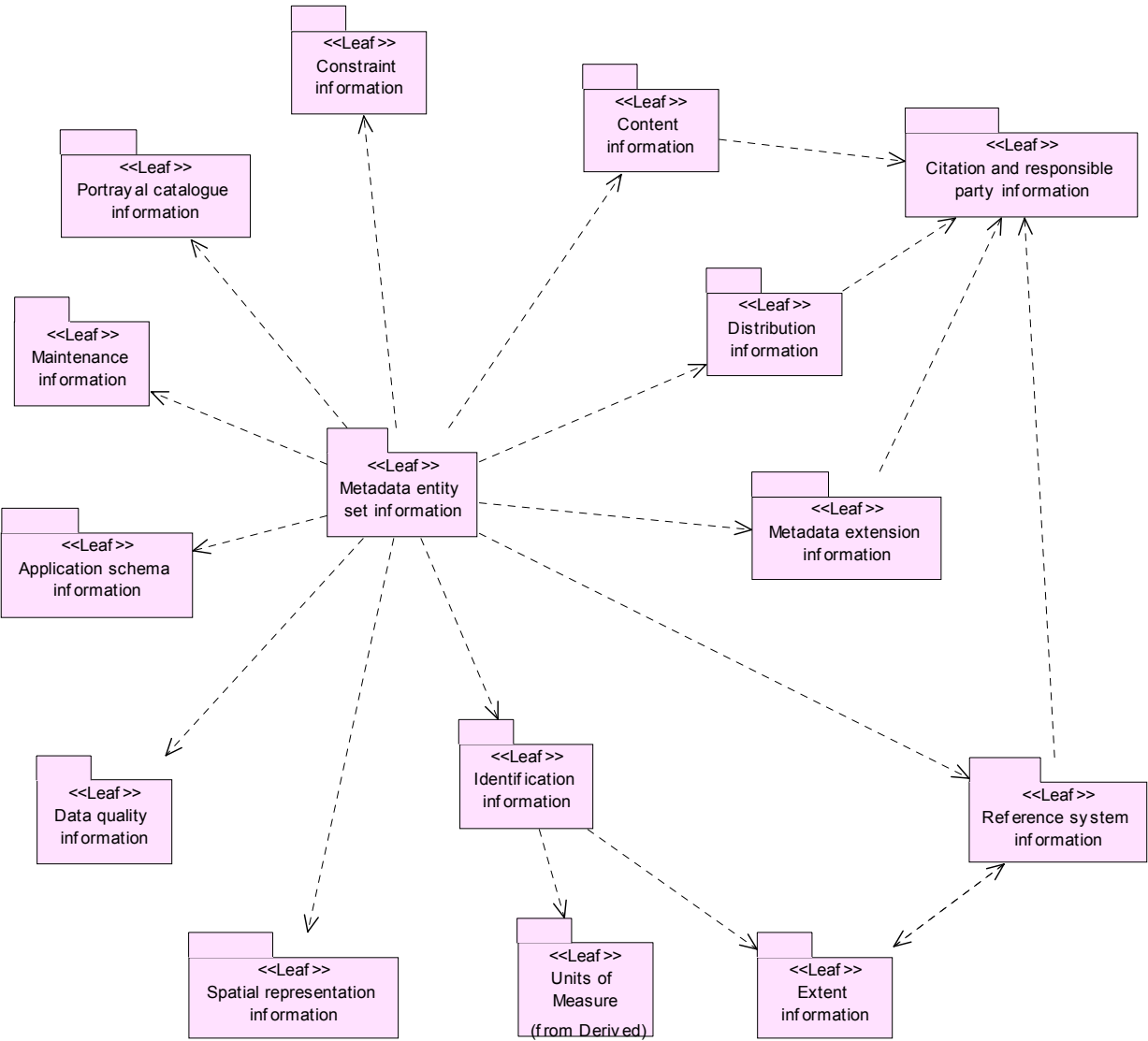


Figure 4 — Metadata packages

The relationship between packages of metadata and metadata entities is shown in Table 2. The packages of metadata are listed in the Package column and the aggregate entity of metadata contained within the corresponding package is listed in the Entity column. The entities contained within the packages are further



defined in 6.3.2 through 6.4.2. Each package has a corresponding subclause, which is listed in the subclause Name column.

**Table 2 — Relationship between packages of metadata and metadata entities**

SubClause Name	Package	Entity	UML Diagram	Data Dictionary
6.3.2.1	Metadata entity set information	MD_Metadata	A.2.1	B.2.1
6.3.2.2	Identification information	MD_Identification	A.2.2	B.2.2
6.3.2.3	Constraint information	MD_Constraints	A.2.3	B.2.3
6.3.2.4	Data quality information	DQ_DataQuality	A.2.4 A.2.4.1 A.2.4.2	B.2.4 B.2.4.1 B.2.4.2
6.3.2.5	Maintenance information	MD_MaintenanceInformation	A.2.5	B.2.5
6.3.2.6	Spatial representation information	MD_SpatialRepresentation	A.2.6	B.2.6
6.3.2.7	Reference system information	MD_ReferenceSystem	A.2.7	B.2.7
6.3.2.8	Content information	MD_ContentInformation	A.2.8	B.2.8
6.3.2.9	Portrayal catalogue information	MD_PortrayalCatalogueReference	A.2.9	B.2.9
6.3.2.10	Distribution information	MD_Distribution	A.2.10	B.2.10
6.3.2.11	Metadata extension information	MD_MetadataExtensionInformation	A.2.11	B.2.11
6.3.2.12	Application schema information	MD_ApplicationSchemaInformation	A.2.12	B.2.12
6.4.1	Extent information	EX_Extent	A.3.1	B.3.1
6.4.2	Citation and responsible party information	CI_Citation CI_ResponsibleParty	A.3.2	B.3.2

## 6.3.2 Package descriptions

### 6.3.2.1 Metadata entity set information (MD\_Metadata)

Metadata entity set information consists of the entity (UML class) MD\_Metadata, which is mandatory. The MD\_Metadata entity contains both mandatory and optional metadata elements (UML attributes). The MD\_Metadata entity is an aggregate of the following entities (which are further explained in the following subclauses):

- MD\_Identification
- MD\_Constraints
- DQ\_DataQuality
- MD\_MaintenanceInformation
- MD\_SpatialRepresentation
- MD\_ReferenceSystem
- MD\_ContentInformation
- MD\_PortrayalCatalogueReference
- MD\_Distribution
- MD\_MetadataExtensionInformation
- MD\_ApplicationSchemaInformation

### 6.3.2.2 Identification information (MD\_Identification)

Identification information contains information to uniquely identify the data. Identification information includes information about the citation for the resource, an abstract, the purpose, credit, the status and points of contact. The MD\_Identification entity is mandatory. It contains mandatory, conditional, and optional elements. The MD\_Identification entity may be specified (subclassed) as MD\_DataIdentification when used to identify data and as MD\_ServiceIdentification when used to identify a service. MD\_ServiceIdentification provides a high level description of a service, for further information see ISO 19119. MD\_Identification is an aggregate of the following entities:

- MD\_Format, format of the data
- MD\_BrowseGraphic, graphic overview of the data
- MD\_Usage, specific uses of the data
- MD\_Constraints, constraints placed on the resource
- MD\_Keywords, keywords describing the resource
- MD\_MaintenanceInformation, how often the data is scheduled to be updated and the scope of the update

The geographicBox and geographicDescription elements of MD\_Identification are conditional; one of them shall be included if the dataset is spatially referenced. If necessary both may be used.

The characterSet element of MD\_Identification is conditional; it is documented if ISO 10646-1 is not used.

### 6.3.2.3 Constraint information (MD\_Constraints)

This package contains information concerning the restrictions placed on data. The MD\_Constraints entity is optional and may be specified as MD\_LegalConstraints and/or MD\_SecurityConstraints.

The otherConstraint element of MD\_LegalConstraints shall be non-zero (used) only if accessConstraints and/or useConstraints elements have a value of "otherRestrictions", which is found in the MD\_Restriction codelist.

### 6.3.2.4 Data quality information (DQ\_DataQuality)

This package contains a general assessment of the quality of the dataset. The DQ\_DataQuality entity is optional and contains the scope of the quality assessment. DQ\_DataQuality is an aggregate of LI\_Lineage and DQ\_Element. DQ\_Element can be specified as DQ\_Completeness, DQ\_LogicalConsistency, DQ\_PositionalAccuracy, DQ\_ThematicAccuracy and DQ\_TemporalAccuracy. Those five entities represent Elements of data quality and can be further subclassed to the sub-Elements of data quality. Users may add additional elements and sub-elements of data quality by sub-classing DQ\_Element or the appropriate sub-element.

This package also contains information about the sources and production processes used in producing a dataset. The LI\_Lineage entity is optional and contains a statement about the lineage. LI\_Lineage is an aggregate of LI\_ProcessStep and LI\_Source.

The "report" and "lineage" roles of DQ\_DataQuality are mandatory if DQ\_DataQuality.scope.DQ\_Scope.level has a value of "dataset".

The "levelDescription" element of DQ\_Scope is mandatory if the "level" element of DQ\_Scope does not have a value of "dataset" or "series".

The 'statement' element of LI\_Lineage is mandatory if DQ\_DataQuality.scope.DQ\_Scope.level has a value of 'dataset' or 'series' and the LI\_Lineage roles of 'source' and 'processStep' are not documented.

The “source” role of LI\_Lineage is mandatory if the “statement” element and the “processStep” role of LI\_Lineage are not documented.

The “processStep” role of LI\_Lineage is mandatory if the “statement” element and the “source” role of LI\_Lineage are not documented.

Either the “description” or “sourceExtent” element of LI\_Source must be documented.

#### **6.3.2.5 Maintenance information (MD\_MaintenanceInformation)**

This package contains information about the scope and frequency of updating data. The MD\_MaintenanceInformation entity is optional and contains mandatory and optional metadata elements.

#### **6.3.2.6 Spatial representation information (MD\_SpatialRepresentation)**

This package contains information concerning the mechanisms used to represent spatial information in a dataset. The MD\_SpatialRepresentation entity is optional and can be specified as MD\_GridSpatialRepresentation and MD\_VectorSpatialRepresentation. Each of the specified entities contains mandatory and optional metadata elements. When further description is necessary, MD\_GridSpatialRepresentation may be specified as MD\_Georectified and/or MD\_Georeferenceable. Metadata for Spatial data representation are derived from ISO 19107.

#### **6.3.2.7 Reference system information (MD\_ReferenceSystem)**

This package contains the description of the spatial and temporal reference system(s) used in a dataset. MD\_ReferenceSystem contains an element to identify the reference system used. MD\_ReferenceSystem may be subclassed as MD\_CRS, which is an aggregate of MD\_ProjectionParameters and MD\_EllipsoidParameters. MD\_ProjectionParameters is an aggregate of MD\_ObliqueLineAzimuth and MD\_ObliqueLinePoint. MD\_ReferenceSystem is derived from RS\_ReferenceSystem, which can be specified as SC\_CRS, SI\_SpatialReferenceSystemUsingGeographicIdentifiers and TM\_ReferenceSystem. Metadata for Reference system information are derived from ISO 19108, ISO 19111 and ISO 19112.

#### **6.3.2.8 Content information (MD\_ContentInformation)**

This package contains information identifying the feature catalogue used (MD\_FeatureCatalogueDescription) and/or information describing the content of a coverage dataset (MD\_CoverageDescription). Both description entities are subclasses of the MD\_ContentInformation entity. MD\_CoverageDescription may be subclassed as MD\_ImageDescription, and is an aggregate of MD\_RangeDimension. MD\_RangeDimension may additionally be subclassed as MD\_Band.

#### **6.3.2.9 Portrayal catalogue information (MD\_PortrayalCatalogueReference)**

This package contains information identifying the portrayal catalogue used. It consists of the optional entity MD\_PortrayalCatalogueReference. This entity contains the mandatory element used to specify which portrayal catalogue is used by the dataset.

#### **6.3.2.10 Distribution information (MD\_Distribution)**

This package contains information about the distributor of, and options for obtaining, a resource. It contains the optional MD\_Distribution entity. MD\_Distribution is an aggregate of the options for the digital distribution of a dataset (MD\_DigitalTransferOptions), identification of the distributor (MD\_Distributor) and the format of the distribution (MD\_Format), which contain mandatory and optional elements. MD\_DigitalTransferOptions contains the medium used for the distribution (MD\_Medium) of a dataset, and is an aggregate of MD\_DigitalTransferOptions. MD\_Distributor is an aggregate of the process for ordering a distribution (MD\_StandardOrderProcess).

The “distributionFormat” role of MD\_Distribution is mandatory if the “distributorFormat” role of MD\_Distributor is not documented.

The “distributorFormat” role of MD\_Distributor is mandatory if the “distributionFormat” role of MD\_Distribution is not documented.

#### **6.3.2.11 Metadata extension information (MD\_MetadataExtensionInformation)**

This package contains information about user specified extensions. It contains the optional MD\_MetadataExtensionInformation entity. MD\_MetadataExtensionInformation is an aggregate of information describing the extended metadata elements (MD\_ExtendedElementInformation).

If the “dataType” element of MD\_ExtendedElementInformation does not have a value of ‘codelist’, ‘enumeration’ or ‘codelistElement’; then the “obligation”, “maximumOccurrence” and “domainValue” elements are mandatory.

If the “dataType” element of MD\_ExtendedElementInformation has a value of ‘codelistElement’, then the “domainCode” element is mandatory.

If the “dataType” element of MD\_ExtendedElementInformation does not have a value of ‘codelistElement’, then the “shortName” element is mandatory.

If the “obligation” element of MD\_ExtendedElementInformation has a value of ‘conditional’, then the “condition” element is mandatory.

#### **6.3.2.12 Application schema information (MD\_ApplicationSchemaInformation)**

This package contains information about the application schema used to build a dataset. It contains the optional entity MD\_ApplicationSchemaInformation which is an aggregate of MD\_SpatialAttributeSupplement, which is an aggregate of MD\_FeatureTypeList. The entities contain mandatory and optional elements.

### **6.4 Metadata datatypes**

#### **6.4.1 Extent information (EX\_Extent)**

The datatype in this package is an aggregate of the metadata elements that describe the spatial and temporal extent of the referring entity. The EX\_Extent entity contains information about the geographic (EX\_GeographicExtent), temporal (EX\_TemporalExtent) and the vertical (EX\_VerticalExtent) extent of the referring entity. EX\_GeographicExtent can be subclassed as EX\_BoundingPolygon, EX\_GeographicBoundingBox and EX\_GeographicDescription. The combined spatial and temporal extent (EX\_SpatialTemporalExtent) is an aggregate of EX\_GeographicExtent. EX\_SpatialTemporalExtent is a subclass of EX\_TemporalExtent.

The EX\_Extent entity has three optional roles named “geographicElement”, “temporalElement”, and “verticalElement” and an element called “description”. At least one of the four shall be used.

The entity stereotype “DataType” is defined in 5.4.

#### **6.4.2 Citation and responsible party information (CI\_Citation and CI\_ResponsibleParty)**

This package of datatypes provides a standardized method (CI\_Citation) for citing a resource (dataset, feature, source, publication, etc.), as well as information about the party responsible (CI\_ResponsibleParty) for a resource. The CI\_ResponsibleParty datatype contains the identity of person(s), and/or position, and/or organization(s) associated with the resource. The location (CI\_Address) of the responsible person or organization is also defined here.

The entity stereotype “DataType” is defined in 5.4.

### **6.5 Core metadata for geographic datasets**

This International Standard defines an extensive set of metadata elements; typically only a subset of the full number of elements is used. However, it is essential that a basic minimum number of metadata elements be

maintained for a dataset. Listed are the core metadata elements required to identify a dataset, typically for catalogue purposes. This list contains metadata elements answering the following questions: “Does a dataset on a specific topic exist (‘what’)?”, “For a specific place (‘where’)?”, “For a specific date or period (‘when’)?” and “A point of contact to learn more about or order the dataset (‘who’)?”. Using the recommended optional elements in addition to the mandatory elements will increase interoperability, allowing users to understand without ambiguity the geographic data and the related metadata provided by either the producer or the distributor. Dataset metadata profiles of this International Standard shall include this core.

Listed below are the core metadata elements (mandatory and recommended optional) required for describing a dataset. An “M” indicates that the element is mandatory. An “O” indicates that the element is optional. A “C” indicates that the element is mandatory under certain conditions.

**Table 3 — Core metadata for geographic datasets**

<b>Dataset title (M)</b> (MD_Metadata > MD_Identification.citation > CI_Citation.title)	<b>Spatial representation type (O)</b> (MD_Metadata > MD_DataIdentification.spatialRepresentationType)
<b>Dataset reference date (M)</b> (MD_Metadata > MD_Identification.citation > CI_Citation > CI_Date.date and CI_dateType)	<b>Reference system (O)</b> (MD_Metadata > MD_ReferenceSystem)
<b>Dataset responsible party (O)</b> (MD_Metadata > MD_Identification.pointOfContact > CI_ResponsibleParty)	<b>Lineage statement (O)</b> (MD_Metadata > DQ_DataQuality > LI_Lineage.statement)
<b>Geographic location of the dataset (by four coordinates or by geographic identifier) (C)</b> (MD_Metadata > MD_DataIdentification.geographicBox or MD_DataIdentification.geographicIdentifier)	<b>On-line resource (O)</b> (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource)
<b>Dataset language (M)</b> (MD_Metadata > MD_DataIdentification.language)	<b>Metadata file identifier (O)</b> (MD_Metadata.fileIdentifier)
<b>Dataset character set (C)</b> (MD_Metadata > MD_DataIdentification.characterSet)	<b>Metadata standard name (O)</b> (MD_Metadata.metadataStandardName)
<b>Dataset topic category (M)</b> (MD_Metadata > MD_DataIdentification.topicCategory)	<b>Metadata standard version (O)</b> (MD_Metadata.metadataStandardVersion)
<b>Spatial resolution of the dataset (O)</b> (MD_Metadata > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	<b>Metadata language (C)</b> (MD_Metadata.language)
<b>Abstract describing the dataset (M)</b> (MD_Metadata > MD_Identification.abstract)	<b>Metadata character set (C)</b> (MD_Metadata.characterSet)
<b>Distribution Format (O)</b> (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version)	<b>Metadata point of contact (M)</b> (MD_Metadata.contact > CI_ResponsibleParty)
<b>Additional extent information for the dataset (vertical and temporal) (O)</b> (MD_Metadata > MD_DataIdentification.extent > EX_Extent)	<b>Metadata date stamp (M)</b> (MD_Metadata.dateStamp)

## **6.6 Unified Modelling Language (UML) diagrams**

Annex A provides the metadata schemas in the form of Unified Modelling Language (UML) diagrams. These diagrams, in conjunction with the data dictionary presented in Annex B, serve to fully define the total abstract model for metadata.

## **6.7 Data dictionary**

Annex B contains the element and entity definitions for the metadata schemas. This dictionary, in conjunction with the diagrams presented in annex A, serve to fully define the total abstract model for metadata.

Codelists and their values provided in this International Standard (B.5 and A.2) are normative. User extensions to codelists shall follow the rules as described in annex C and ISO 11179-6. ISO 11179-6 defines the information to be specified, conditions to be fulfilled and procedure(s) to be followed for registering data elements.

## **6.8 Metadata extensions and profiles**

Annex C provides the rules for defining and applying additional metadata to better serve special user needs.

## **6.9 Abstract test suite**

Annex D defines the tests that must be passed to claim conformance with this International Standard.

## **6.10 Comprehensive dataset metadata application profile**

Annex E defines a comprehensive metadata application schema, which provides an implementable metadata profile. It incorporates the mandatory and optional metadata required to document a geographic data resource completely (independent dataset, dataset series, or individual geographic features). This schema fully defines the complete range of metadata required to identify, evaluate, extract, employ, and manage geographic information. Data producers typically provide comprehensive metadata.

This schema is provided as a UML model.

The codelists values presented in the XML DTD are shown as the plain text terms to further understanding of the standard. To facilitate interoperability in a multi-lingual environment, the numerical codes may be used in an actual implementation.

## **6.11 Dataset metadata – XML DTD**

Annex F contains an XML DTD, based on the comprehensive dataset metadata application schema.

## **6.12 Metadata extension methodology**

Annex G provides guidance on extending metadata. Additional metadata elements shall be defined according to the rules described in Annex C.

## **6.13 Metadata implementation**

Annex H provides an overview of methods and ideas for the implementation and management of metadata for the purposes of search and retrieval, metadata exchange, and presentation.

## **6.14 Hierarchical levels of metadata**

Annex I provides methods for efficiently handling metadata for datasets with metadata requirements at different levels.

## **6.15 Implementation examples**

Annex J provides an example of the use of this International Standard, utilizing the core components of the comprehensive profile, for a geographic dataset. It is presented in an XML document (J.1). An example of extended metadata elements, as may be developed by a specific information community, is also provided (J.2).

## **6.16 Multi-lingual support for free text fields**

Annex K provides a structure to implement the free text fields of this International Standard in multiple languages.

## **Annex A** (normative)

### **Metadata schemas**

#### **A.1 Metadata UML models**

Metadata for describing geographic data is defined using an abstract object model in the Unified Modelling Language (UML). The diagrams in the following subclauses provide “views,” which are portions of the total abstract model for metadata. Each diagram defines a metadata section (UML package) of related entities, elements, data types, and code lists. Related entities, which are defined in another diagram, are shown with elements suppressed and the defining package specified under the entity name in parenthesis. Throughout the following models, entities may have mandatory and/or optional elements and associations. In some cases, optional entities may have mandatory elements; those elements become mandatory only if the optional element is used



## A.2 Metadata package UML diagrams

### A.2.1 Metadata entity set information

Figure A.1 defines the class “MD\_Metadata” and shows containment relationships with the other metadata classes which, in aggregate, define metadata for geographic data. The other metadata class diagrams can be found on the following pages. The data dictionary for this diagram is located in B.2.1

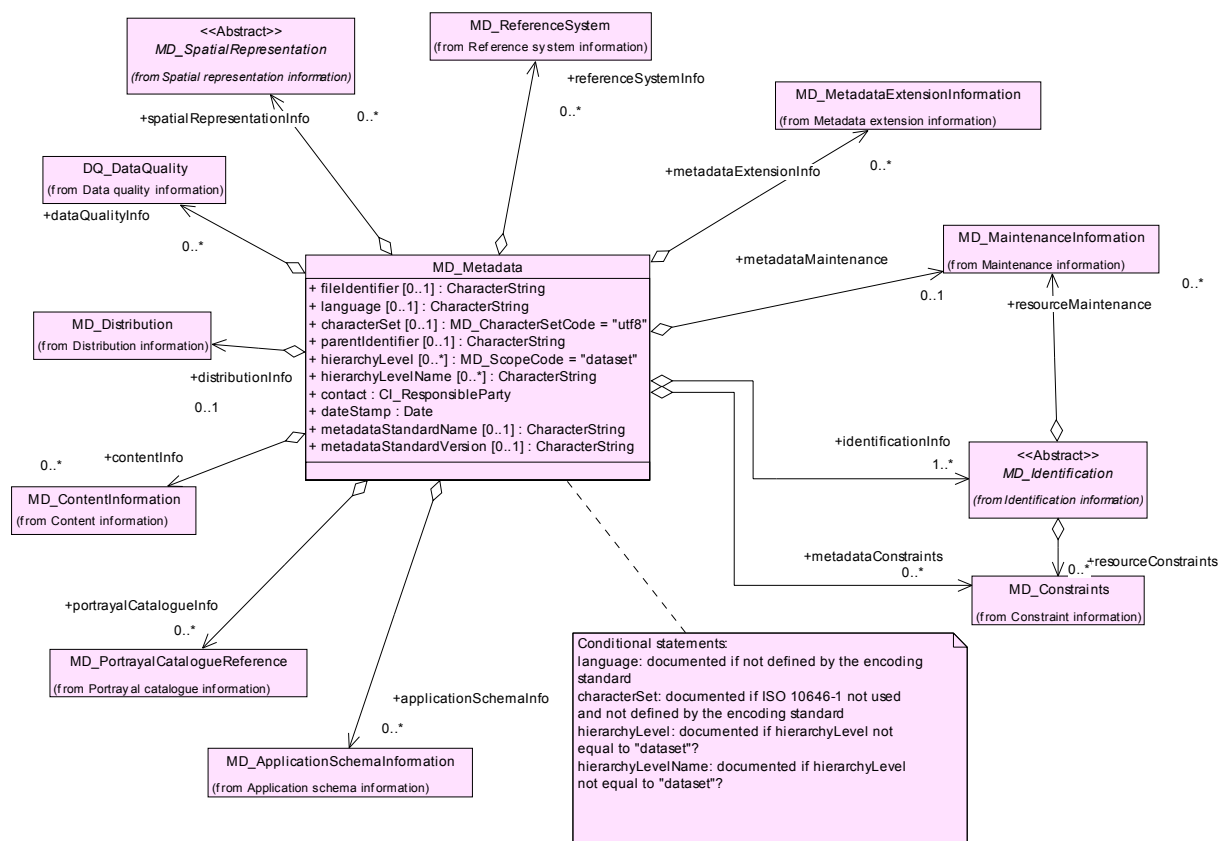
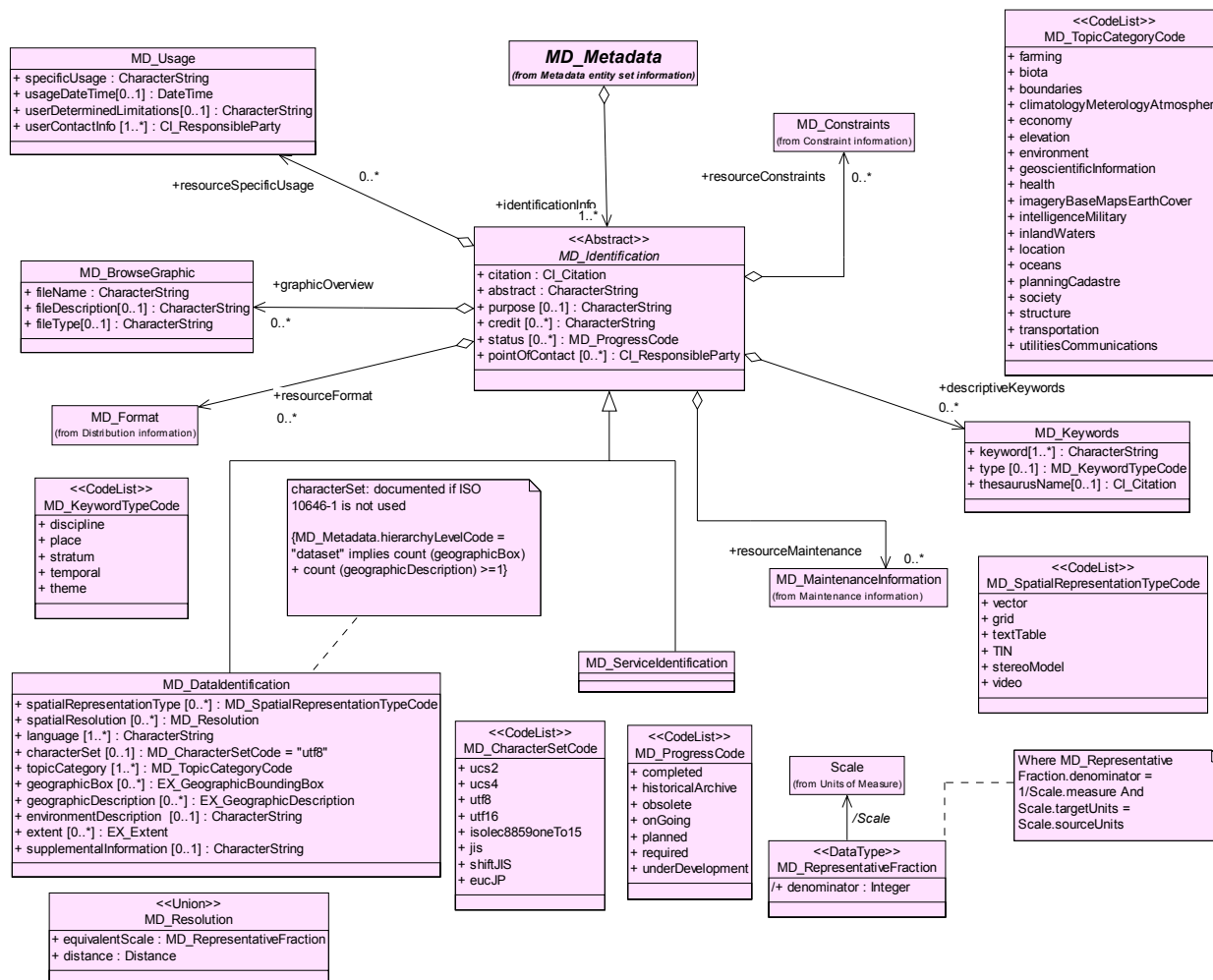


Figure A.1 — Metadata entity set information

### A.2.2 Identification information

Figure A.2 defines the metadata classes required to identify a resource. It also defines separate specialization sub-classes for identifying data and services. The data dictionary for this diagram is located in B.2.2.



### Figure A.2 — Identification information

### A.2.3 Constraint information

Figure A.3 defines the metadata required for managing rights to information including restrictions on access and use. The data dictionary for this diagram is located in B.2.3.

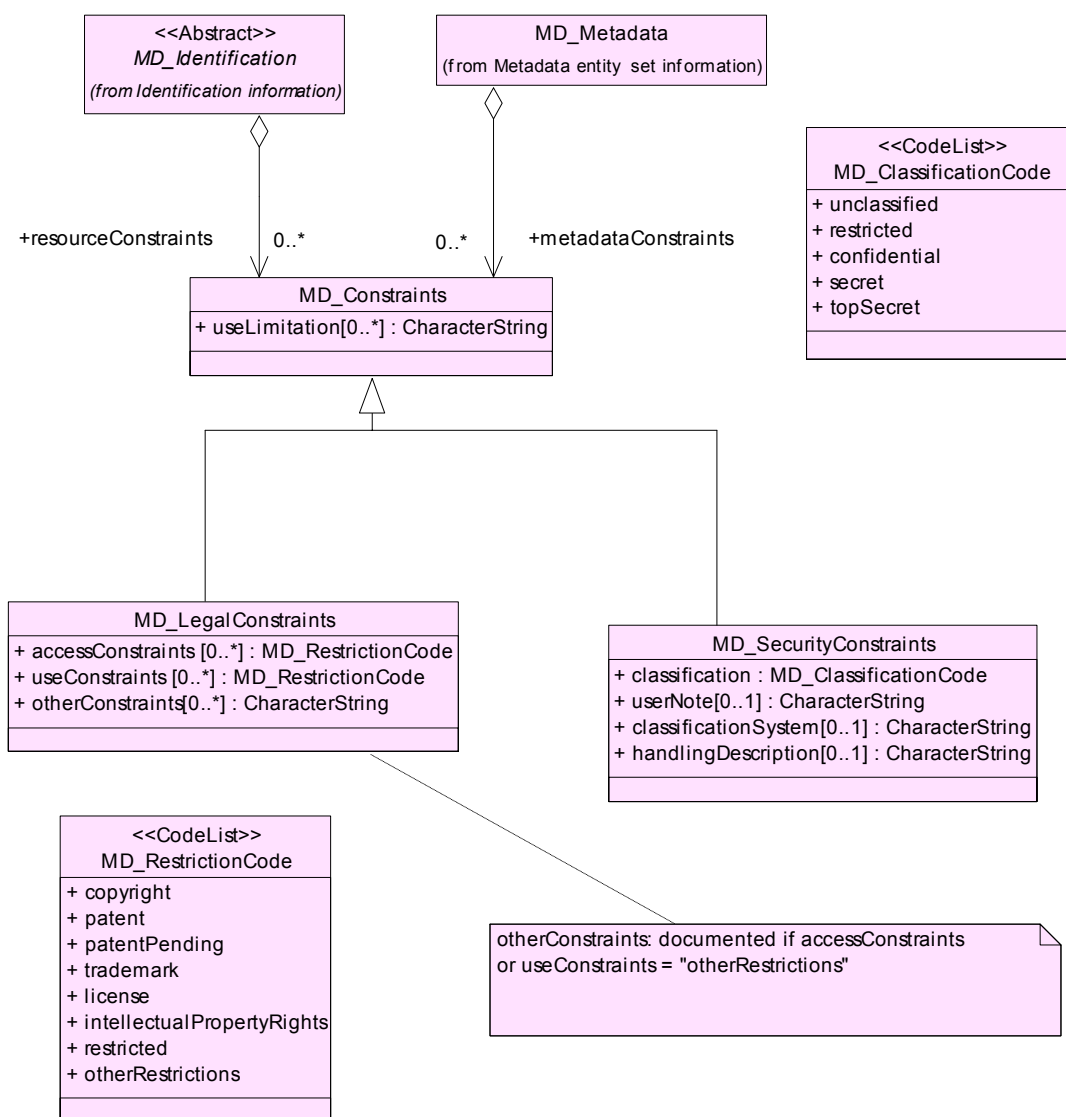


Figure A.3 — Constraint information

A.2.4 Data quality information

Figure A.4 defines the metadata required to give a general assessment of the quality of a resource. The data dictionary for this diagram is located in B.2.4.

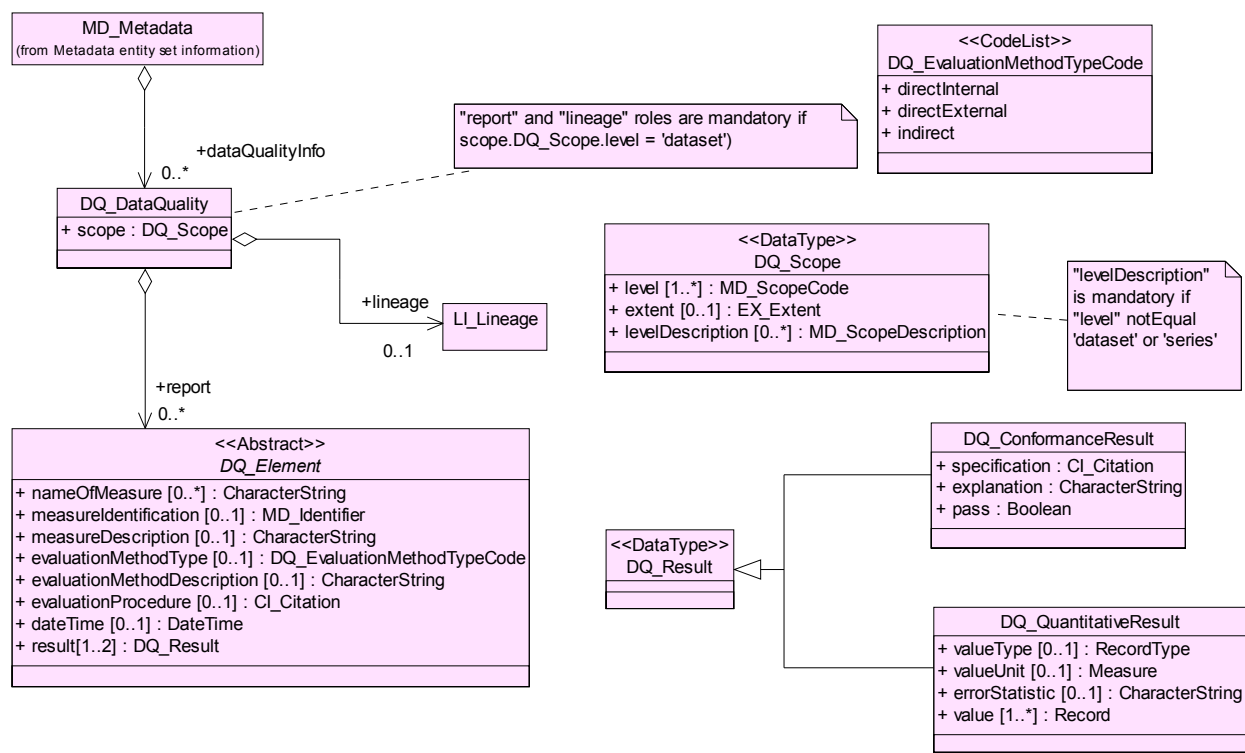


Figure A.4 — Data quality information

### A.2.4.1 Lineage information

Figure A.5 defines metadata required to describe the sources and production processes used in producing a dataset. The data dictionary for this diagram is located in B.2.4.1.

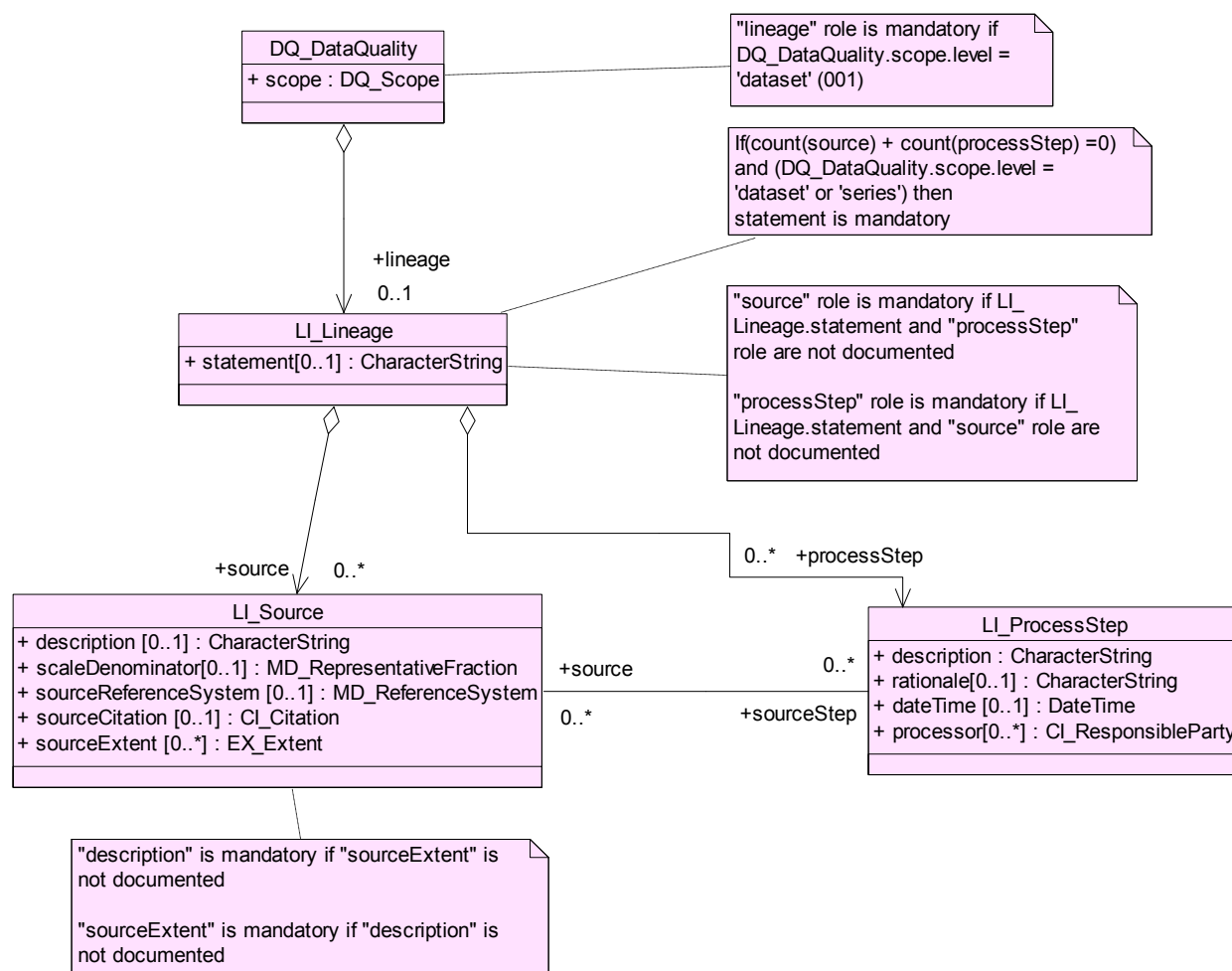


Figure A.5 — Lineage information

### A.2.4.2 Data quality classes and subclasses

Figure A.6 defines the classes and subclasses of data quality used in the data quality diagram. The data dictionary for this diagram is located in B.2.4.2.

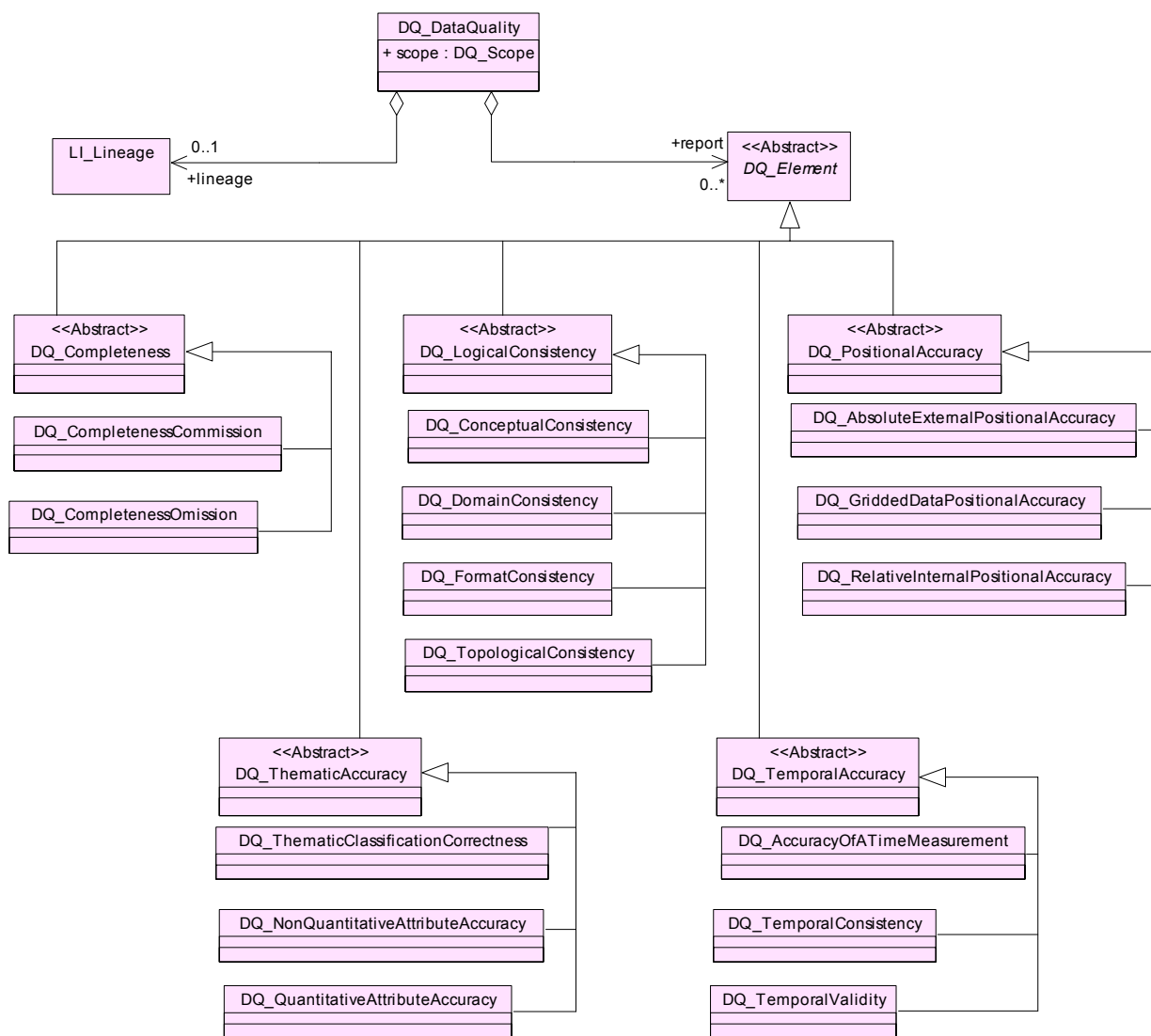


Figure A.6 — Data quality classes and subclasses

### A.2.5 Maintenance information

Figure A.7 defines the metadata required to describe the maintenance and update practices for information. The data dictionary for this diagram is located in B.2.5.

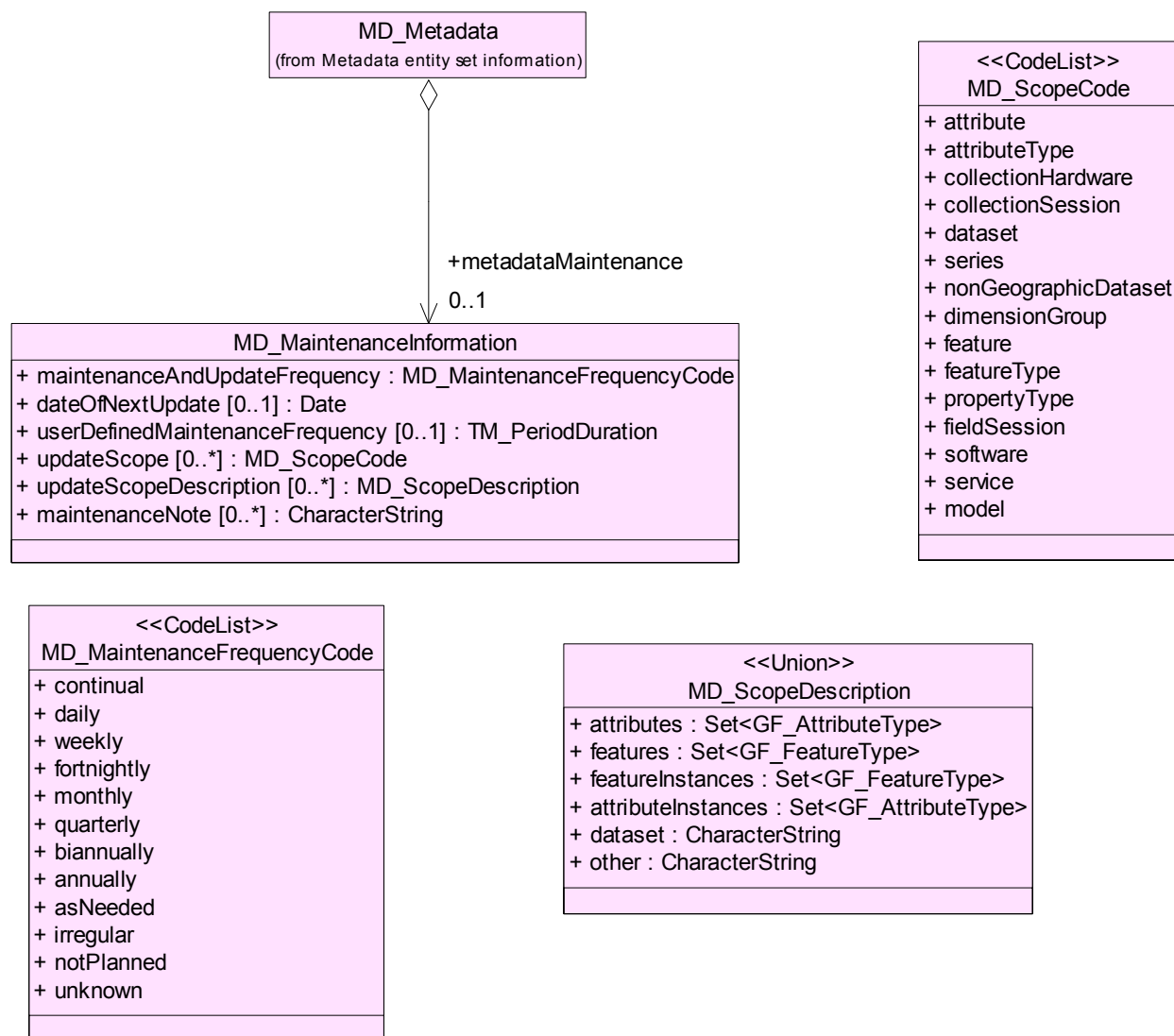


Figure A.7 — Maintenance information

## A.2.6 Spatial representation information

Figure A.8 defines metadata required to describe the mechanism used to represent spatial information. The data dictionary for this diagram is located in B.2.6.

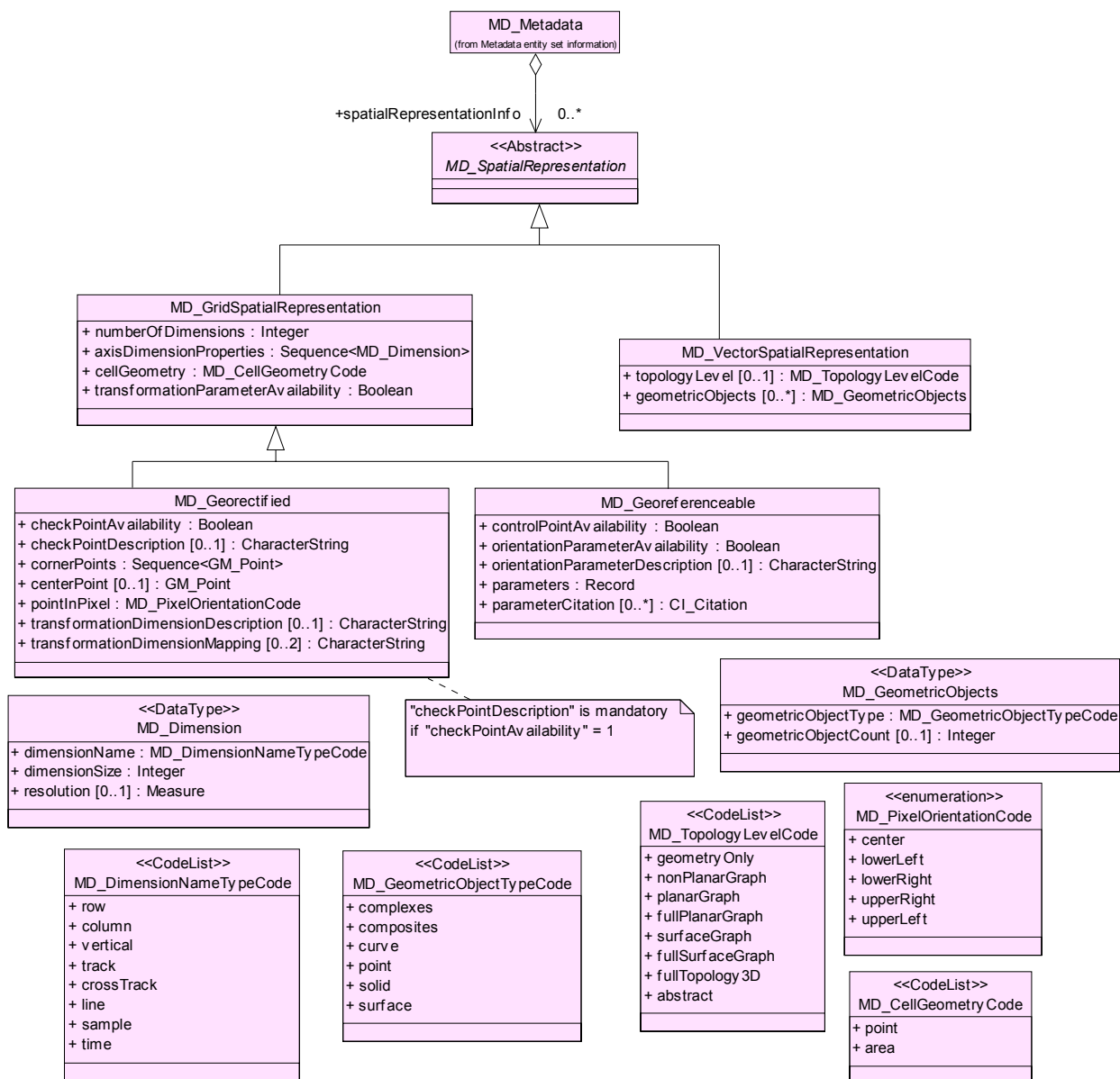


Figure A.8 — Spatial representation information



## A.2.7 Reference system information

Figure A.9 defines metadata required to describe the spatial and temporal reference system used. The data dictionary for this diagram is located in B.2.7.

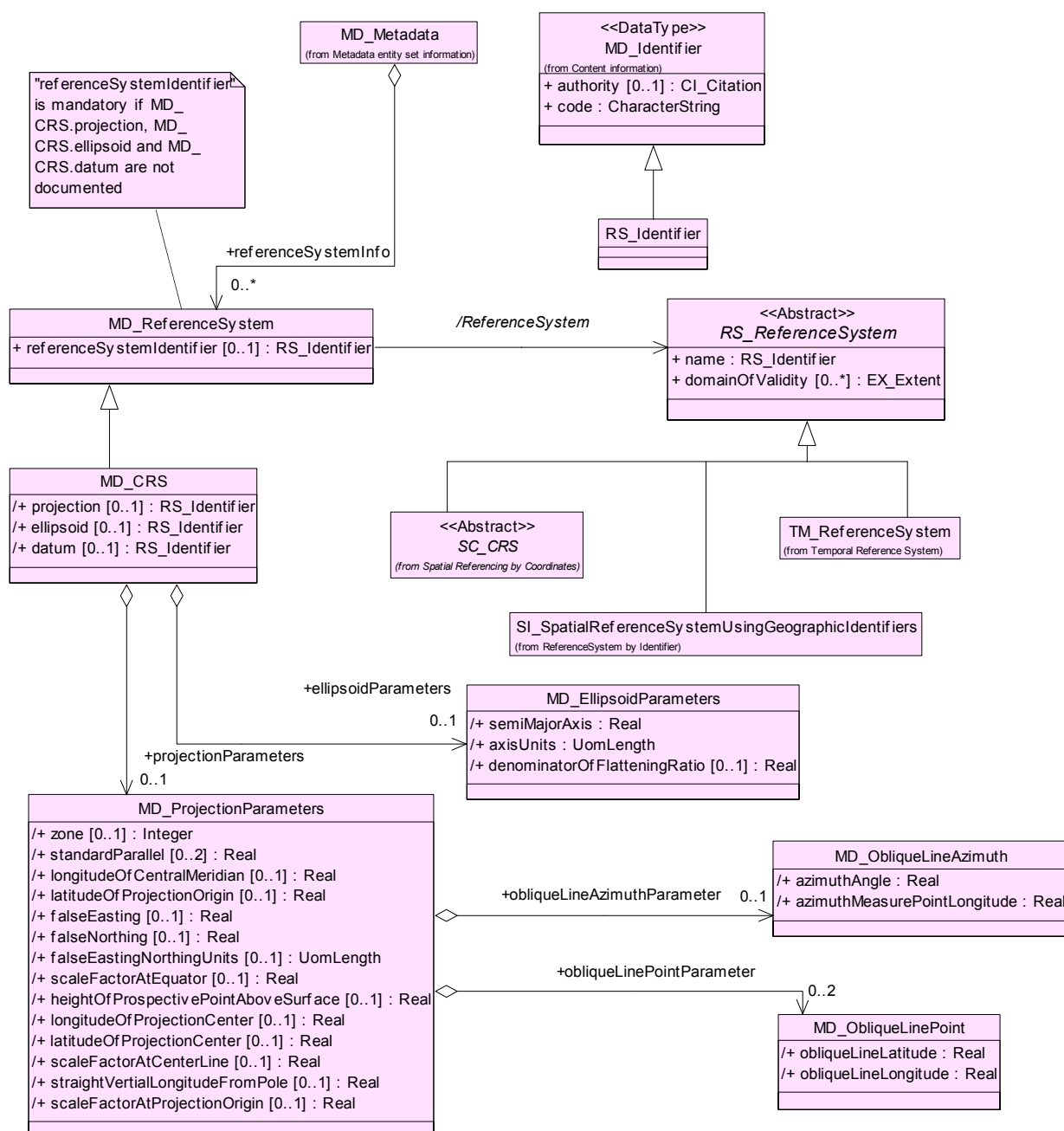


Figure A.9 — Reference system information

## A.2.8 Content information

Figure A.10 defines metadata about the content of a coverage and the feature catalogue(s) used to define features. The data dictionary for this diagram is located in B.2.8.

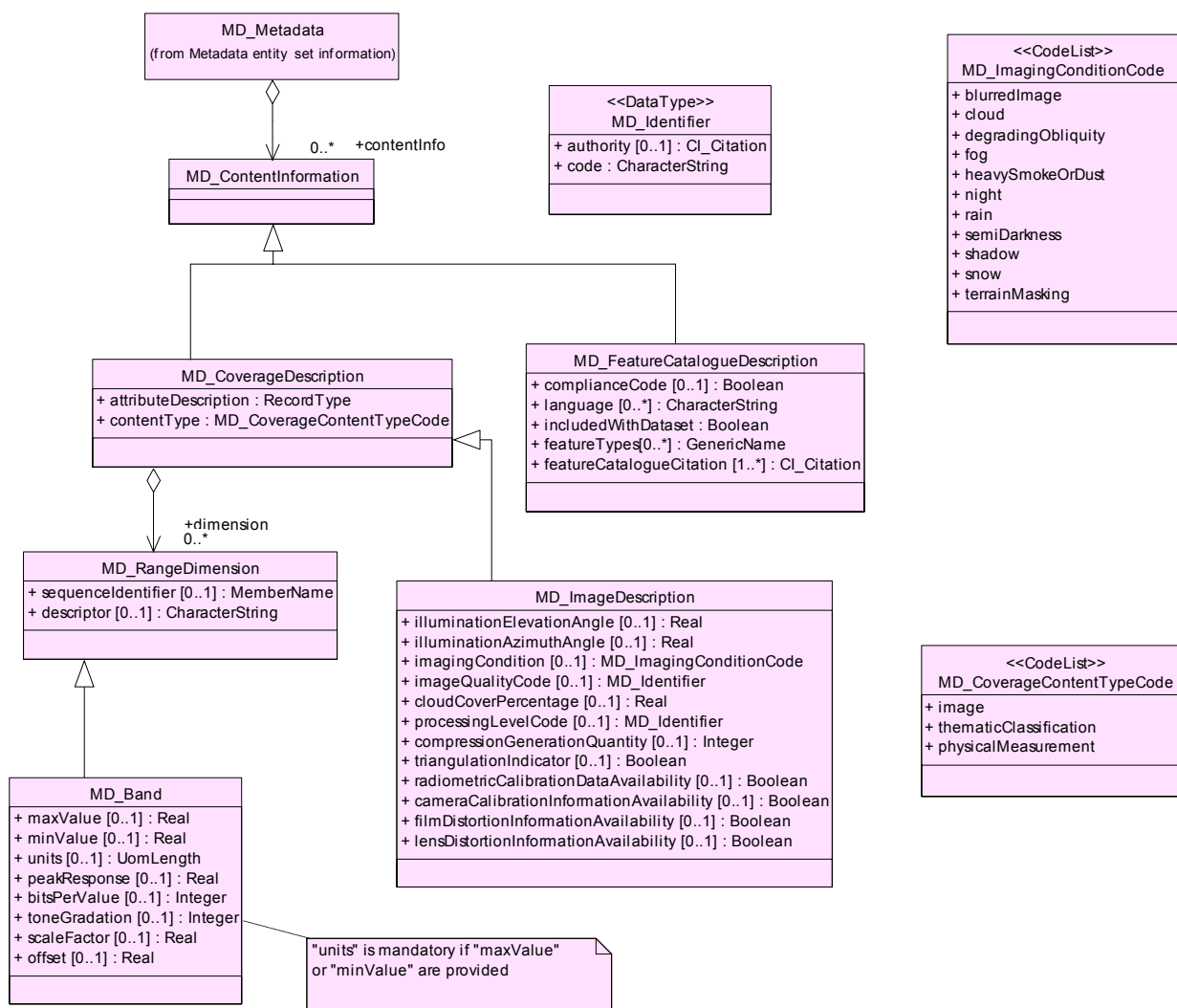
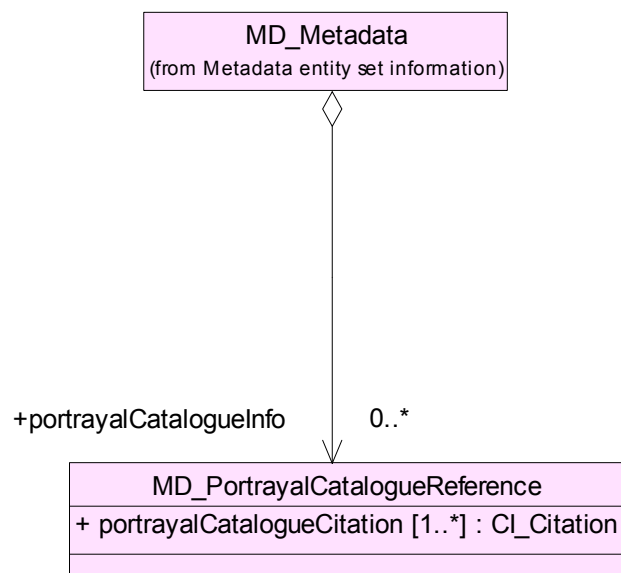


Figure A.10 — Content information

### A.2.9 Portrayal catalogue information

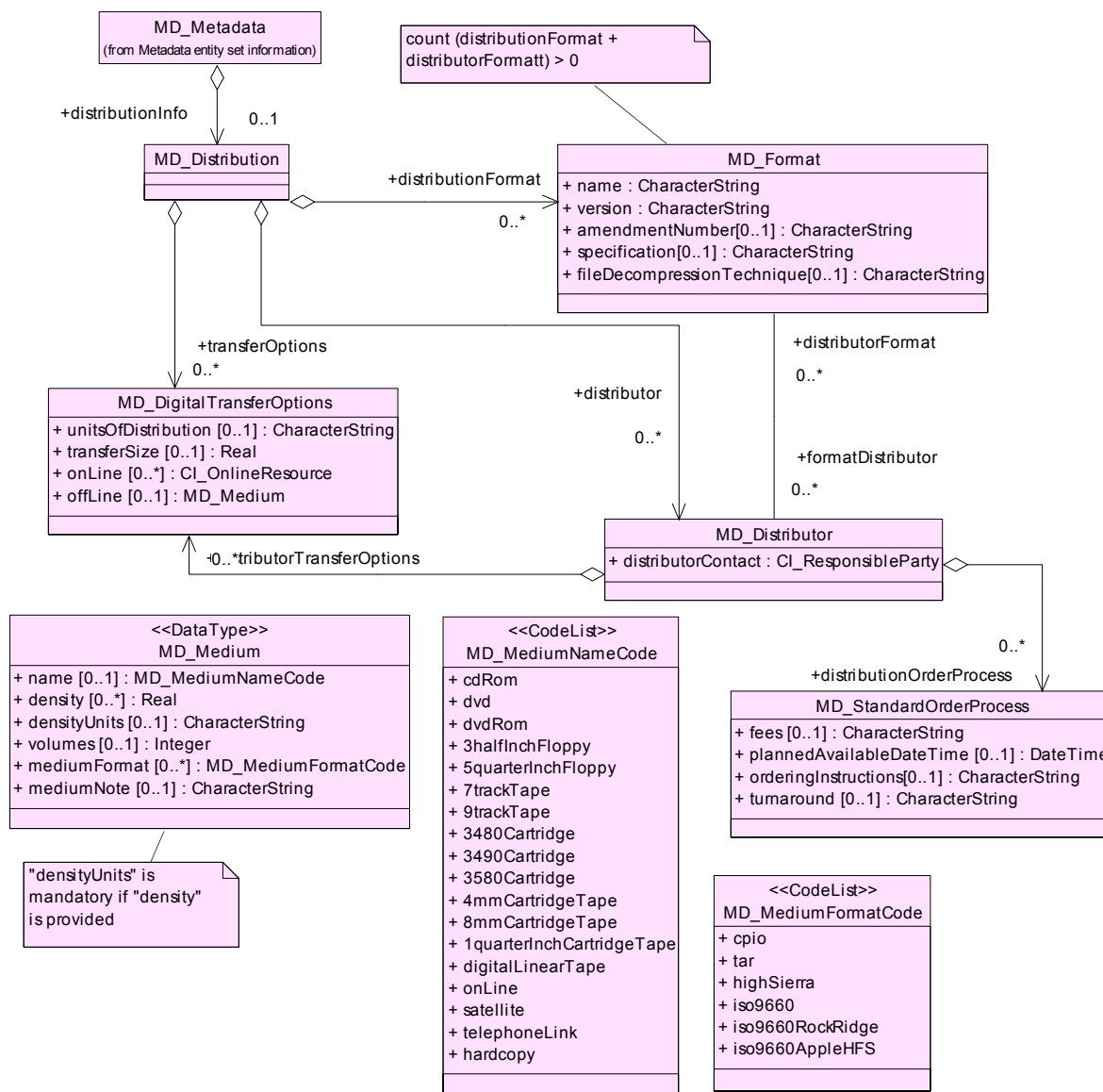
Figure A.11 defines metadata about the portrayal catalogue(s) used to display data. The data dictionary for this diagram is located in B.2.9.



**Figure A.11 — Portrayal catalogue information**

### A.2.10 Distribution information

Figure A.12 defines metadata required for accessing a resource. The data dictionary for this diagram is located in B.2.10.



### Figure A.12 — Distribution information

### A.2.11 Metadata extension information

Figure A.13 defines the extended metadata elements. The data dictionary for this diagram is located in B.2.11.

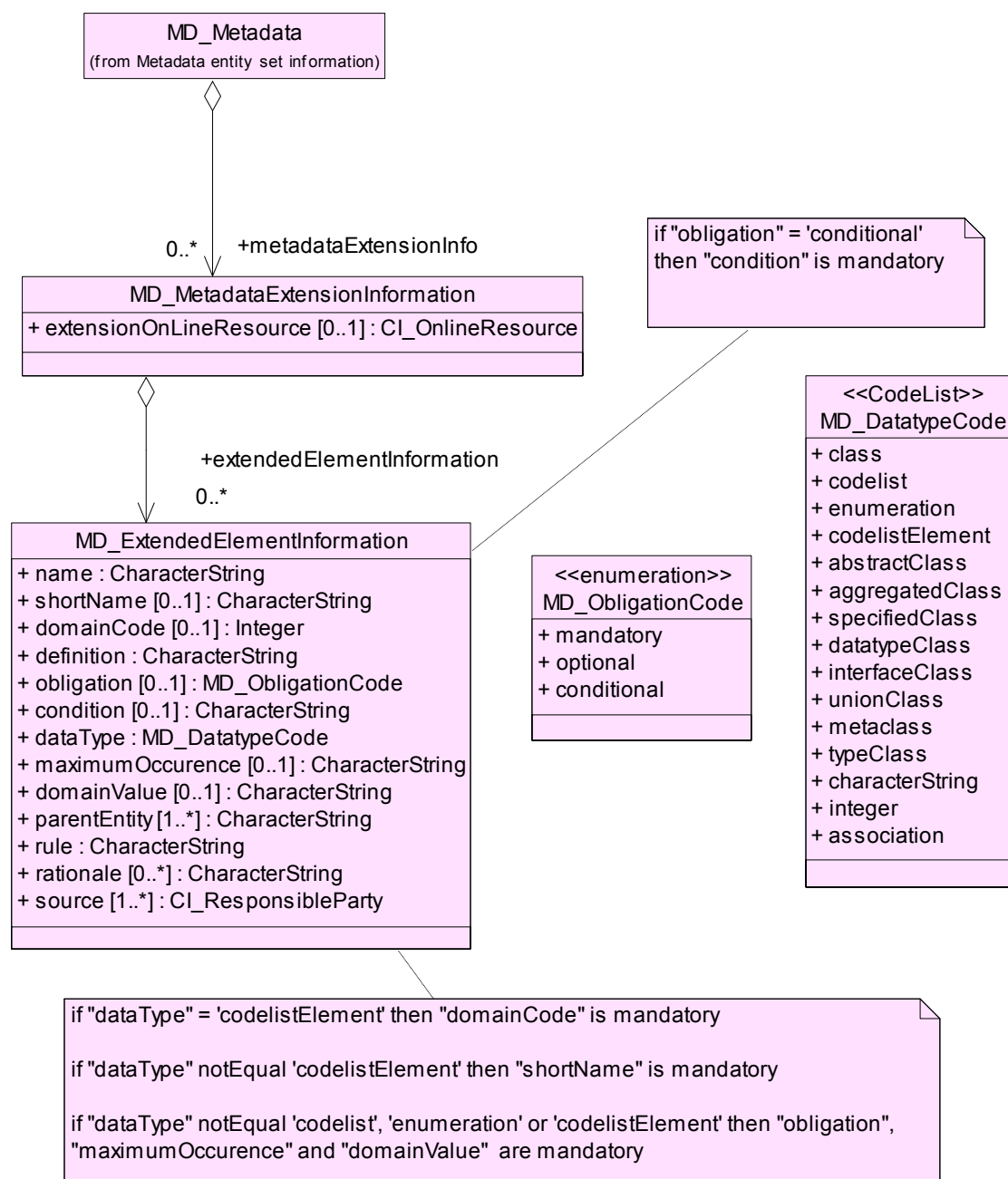


Figure A.13 — Metadata extension information

### A.2.12 Application schema information

Figure A.14 defines the application schema used. The data dictionary for this diagram is located in B.2.12.

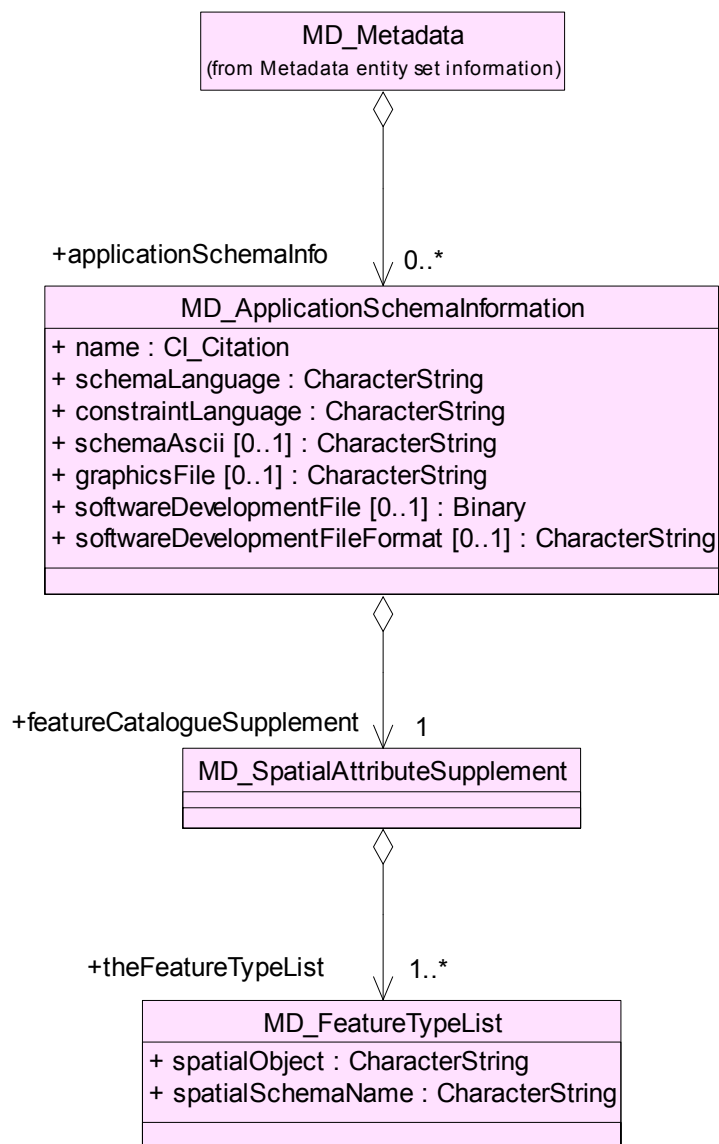


Figure A.14 — Application schema information

## A.3 Metadata data types

### A.3.1 Extent information

Figure A.15 defines metadata describing the spatial and temporal extent covered by a resource. The data dictionary for this diagram is located in B.3.1.

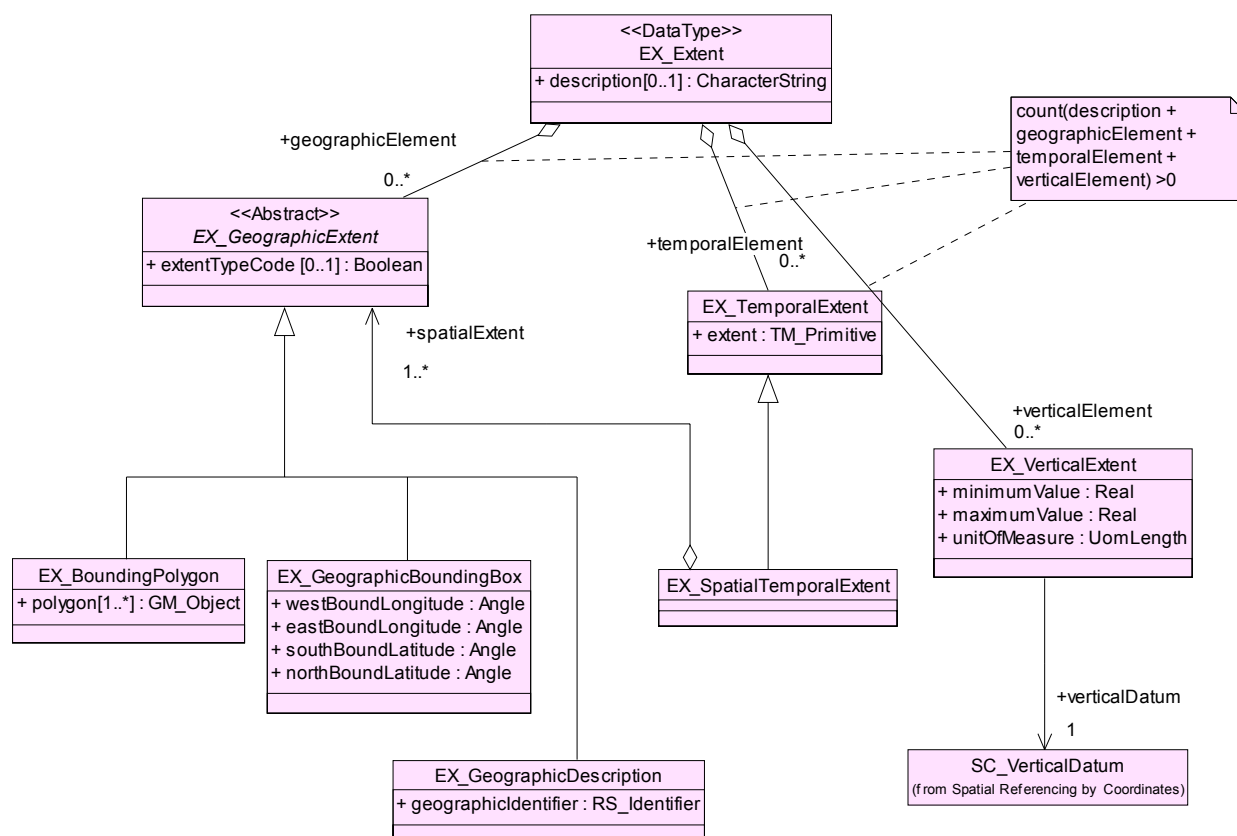


Figure A.15 — Extent information

### A.3.2 Citation and responsible party information

Figure A.16 defines metadata describing authoritative reference information, including responsible party and contact information. The data dictionary for this diagram is located in B.3.2.

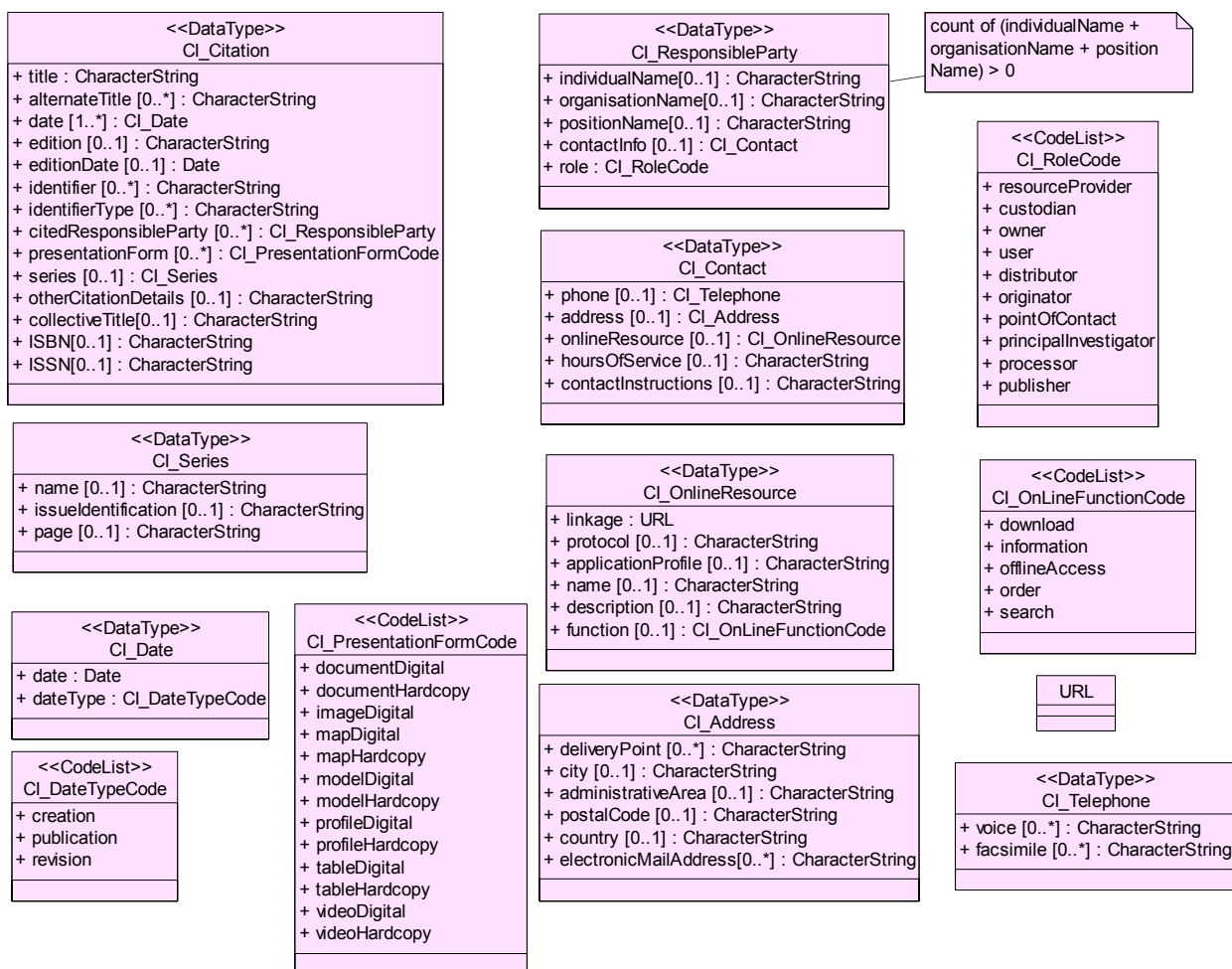


Figure A.16 — Citation and responsible party information



## Annex B (normative)

### Data dictionary for geographic metadata

#### B.1 Data dictionary overview

##### B.1.1 Introduction

This data dictionary describes the characteristics of the metadata defined in clause 6 and annex A. The dictionary is specified in a hierarchy to establish relationships and an organization for the information. The dictionary is categorised into sections by UML model package diagram: Metadata Entity Set, Identification, Resource Constraints, Data Quality, Maintenance, Spatial Representation, Reference System, Content, Portrayal Catalogue, Distribution, Metadata Extension, Application Schema, Extent, Citation and Responsible Party and Metadata Application. The clause titles of several of the tables have been expanded to reflect class specification within the respective diagram. Each model diagram from Annex A has a section within the data dictionary. Each UML model class equates to a data dictionary entity. Each UML model class attribute equates to a data dictionary element. The shaded rows define entities. The entities and elements within the data dictionary are defined by seven attributes (those attributes are listed below and are based on those specified in ISO/IEC 11179-3 for the description of data element concepts, i.e. data elements without representation). The term “dataset” when used as part of a definition is synonymous with all types of geographic data resources (aggregations of datasets, individual geographic features and the various classes that compose a feature).

##### B.1.2 Name/role name

A label assigned to a metadata entity or to a metadata element. Metadata entity names start with an upper case letter. Spaces do not appear in a metadata entity name. Instead, multiple words are concatenated, with each new sub-word starting with a capital letter (example: XnnnYmmm). Metadata entity names are unique within the entire data dictionary of this International Standard. Metadata element names are unique within a metadata entity, not the entire data dictionary of this International Standard. Metadata element names are made unique, within an application, by the combination of the metadata entity and metadata element names (example: MD\_Metadata.characterSet). Role names are used to identify metadata abstract model associations and are preceded by “Role name:” to distinguish them from other metadata elements. Names and role names may be in a language other than that used in this International Standard.

##### B.1.3 Short name and domain code

Those classes that are not CodeList or Enumeration stereotypes are provided with a Short Name for each element. These short names are unique within this International Standard and may be used with the Extensible Markup Language (XML) and ISO 8879 (SGML) or other similar implementation techniques. A naming convention similar to that used to create the longer entity and element names was used to create the short names. NOTE Implementation using SGML and XML is not mandatory; other implementation methods may be accommodated. For CodeList and Enumeration stereotypes, a code is provided for each possible selection. These domain codes are numerical, unique within the codelist and 3 digits long. Row one of each CodeList and Enumeration contains an alphabetic short name, described above, as row one is the name of the CodeList or Enumeration.

##### B.1.4 Definition

The metadata entity/element description.

## **B.1.5 Obligation/Condition**

### **B.1.5.1 General**

This is a descriptor indicating whether a metadata entity or metadata element shall always be documented or sometimes be documented (i.e. contains value(s)). This descriptor may have the following values: M (mandatory), C (conditional), or O (optional).

### **B.1.5.2 Mandatory (M):**

The metadata entity or metadata element shall be documented.

### **B.1.5.3 Conditional (C):**

Specifies an electronically manageable condition under which at least one metadata entity or a metadata element is mandatory. 'Conditional' is used for one of the three following possibilities:

- Expressing a choice between two or more options. At least one option is mandatory and must be documented.
- Documenting a metadata entity or a metadata element if another element has been documented.
- Documenting a metadata element if a specific value for another metadata element has been documented. To facilitate reading by humans, the specific value is used in plain text (ex. table in clause B.2, row 6 "C/hierarchyLevelCode is not equal to 'dataset'?). However, the code shall be used to verify the condition in an electronical user-interface.

If the answer to the condition is positive, then the metadata entity or the metadata element shall be mandatory.

### **B.1.5.4 Optional (O):**

The metadata entity or the metadata element may be documented or may not be documented. Optional metadata entities and optional metadata elements have been defined to provide a guide to those looking to fully document their data. (Use of this common set of defined elements will help promote interoperability among geographic data users and producers world-wide.) If an optional entity is not used, the elements contained within that entity (including mandatory elements) will also not be used. Optional entities may have mandatory elements; those elements only become mandatory if the optional entity is used.

## **B.1.6 Maximum occurrence**

Specifies the maximum number of instances the metadata entity or the metadata element may have. Single occurrences are shown by "1"; repeating occurrences are represented by "N". Fixed number occurrences other than one are allowed, and will be represented by the corresponding number (i.e. "2", "3"...etc).

## **B.1.7 Data type**

Specifies a set of distinct values for representing the metadata elements; for example, integer, real, string, DateTime, and Boolean. The data type attribute is also used to define metadata entities, stereotypes, and metadata associations.

NOTE Data types are defined in ISO 19118, 8.2.2.

## **B.1.8 Domain**

For an entity, the domain indicates the line numbers covered by that entity.

For a metadata element, the domain specifies the values allowed or the use of free text. “Free text” indicates that no restrictions are placed on the content of the field. Integer-based codes shall be used to represent values for domains containing codelists.



## B.2 Metadata package data dictionaries

### B.2.1 Metadata entity set information

- UML model shown in Figure A.1

	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 language	mdFileID	unique identifier for this metadata file	O	1	CharacterString	Free text
3.		mdLang	language used for documenting metadata	C / not defined by encoding?	1	CharacterString	
4.	characterSet	mdChar	full name of the character coding standard used for the metadata set	C / ISO 10646-1 not used and not defined by encoding	1	Class	ISO 639-2, other parts may be used MD_CharacterSetCode <<CodeList>> (B.5.10)
5.	parentIdentifier	mdParentID	file identifier of the metadata to which this metadata is a subset (child)	O	1	CharacterString	Free text
6.	hierarchyLevel	mdHrLvl	scope to which the metadata applies (see Annex H for more information about metadata hierarchy levels)	C/ hierarchyLevel is not equal to "dataset"?	N	Class	MD_ScopeCode <<CodeList>> (B.5.25)
7.	hierarchyLevelName	mdHrLvlName	name of the hierarchy levels for which the metadata is provided	O	N	CharacterString	Free text
8.	contact	mdContact	party responsible for the metadata information	M	1	Class	CI_ResponsibleParty (B.3.2)
9.	dateStamp	mdDateSt	date that the metadata was created	M	1	Class	<<DataType>> Date (B.4.2)
10.	metadataStandardName	mdStanName	name of the metadata standard (including profile name) used	O	1	CharacterString	Free text
11.	metadataStandardVersion	mdStanVer	version (profile) of the metadata standard used	O	1	CharacterString	Free text
12.	Role name: spatialRepresentationInfo	spatRepInfo	digital representation of spatial information in the dataset	O	N	Association	MD_SpatialRepresentation <<Abstract>> (B.2.6)
13.	Role name: referenceSystemInfo	refSysInfo	description of the spatial and temporal reference systems used in the dataset	O	N	Association	MD_ReferenceSystem (B.2.7)
14.	Role name: metadataExtensionInfo	mdExtInfo	information describing metadata extensions	O	N	Association	MD_MetadataExtensionInformation (B.2.11)
15.	Role name: identificationInfo	dataIdInfo	basic information about the resource(s) to which the metadata applies	M	N	Association	MD_Identification <<Abstract>> (B.2.2)
16.	Role name: contentInfo	contInfo	provides information about the feature catalogue and describes the coverage and image data characteristics	O	N	Association	MD_ContentInformation (B.2.8)
17.	Role name: distributionInfo	distInfo	provides information about the distributor of and options for obtaining the resource(s)	O	1	Association	MD_Distribution (B.2.10)

18.	<i>Role name:</i> dataQualityInfo	dqInfo	provides overall assessment of quality of a resource(s)	O	N	Association	DQ_DataQuality (B 2.4)
19.	<i>Role name:</i> portrayalCatalogueInfo	porCatInfo	provides information about the catalogue of rules defined for the portrayal of a resource(s)	O	N	Association	MD_PortrayalCatalogueReference (B 2.9)
20.	<i>Role name:</i> metadataConstraints	mdConst	provides restrictions on the access and use of data	O	N	Association	MD_Constraints (B 2.3)
21.	<i>Role name:</i> applicationSchemaInfo	appSchInfo	provides information about the conceptual schema of a dataset	O	N	Association	MD_ApplicationSchemaInformation (B 2.12)
22.	<i>Role name:</i> metadataMaintenance	mdMaint	provides information about the frequency of metadata updates, and the scope of those updates	O	1	Association	MD_MaintenanceInformation (B 2.5)

## B.2.2 Identification information (includes data and service identification)

- UML model shown in Figure A.2

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
23.	<i>MD_Identification</i>	Ident	basic information required to uniquely identify a resource or resources	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata) <<Abstract>>	Lines 24-35
24.	citation	idCitation	citation data for the resource(s)	M	1	Class	CI_Citation (B.3.2) <<DataType>>
25.	abstract	idAbs	brief narrative summary of the content of the resource(s)	M	1	CharacterString	Free text
26.	purpose	idPurp	summary of the intentions with which the resource(s) was developed	O	1	CharacterString	Free text
27.	credit	idCredit	recognition of those who contributed to the resource(s)	O	N	CharacterString	Free text
28.	status	idStatus	status of the resource(s)	O	N	Class	MD_ProgressCode <<CodeList>> (B.5.23)
29.	pointOfContact	idPoC	identification of, and means of communication with, person(s) and organizations(s) associated with the resource(s)	O	N	Class	CI_ResponsibleParty (B.3.2) <<DataType>>
30.	<i>Role name:</i> resourceMaintenance	resMaint	provides information about the frequency of resource updates, and the scope of those updates	O	N	Association	MD_MaintenanceInformation (B 2.5)

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
31.	<i>Role name:</i> graphicOverview	graphOver	provides a graphic that illustrates the resource(s) (should include a legend for the graphic)	O	N	Association	MD_BrowseGraphic (B 2.2.1)
32.	<i>Role name:</i> resourceFormat	dsFormat	provides a description of the format of the resource(s)	O	N	Association	MD_Format (B 2.10.3)
33.	<i>Role name:</i> descriptiveKeywords	descKeys	provides category keywords, their type, and reference source	O	N	Association	MD_Keywords (B 2.2.2)
34.	<i>Role name:</i> resourceSpecificUsage	idSpecUse	provides basic information about specific application(s) for which the resource(s) has/have been or is being used by different users	O	N	Association	MD_Usage (B 2.2.5)
35.	<i>Role name:</i> resourceConstraints	resConst	provides information about constraints which apply to the resource(s)	O	N	Association	MD_Constraints (B 2.3)
36.	MD_DataIdentification	DataIdent	information required to identify a dataset	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Identification)	Lines 37-46 and 24-35
37.	spatialRepresentationType	spatRpType	method used to spatially represent geographic information	O	N	Class	MD_SpatialRepresentationTypeCode <<CodeList>> (B.5.26)
38.	spatialResolution	dataScale	factor which provides a general understanding of the density of spatial data in the dataset	O	N	Class	MD_Resolution <<Union>> (B.2.2.4)
39.	language	dataLang	language(s) used within the dataset	M	N	CharacterString	ISO 639-2, other parts may be used
40.	characterSet	dataChar	full name of the character coding standard used for the dataset	C/ISO 10646-1 not used?	1	Class	MD_CharacterSetCode <<CodeList>> (B.5.10)
41.	topicCategory	tpCat	main theme(s) of the dataset	M	N	Class	MD_TopicCategoryCode <<CodeList>> (B.5.27)
42.	geographicBox	geoBox	minimum bounding rectangle within which data is available	C / hierarchyLevel equals "dataset" and geographicDescription not documented?	N	Class	EX_GeographicBoundingBox (B.3.1.1)
43.	geographicDescription	geoDesc	description of the geographic area within which data is available	C / if hierarchyLevel equals "dataset" and geographicBox not documented?	N	Class	EX_GeographicDescription (B.3.1.1)
44.	environmentDescription	envirDesc	description of the dataset in the producer's processing environment, including items such as the software, the computer operating system, file name, and the dataset size	O	1	CharacterString	Free text

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
45.	extent	dataExt	additional extent information including the bounding polygon, vertical, and temporal extent of the dataset	O	N	Class	EX_Extent <<DataType>> (B.3.1)
46.	supplementalInformation	suppInfo	any other descriptive information about the dataset	O	1	CharacterString	Free text
47.	MD_ServiceIdentification	SerIdent	identification of capabilities which a service provider makes available to a service user through a set of interfaces that define a behaviour - See ISO 19119 – Services for further information	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Identification)	Lines 24-35

### B.2.2.1 Browse graphic information

48.	MD_BrowseGraphic	BrowseGraph	graphic that provides an illustration of the dataset (should include a legend for the graphic)	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Identification)	Lines 49-51
49.	fileName	bgFileName	name of the file that contains a graphic that provides an illustration of the dataset	M	1	CharacterString	Free text
50.	fileDescription	bgFileDesc	text description of the illustration	O	1	CharacterString	Free text
51.	fileType	bgFileType	format in which the illustration is encoded Examples: CGM, EPS, GIF, JPEG, PBM, PS, TIFF, XWD	O	1	CharacterString	Free text

### B.2.2.2 Keyword information

52.	MD_Keywords	Keywords	keywords, their type and reference source	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Identification)	Lines 53-55
53.	keyword	keyword	commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject	M	N	CharacterString	Free text
54.	type	keyType	subject matter used to group similar keywords	O	1	Class	MD_KeywordTypeCode <<CodeList>> (B.5.17)



55.	thesaurusName	thesaName	name of the formally registered thesaurus or a similar authoritative source of keywords	O	1	Class	CI_Citation (B.3.2) <<DataType>>
-----	---------------	-----------	---	---	---	-------	----------------------------------

### B.2.2.3 Representative fraction information

56.	MD_RepresentativeFraction	RepFract	derived from Scale where MD_RepresentativeFraction.denominator = 1 / Scale.measure And Scale.targetUnits = Scale.sourceUnits	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 57-58
57.	denominator	rfDenom	the number below the line in a vulgar fraction	M	1	Integer	Integer > 0
58.	Role name (derived): /Scale	derScale	role indicating that MD_RepresentativeFraction is derived from Scale	(Not applicable)	(Not applicable)	Derived Association	Scale (B.4.3)

### B.2.2.4 Resolution information

59.	MD_Resolution	Resol	level of detail expressed as a scale factor or a ground distance	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<Union>>	Lines 60-61
60.	equivalentScale	equScale	level of detail expressed as the scale of a comparable hardcopy map or chart	C / distance not documented?	1	Class	MD_RepresentativeFraction <<DataType>> (B.2.2.3)
61.	distance	scaledDist	ground sample distance	C / equivalentScale not documented?	1	Class	Distance (B.4.3)

### B.2.2.5 Usage information

62.	MD_Usage	Usage	brief description of ways in which the resource(s) is/are currently used	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Identification)	Lines 63-65
63.	specificUsage	specUsage	brief description of the resource and/or resource series usage	M	1	CharacterString	Free text

64.	usageDateTime	usageDate	date and time of the first use or range of uses of the resource and/or resource series	O	1	Class	DateTime (B.4.2)
65.	userDeterminedLimitations	usrDetLim	applications, determined by the user for which the resource and/or resource series is not suitable	O	1	CharacterString	Free text
66.	userContactInfo	usrCntlInfo	identification of and means of communicating with person(s) and organization(s) using the resource(s)	M	N	Class	CI_ResponsibleParty <<DataType>> (B.3.2)

### B.2.3 Constraint information (includes legal and security)

- UML model shown in Figure A.3

	Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
67.	MD_Constraints	Consts	restrictions on the access and use of a resource or metadata	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata and MD_Identification)	Line 68
68.	useLimitation	useLimit	limitation affecting the fitness for use of the resource. Example, "not to be used for navigation"	O	N	CharacterString	Free text
69.	MD_LegalConstraints	LegConsts	restrictions and legal prerequisites for accessing and using the resource	Use obligation from referencing object	N	Specified Class (MD_Constraints)	Lines 70-72 and 68
70.	accessConstraints	accessConsts	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource	O	N	Class	MD_RestrictionCode <<CodeList>> (B.5.24)
71.	useConstraints	useConsts	constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource	O	N	Class	MD_RestrictionCode <<CodeList>> (B.5.24)
72.	otherConstraints	othConsts	other restrictions and legal prerequisites for accessing and using the resource	C / accessConstraints or useConstraints equal "otherRestrictions"?	N	CharacterString	Free text
73.	MD_SecurityConstraints	SecConsts	handling restrictions imposed on the resource for national security or similar security concerns	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Constraints)	Lines 74-77 and 68

74.	classification	class	name of the handling restrictions on the resource	M	1	Class	MD_ClassificationCode <<CodeList>> (B.5.11)
75.	userNote	userNote	explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the resource	O	1	CharacterString	Free text
76.	classificationSystem	classSys	name of the classification system	O	1	CharacterString	Free text
77.	handlingDescription	handDesc	additional information about the restrictions on handling the resource	O	1	CharacterString	Free text

## B.2.4 Data quality information

- UML model shown in Figures A.4, A.5 (Lineage) and A.6 (Data quality classes and subclasses)

Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
78.	DQ_DataQuality	quality information for the data specified by a data quality scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 79-81
79.	scope	the specific data to which the data quality information applies	M	1	Class	DQ_Scope <<DataType>> (B.2.4.4)
80.	Role name: report	quantitative quality information for the data specified by the scope	C / scope.DQ_Scope.level equals "dataset"?	N	Association	DQ_Element <<Abstract>> (B.2.4.2)
81.	Role name: lineage	non-quantitative quality information about the lineage of the data specified by the scope	C / scope.DQ_Scope.level equals "dataset"?	1	Association	LI_Lineage (B.2.4.1)

### B.2.4.1 Lineage information

82.	LI_Lineage	Lineage	information about the events or source data used in constructing the data specified by the scope or lack of knowledge about lineage	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (DQ_DataQuality)	Lines 83-85
-----	------------	---------	---	--	--	-----------------------------------	-------------

83.	statement	statement	general explanation of the data producer's knowledge about the lineage of a dataset	C / (DQ_DataQuality.scope. DQ_Scope.level = "dataset" or "series") and source and processStep not provided?	1	CharacterString	Free text
84.	<i>Role name:</i> processStep	procStep	information about an event in the creation process for the data specified by the scope	C / statement and source not provided?	N	Association	LI_ProcessStep (B.2.4.1.1)
85.	<i>Role name:</i> source	dataSource	information about the source data used in creating the data specified by the scope	C / statement and processStep not provided?	N	Association	LI_Source (B.2.4.1.2)

#### B.2.4.1.1 Process step information

86.	LI_ProcessStep	ProcessStep	information about an event in the creation process for the data specified by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (LI_Lineage)	Lines 86-91
87.	description	stepDesc	description of the event, including related parameters or tolerances	M	1	CharacterString	Free Text
88.	rationale	stepRat	requirement or purpose for the process step	O	1	CharacterString	Free Text
89.	dateTime	stepDateTm	date and time or range of date and time on or over which the process step occurred	O	1	Class	Date Time (B.4.2)
90.	processor	stepProc	identification of, and means of communication with, person(s) and organization(s) associated with the process step	O	N	Class	CI_ResponsibleParty <<DataType>> (B.3.2)
91.	<i>Role name:</i> source	stepSrc	information about the source data used in creating the data specified by the scope	O	N	Association	LI_Source (B.2.4.1.2)

#### B.2.4.1.2 Source information

92.	LI_Source	Source	information about the source data used in creating the data specified by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (LI_Lineage)	Lines 93-98
-----	-----------	--------	--	---	---	----------------------------------	-------------

93.	description	srcDesc	detailed description of the level of the source data	C / sourceExtent not provided?	1	CharacterString	Free Text
94.	scaleDenominator	srcScale	denominator of the representative fraction on a source map	O	1	Class	MD_RepresentativeFraction <<DataType>> (B.2.2.3)
95.	sourceReferenceSystem	srcRefSys	spatial reference system used by the source data	O	1	Class	MD_ReferenceSystem (B.2.7)
96.	sourceCitation	srcCitatn	recommended reference to be used for the source data	O	1	Class	CI_Citation <<DataType>> (B.3.2)
97.	sourceExtent	srcExt	information about the spatial, vertical and temporal extent of the source data	C / description not provided?	N	Class	EX_Extent <<DataType>> (B.3.1)
98.	Role name: sourceStep	srcStep	information about an event in the creation process for the source data	O	N	Association	LI_ProcessStep (B.2.4.1.1)

### B.2.4.2 Data quality element information

99.	DQ_Element	DQElement	type of test applied to the data specified by a data quality scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (DQ_DataQuality) <<Abstract>>	Lines 100-107
100.	nameOfMeasure	measName	name of the test applied to the data	O	N	CharacterString	Free text
101.	measureIdentification	measId	code identifying a registered standard procedure	O	1	Class	MD_Identifier <<DataType>> (B.2.7.2)
102.	measureDescription	measDesc	description of the measure being determined	O	1	CharacterString	Free text
103.	evaluationMethodType	evalMethType	type of method used to evaluate quality of the dataset	O	1	Class	DQ_EvaluationMethodTypeCode <<CodeList>> (B.5.6)
104.	evaluationMethodDescription	evalMethDesc	description of the evaluation method	O	1	CharacterString	Free text
105.	evaluationProcedure	evalProc	reference to the procedure information	O	1	Class	CI_Citation <<DataType>> (B.3.2)
106.	dateTime	measDateTm	date or range of dates on which a data quality measure was applied	O	1	Class	Date Time (B.4.2)
107.	result	measResult	value (or set of values) obtained from applying a data quality measure or the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level	M	2	Class	DQ_Result <<DataType>> (B.2.4.3)

108.	DQ_Completeness	DQComplete	presence and absence of features, their attributes and their relationships	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Element) <<Abstract>>	Lines 100-107
109.	DQ_CompletenessCommission	DQCompCommission	excess data present in the dataset, as described by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Completeness)	Lines 100-107
110.	DQ_CompletenessOmission	DQCompOmission	data absent from the dataset, as described by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Completeness)	Lines 100-107
111.	DQ_LogicalConsistency	DQLogConsistency	degree of adherence to logical rules of data structure, attribution and relationships (data structure can be conceptual, logical or physical)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Element) <<Abstract>>	Lines 100-107
112.	DQ_ConceptualConsistency	DQConcConsistency	adherence to rules of the conceptual schema	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_LogicalConsistency)	Lines 100-107
113.	DQ_DomainConsistency	DQDomConsistency	adherence of values to the value domains	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_LogicalConsistency)	Lines 100-107
114.	DQ_FormalConsistency	DQFormConsistency	degree to which data is stored in accordance with the physical structure of the dataset, as described by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_LogicalConsistency)	Lines 100-107
115.	DQ_TopologicalConsistency	DQTopConsistency	correctness of the explicitly encoded topological characteristics of the dataset as described by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_LogicalConsistency)	Lines 100-107

116.	DQ_PositionalAccuracy	DQPosAcc	accuracy of the position of features	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Element) <<Abstract>>	Lines 100-107
117.	DQ_AbsoluteExternalPositionalAccuracy	DQAbsExtPosAcc	closeness of reported coordinate values to values accepted as or being true	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_PositionalAccuracy)	Lines 100-107
118.	DQ_GriddedDataPositionalAccuracy	DQGridDataPosAcc	closeness of gridded data position values to values accepted as or being true	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_PositionalAccuracy)	Lines 100-107
119.	DQ_RelativeInternalPositionalAccuracy	DQRelIntPosAcc	closeness of the relative positions of features in the scope to their respective relative positions accepted as or being true	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_PositionalAccuracy)	Lines 100-107
120.	DQ_TemporalAccuracy	DQTempAcc	accuracy of the temporal attributes and temporal relationships of features	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Element) <<Abstract>>	Lines 100-107
121.	DQ_AccuracyOfTimeMeasurement	DQAccTimeMeas	correctness of the temporal references of an item (reporting of error in time measurement)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_TemporalAccuracy)	Lines 100-107
122.	DQ_TemporalConsistency	DQTempConsis	correctness of ordered events or sequences, if reported	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_TemporalAccuracy)	Lines 100-107
123.	DQ_TemporalValidity	DQTempValid	validity of data specified by the scope with respect to time	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_TemporalAccuracy)	Lines 100-107

124.	DQ_ThematicAccuracy	DQThemAcc	accuracy of quantitative attributes and the correctness of non-quantitative attributes and of the classifications of features and their relationships	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Element) <<Abstract>>	Lines 100-107
125.	DQ_ThematicClassificationCorrectness	DQThemClassCor	comparison of the classes assigned to features or their attributes to a universe of discourse	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_ThematicAccuracy)	Lines 100-107
126.	DQ_NonQuantitativeAttributeCorrectness	DQNonQuantAttributeAcc	correctness of non-quantitative attributes	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_ThematicAccuracy)	Lines 100-107
127.	DQ_QuantitativeAttributeAccuracy	DQQuantAttributeAcc	accuracy of quantitative attributes	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_ThematicAccuracy)	Lines 100-107

### B.2.4.3 Result information

128.	DQ_Result	Result	generalization of more specific result classes	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	
129.	DQ_ConformanceResult	ConResult	Information about the outcome of evaluating the obtained value (or set of values) against a specified acceptable conformance quality level	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Result)	Lines 130-132
130.	specification	conSpec	citation of product specification or user requirement against which data is being evaluated	M	1	Class	CI_Citation <<DataType>> (B.3.2)
131.	explanation	conExpl	explanation of the meaning of conformance for this result	M	1	CharacterString	Free text



132.	pass	conPass	indication of the conformance result where 0 = fail and 1 = pass	M	1	Boolean	1 = yes 0 = no
133.	DQ_QuantitativeResult	QuanResult	Information about the value (or set of values) obtained from applying a data quality measure	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DQ_Result)	Lines 134-137
134.	valueType	quanValType	value type for reporting a data quality result	O	1	Class	RecordType <<Metaclass>> (B.4.3)
135.	valueUnit	quanValUnit	value unit for reporting a data quality result	O	1	Class	Measure (B.4.3)
136.	errorStatistic	errStat	statistical method used to determine the value	O	1	CharacterString	Free text
137.	value	quanVal	quantitative value or values, content determined by the evaluation procedure used	M	N	Class	Record (B.4.3)

#### B.2.4.4 Scope information

138.	DQ_Scope	DQScope	description of the data specified by the scope	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 139-141
139.	level	scplvl	hierarchical level of the data specified by the scope	M	1	Class	MD_ScopeCode <<CodeList>> (B.5.25)
140.	extent	scpExt	information about the spatial, vertical and temporal extent of the data specified by the scope	O	1	Class	EX_Extent <<DataType>> (B.3.1)
141.	levelDescription	scplvlDesc	detailed description about the level of the data specified by the scope	C / level not equal "dataset" or "series"?	N	Class	MD_ScopeDescription <<Union>> (B.2.5.1)

#### B.2.5 Maintenance information

- UML model shown in Figure A.7

Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
------	------------	------------	------------------------	--------------------	-----------	--------

142.	MD_MaintenanceInformation	MaintInfo	information about the scope and frequency of updating	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata and MD_Identification)	Lines 143-148
143.	maintenanceAndUpdateFrequency	maintFreq	frequency with which changes and additions are made to the resource after the initial resource is completed	M	1	Class	MD_MaintenanceFrequencyCode <<CodeList>> (B.5.18)
144.	dateOfNextUpdate	dateNext	scheduled revision date for resource	O	1	Class	Date (B.4.2)
145.	userDefinedMaintenanceFrequency	usrDefFreq	maintenance period other than those defined	O	1	Class	TM_PeriodDuration (B.4.5)
146.	updateScope	maintScp	scope of data to which maintenance is applied	O	N	Class	MD_ScopeCode <<CodeList>> (B.5.25)
147.	updateScopeDescription	upScpDesc	additional information about the range or extent of the resource	O	N	Class	MD_ScopeDescription <<Union>> (B.2.5.1)
148.	maintenanceNote	maintNote	information regarding specific requirements for maintaining the resource	O	N	CharacterString	Free text

### B.2.5.1 Scope description information

149.	MD_ScopeDescription	ScpDesc	description of the class of information covered by the information	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<Union>>	Lines 150-155
150.	attributes	attribSet	attributes to which the information applies	C / features, featureInstances, attributeInstances, dataset and other not documented?	1	Set (B.4.7)	GF_AttributeType (B.4.4)
151.	features	featSet	features to which the information applies	C / attributes, featureInstances, attributeInstances, dataset and other not documented?	1	Set (B.4.7)	GF_FeatureType (B.4.4)
152.	featureInstances	featInstSet	feature instances to which the information applies	C / attributes, features, attributeInstances, dataset and other not documented?	1	Set (B.4.7)	GF_FeatureType (B.4.4)

153.	attributeInstances	attribIntSet	attribute instances to which the information applies	C / attributes, features, featureInstances, dataset and other not documented?	1	Set (B.4.7)	GF_AttributeType (B.4.4)
154.	dataset	datasetSet	dataset to which the information applies	C / attributes, features, featureInstances, and other not documented?	1	CharacterString	Free text
155.	other	other	class of information that does not fall into the other categories to which the information applies	C / attributes, features, featureInstances, and attributeInstances, and dataset not documented?	1	CharacterString	Free text

## B.2.6 Spatial representation information (includes grid and vector representation)

- UML model shown in Figure A.8

Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
MD_SpatialRepresentation	SpatRep	digital mechanism used to represent spatial information	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata) <<Abstract>>	
MD_GridSpatialRepresentation	GridSpatRep	information about grid spatial objects in the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_SpatialRepresentation)	Lines 158-161
numberOfDimensions	numDims	number of independent spatial-temporal axes	M	1	Integer	Integer
axisDimensionsProperties	axDimProps	information about spatial-temporal axis properties	M	1	Sequence (B.4.7)	MD_Dimension <<DataType>> (B.2.6.1)
cellGeometry	cellGeo	identification of grid data as point or cell	M	1	Class	MD_CellGeometryCode <<CodeList>> (B.5.9)
transformationParameterAvailability	tranParaAv	indication of whether or not parameters for transformation exists	M	1	Boolean	1 = yes 0 = no

162.	MD_Georectified	Georect	grid whose cells are regularly spaced in a geographic (i.e., lat / long) or map coordinate system defined in the Spatial Referencing System (SRS) so that any cell in the grid can be geolocated given its grid coordinate and the grid origin, cell spacing, and orientation	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified (MD_GridSpatialRepresentation)	Lines 163-170 and 158-161
163.	checkPointAvailability	chkPtAv	indication of whether or not geographic position points are available to test the accuracy of the georeferenced grid data	M	1	Boolean	1 = yes 0 = no
164.	checkPointDescription	chkPtDesc	description of geographic position points used to test the accuracy of the georeferenced grid data	C / checkPointAvailability equals "yes"?	1	CharacterString	Free text
165.	cornerPoints	cornerPts	earth location in the coordinate system defined by the Spatial Reference System and the grid coordinate of the cells at opposite ends of grid coverage along two diagonals in the grid spatial dimensions. There are four corner points in a georectified grid; at least two corner points along one diagonal are required	M	1	Sequence (B.4.7)	GM_Point <<Type>> (B.4.6)
166.	centerPoint	centerPt	earth location in the coordinate system defined by the Spatial Reference System and the grid coordinate of the cell halfway between opposite ends of the grid in the spatial dimensions	O	1	Class	GM_Point <<Type>> (B.4.6)
167.	pointInPixel	ptInPixel	point in a pixel corresponding to the Earth location of the pixel	M	1	Class	MD_PixelOrientationCode <<Enumeration>> (B.5.22)
168.	transformationDimensionDescription	transDimDesc	description of the information about which grid dimensions are the spatial dimensions	O	1	CharacterString	Free text
169.	transformationDimensionMapping	transDimMap	information about which grid dimensions are the spatial dimensions	O	2	CharacterString	Free text
170.	MD_Georeferenceable	Georef	grid with cells irregularly spaced in any given geographic/map projection coordinate system, whose individual cells can be geolocated using geolocation information supplied with the data but cannot be geolocated from the grid properties alone	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_GridSpatialRepresentation)	Lines 171-175 and 158-161
171.	controlPointAvailability	ctrlPtAv	indication of whether or not control point(s) exists	M	1	Boolean	1 = yes 0 = no
172.	orientationParameterAvailability	orieParaAv	indication of whether or not orientation parameters are available	M	1	Boolean	1 = yes 0 = no
173.	orientationParameterDescription	orieParaDs	description of parameters used to describe sensor orientation	O	1	CharacterString	Free text
174.	parameters	georefPars	terms which support grid data georeferencing	M	1	Class	Record (B.4.3)

175.	parameterCitation	paraCit	reference providing description of the parameters	O	N	Class	CL_Citation <<DataType>> (B.3.2)
176.	MD_VectorSpatialRepresentation	VectSpatRep	information about the vector spatial objects in the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_SpatialRepresentation)	Lines 177-178
177.	topologyLevel	topLvl	code which identifies the degree of complexity of the spatial relationships	O	1	Class	MD_TopologyLevelCode <<CodeList>> (B.5.28)
178.	geometricObjects	geometObjs	information about the geometric objects used in the dataset	O	N	Class	MD_GeometricObjects <<DataType>> (B.2.6.2)

### B.2.6.1 Dimension information

179.	MD_Dimension	Dimen	axis properties	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 180-182
180.	dimensionName	dimName	name of the axis	M	1	Class	MD_DimensionNameTypeCode <<CodeList>> (B.5.14)
181.	dimensionSize	dimSize	number of elements along the axis	M	1	Integer	Integer
182.	resolution	dimResol	degree of detail in the grid dataset	O	1	Class	Measure (B.4.3)

### B.2.6.2 Geometric object information

183.	MD_GeometricObjects	GeometObjs	number of objects, listed by geometric object type, used in the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 184-185
184.	geometricObjectType	geoObjTyp	name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the dataset	M	1	Class	MD_GeometricObjectTypeCode <<CodeList>> (B.5.15)
185.	geometricObjectCount	geoObjCnt	total number of the point or vector object type occurring in the dataset	O	1	Integer	> 0

## B.2.7 Reference system information (includes temporal, coordinate and geographic identifiers)

- UML model shown in Figure A.9

	Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
186.	MD_ReferenceSystem	RefSystem	information about the reference system.	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 187-188
187.	referenceSystemIdentifier	refSysID	name of reference system	C / MD_CRS.projection, MD_CRS.ellipsoid, and MD_CRS.datum not documented?	1	Class	RS_Identifier (B.2.7.2)
188.	role name (derived): /Reference System	derRefSys	relationship indicating that MD_ReferenceSystem (as well as its attributes and aggregates) is derived from RS_ReferenceSystem	(Not applicable)	(Not applicable)	Derived Association	RS_ReferenceSystem <<Abstract>> (B.2.7)
189.	MD_CRS	MDCoRefSys	metadata about a coordinate system in which attributes have been derived from SC_CRS as defined in ISO 19111 – Spatial referencing by coordinates	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_ReferenceSystem)	Lines 190-194 and 187-188
190.	projection	projection	identity of the projection used	O	1	Class	RS_Identifier (B.2.7.2)
191.	ellipsoid	ellipsoid	identity of the ellipsoid used	O	1	Class	RS_Identifier (B.2.7.2)
192.	datum	datum	Identity of the datum used	O	1	Class	RS_Identifier (B.2.7.2)
193.	role name: ellipsoidParameters	ellParas	set of parameters that describe the ellipsoid	O	1	Association	MD_EllipsoidParameters (B.2.7.1)
194.	role name: projectionParameters	projParas	set of parameters that describe the projection	O	1	Association	MD_ProjectionParameters (B.2.7.5)
195.	RS_ReferenceSystem	RefSys	description of the spatial and temporal reference systems used in the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Abstract>>	Lines 196-197
196.	name	refSysName	name of reference system used	M	1	Class	RS_Identifier (B.2.7.2)
197.	domainOfValidity	domOValid	range which is valid for the reference system	O	N	Class	EX_Extent <<DataType>> (B.3.1)

198.	TM_ReferenceSystem	TMRefSys	documented in ISO 19108 – Temporal schema	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (RS_ReferenceSystem)	Lines 196-197
199.	SI_SpatialReferenceSystemUsingGeographicIdentifiers	SIRefSys	documented in ISO 19112 – Spatial referencing by geographic identifiers	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (RS_ReferenceSystem)	Lines 196-197
200.	SC_CRS	SCRefSys	documented in ISO 19111 – Spatial referencing by coordinates	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (RS_ReferenceSystem) <<Abstract>>	Lines 196-197

### B.2.7.1 Ellipsoid parameter information

201.	MD_EllipsoidParameters	EllParas	set of parameters that describe the ellipsoid	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_CRS)	Lines 202-204
202.	semiMajorAxis	semiMajorAxis	radius of the equatorial axis of the ellipsoid	M	1	Real	> 0.0
203.	axisUnits	axisUnits	units of the semi-major axis	M	1	Class	UomLength (B.4.3)
204.	denominatorOfFlatteningRatio	denFlatRat	ratio of the difference between the equatorial and polar radii of the ellipsoid to the equatorial radius when the numerator is set to 1	C / not a spheroid?	1	Real	> 0.0

### B.2.7.2 Identifier information

205.	MD_Identifier	MdIdent	value uniquely identifying an object within a namespace	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class	Lines 206-207
------	---------------	---------	---	--	--	-------	---------------

206.	authority	identAuth	person or party responsible for maintenance of the namespace	O	1	Class	CI_Citation <<DataType>> (B.3.2)
207.	code	identCode	alphanumeric value identifying an instance in the namespace	M	1	CharacterString	Free text
208.	RS_Identifier	RsIdent	identifier used for reference systems	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Identifier)	Lines 206-207

### B.2.7.3 Oblique line azimuth information

209.	MD_ObliqueLineAzimuth	ObLineAzi	method used to describe the line along which an oblique mercator map projection is centred using the map projection origin and an azimuth	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_ProjectionParameters)	Lines 210-211
210.	azimuthAngle	aziAngle	angle measured clockwise from north, and expressed in degrees	M	1	Real	Real
211.	azimuthMeasurePointLongitude	aziPtLong	longitude of the map projection origin	M	1	Real	Real

### B.2.7.4 Oblique line point information

212.	MD_ObliqueLinePoint	ObLinePt	method used to describe the line along which an oblique mercator map projection is centred using two points near the limits of the mapped region that define the centre line	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_ProjectionParameters)	Lines 213-214
213.	obliqueLineLatitude	obLineLat	latitude of a point defining the oblique line	M	1	Real	Real
214.	obliqueLineLongitude	obLineLong	longitude of a point defining the oblique line	M	1	Real	Real



## B.2.7.5 Projection parameter information

215.	MD_ProjectionParameters	ProjParams	set of parameters that describe the projection	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_CRS)	Lines 216-231
216.	zone	zone	unique identifier for 100,000 metre grid zone	O	1	Integer	Integer
217.	standardParallel	stanParal	line of constant latitude at which the surface of the Earth and the plane or developable surface intersect	O	2	Real	Real
218.	longitudeOfCentralMeridian	longCntMer	line of longitude at the centre of a map projection generally used as the basis for constructing the projection	O	1	Real	Real
219.	latitudeOfProjectionOrigin	latProjOri	latitude chosen as the origin of rectangular coordinates for a map projection	O	1	Real	Real
220.	falseEasting	falseEasting	value added to all "x" values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units	O	1	Real	Real
221.	falseNorthing	falseNorthing	value added to all "y" values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units	O	1	Real	Real
222.	falseEastingNorthingUnits	falseENUUnits	units of false northing and false easting	O	1	Class	UomLength (B.4.3)
223.	scaleFactorAtEquator	sclFacEqu	ratio between physical distance and corresponding map distance, along the equator	O	1	Real	> 0,0
224.	heightOfProspectivePointAboveSurface	hgtProsPt	height of viewpoint above the Earth, expressed in metres	O	1	Real	> 0,0
225.	longitudeOfProjectionCenter	longProjCnt	longitude of the point of projection for azimuthal projections	O	1	Real	Real
226.	latitudeOfProjectionCenter	latProjCnt	latitude of the point of projection for azimuthal projections	O	1	Real	Real
227.	scaleFactorAtCenterLine	sclFacCnt	ratio between physical distance and corresponding map distance, along the centre line	O	1	Real	Real
228.	straightVerticalLongitudeFromPole	stVrLongPl	longitude to be oriented straight up from the North or South Pole	O	1	Real	Real

229.	scaleFactorAtProjectionOrigin	scaleFactorAtProjectionOrigin	multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance at the projection origin	O	1	Real	Real
230.	role name: obliqueLineAzimuthParameter	obLnAziPars	parameters describing the oblique line azimuth	O	1	Association	MD_ObliqueLineAzimuth (B.2.7.3)
231.	role name: obliqueLinePointParameter	obLnPtPars	parameters describing the oblique line point	O	2	Association	MD_ObliqueLinePoint (B.2.7.4)

## B.2.8 Content information (includes Feature catalogue and Coverage descriptions)

- UML model shown in Figure A.10

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
232.	MD_ContentInformation	ContInfo	description of the content of a dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	
233.	MD_FeatureCatalogueDescription	FetCatDesc	information identifying the feature catalogue	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_ContentInformation)	Lines 234-238
234.	complianceCode	compCode	indication of whether or not the cited feature catalogue complies with ISO 19110	O	1	Boolean	0=not compliant 1=compliant
235.	language	catLang	language(s) used within the catalogue	O	N	CharacterString	ISO 639-2, other parts can be used
236.	includedWithDataset	incWithDS	indication of whether or not the feature catalogue is included with the dataset	M	1	Boolean	0=no 1=yes
237.	featureTypes	catFetTypes	subset of feature types from cited feature catalogue occurring in dataset	O	N	Class	GenericName (B.4.8)
238.	featureCatalogueCitation	catCitation	complete bibliographic reference to one or more external feature catalogues	M	N	Class	CI_Citation <<DataType>> (B.3.2)
239.	MD_CoverageDescription	CovDesc	information about the content of a grid data cell	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_ContentInformation)	Lines 240-242

240.	attributeDescription	attDesc	description of the attribute described by the measurement value	M	1	Class	RecordType <<Metaclass>> (B.4.3)
241.	contentType	contentTyp	type of information represented by the cell value	M	1	Class	MD_CoverageContentTypeCode <<CodeList>> (B.5.12)
242.	<i>Role name:</i> dimension	covDim	information on the dimensions of the cell measurement value	O	N	Class	MD_RangeDimension (B.2.8.1)
243.	MD_ImageDescription	imgDesc	information about an image's suitability for use	O	Use maximum occurrence from referencing object	Specified Class (MD_CoverageDescription)	Lines 244-255 and 241-242
244.	illuminationElevationAngle	illElevAng	illumination elevation measured in degrees clockwise from the target plane at intersection of the optical line of sight with the Earth's surface. For images from a scanning device, refer to the centre pixel of the image	O	1	Real	-90 – 90
245.	illuminationAzimuthAngle	illAziAng	illumination azimuth measured in degrees clockwise from true north at the time the image is taken. For images from a scanning device, refer to the centre pixel of the image conditions affected the image	O	1	Real	0,00 – 360
246.	imagingCondition	imgCond	specifies the image quality	O	1	Class	MD_ImagingConditionCode <<CodeList>> (B.5.16)
247.	imageQualityCode	imgQuCode		O	1	Class	MD_Identifier <<Data Type>> (B.2.7.2)
248.	cloudCoverPercentage	cloudCovPer	area of the dataset obscured by clouds, expressed as a percentage of the spatial extent	O	1	Real	0,0 – 100,0
249.	processingLevelCode	prcTypCde	image distributor's code that identifies the level of radiometric and geometric processing that has been applied	O	1	Class	MD_Identifier <<Data Type>> (B.2.7.2)
250.	compressionGenerationQuantity	cmpGenQuan	count of the number the number of lossy compression cycles performed on the image	O	1	Integer	Integer
251.	triangulationIndicator	trianInd	indication of whether or not triangulation has been performed upon the image	O	1	Boolean	0-no 1-yes
252.	radiometricCalibrationDataAvailability	radCalDataAv	indication of whether or not the radiometric calibration information for generating the radiometrically calibrated standard data product is available	O	1	Boolean	0-no 1-yes
253.	cameraCalibrationInformationAvailability	camCallnAv	indication of whether or not constants are available which allow for camera calibration corrections	O	1	Boolean	0-no 1-yes
254.	filmDistortionInformationAvailability	filmDistlnAv	indication of whether or not Calibration Reseau information is available	O	1	Boolean	0-no 1-yes

255.	lensDistortionInformationA vailability	lensDistInAv	indication of whether or not lens aberration correction information is available	O	1	Boolean	0-no 1-yes
------	---	--------------	---	---	---	---------	---------------

#### B.2.8.1 Range dimension information (includes Band information)

256.	MD_RangeDimension	RangeDim	information on the range of each dimension of a cell measurement value	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_CoverageDescri ption)	Lines 257-258
257.	sequenceIdentifier	seqID	number that uniquely identifies instances of bands of wavelengths on which a sensor operates	O	1	Class	MemberName (B.4.8)
258.	descriptor	dimDescrp	description of the range of a cell measurement value	O	1	CharacterString	Free text
259.	MD_Band	Band	range of wavelengths in the electromagnetic spectrum	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_RangeDimensio n)	Lines 260-267 and 257-258
260.	maxValue	maxVal	longest wavelength that the sensor is capable of collecting within a designated band	O	1	Real	Real
261.	minValue	minVal	shortest wavelength that the sensor is capable of collecting within a designated band	O	1	Real	Real
262.	units	valUnit	units in which sensor wavelengths are expressed	C / minValue or maxValue provided?	1	Class	UomLength (B.4.3)
263.	peakResponse	pkResp	wavelength at which the response is the highest	O	1	Real	Real
264.	bitsPerValue	bitsPerVal	maximum number of significant bits in the uncompressed representation for the value in each band of each pixel	O	1	Integer	Integer
265.	toneGradation	toneGrad	number of discrete numerical values in the grid data	O	1	Integer	Integer
266.	scaleFactor	scfFac	scale factor which has been applied to the cell value	O	1	Real	Real
267.	offset	offset	the physical value corresponding to a cell value of zero	O	1	Real	Real

## B.2.9 Portrayal catalogue information

- UML model shown in Figure A.11

Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
268. MD_PortrayalCatalogueReference	PortCatRef	information identifying the portrayal catalogue used	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Line 269
269. portrayalCatalogueCitation	portCatCit	bibliographic reference to the portrayal catalogue cited	M	N	Class	CI_Citation <<DataType>> (B.3.2)

## B.2.10 Distribution information

- UML model shown in Figure A.12

Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
270. MD_Distribution	Distrib	information about the distributor of and options for obtaining the resource	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 271-273
271. Role name: distributionFormat	distFormat	provides a description of the format of the data to be distributed	C / MD_Distributor.distributorFormat not documented?	N	Association	MD_Format (B.2.10.3)
272. Role name: distributor	distributor	provides information about the distributor	O	N	Association	MD_Distributor (B.2.10.2)
273. Role name: transferOptions	distTranOps	provides information about technical means and media by which a resource is obtained from the distributor	O	N	Association	MD_DigitalTransferOptions (B.2.10.1)

**B.2.10.1 Digital transfer options information**

274.	MD_DigitalTransferOptions	DigTranOps	technical means and media by which a resource is obtained from the distributor	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution and MD_Distributor)	Lines 275-278
275.	unitsOfDistribution	unitsOfDist	tiles, layers, geographic areas, etc., in which data is available	O	1	CharacterString	Free text
276.	transferSize	transSize	estimated size of a unit in the specified transfer format, expressed in megabytes. The transfer size is > 0.0	O	1	Real	> 0,0
277.	onLine	onLineSrc	information about online sources from which the resource can be obtained	O	N	Class	CI_OnLineResource <<DataType>> (B.3.2.4)
278.	offLine	offLineMed	information about offline media on which the resource can be obtained	O	1	Class	MD_Medium <<DataType>> (B.2.10.4)

**B.2.10.2 Distributor information**

279.	MD_Distributor	Distributor	information about the distributor	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution)	Lines 280-283
280.	distributorContact	distorCont	party from whom the resource may be obtained. This list need not be exhaustive	M	1	Class	CI_ResponsibleParty <<DataType>> (B.3.2)
281.	<i>Role name:</i> distributionOrderProcess	distorOrdPrc	provides information about how the resource may be obtained, and related instructions and fee information	O	N	Association	MD_StandardOrderProcess (B.2.10.5)
282.	<i>Role name:</i> distributorFormat	distorFormat	provides information about the format used by the distributor	C / MD_Distribution.distributionFormat not documented?	N	Association	MD_Format (B.2.10.3)
283.	<i>Role name:</i> distributorTransferOptions	distorTran	provides information about the technical means and media used by the distributor	O	N	Association	MD_DigitalTransferOptions (B.2.10.1)

**B.2.10.3 Format information**

284.	MD_Format	Format	description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distribution and MD_Identification)	Lines 285-290
285.	name	formatName	name of the data transfer format(s)	M	1	CharacterString	Free text
286.	version	formatVer	version of the format (date, number, etc.)	M	1	CharacterString	Free text
287.	amendmentNumber	formatAmdNum	amendment number of the format version	O	1	CharacterString	Free text
288.	specification	formatSpec	name of a subset, profile, or product specification of the format	O	1	CharacterString	Free text
289.	fileDecompressionTechnique	fileDecmTech	recommendations of algorithms or processes that can be applied to read or expand resources to which compression techniques have been applied	O	1	CharacterString	Free text
290.	Role name: formatDistributor	formatDist	provides information about the distributor's format	O	N	Association	MD_Distributor (B.2.10.2)

**B.2.10.4 Medium information**

291.	MD_Medium	Medium	information about the media on which the resource can be distributed	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 292-297
292.	name	medName	name of the medium on which the resource can be received	O	1	Class	MD_MediumNameCode <<CodeList>> (B.5.20)
293.	density	medDensity	density at which the data is recorded	O	N	Real	> 0,0
294.	densityUnits	medDenUnits	units of measure for the recording density	C / density documented?	1	CharacterString	Free text
295.	volumes	medVol	number of items in the media identified	O	1	Integer	> 0,0
296.	mediumFormat	medFormat	method used to write to the medium	O	N	Class	MD_MediumFormatCode <<CodeList>> (B.5.19)
297.	mediumNote	medNote	description of other limitations or requirements for using the medium	O	1	CharacterString	Free text

**B.2.10.5 Standard order process information**

298.	MD_StandardOrderProcesses	StanOrdProc	common ways in which the resource may be obtained or received, and related instructions and fee information	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Distributor)	Lines 299-302
299.	fees	resFees	fees and terms for retrieving the resource. Include monetary units (as specified in ISO 4217)	O	1	CharacterString	Free text
300.	plannedAvailableDateTimes	planAvDtTm	date and time when the dataset will be available	O	1	Class	DateTime (B.4.2)
301.	orderingInstructions	ordInstr	general instructions, terms and services provided by the distributor	O	1	CharacterString	Free text
302.	turnaround	ordTurn	typical turnaround time for the filling of an order	O	1	CharacterString	Free text

**B.2.11 Metadata extension information**

- UML model shown in Figure A.13

	Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
303.	MD_MetadataExtensionInformation	MdExtInfo	information describing metadata extensions	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadata)	Lines 304-305
304.	extensionOnLineResource	extOnRes	information about on-line sources containing the community profile name and the extended metadata elements. Information for all new metadata elements	O	1	Class	CI_OnLineResource <<DataType>> (B.3.2.4)
305.	Role name: extendedElementInformation	extEleInfo	provides information about a new metadata element, not found in ISO 19115, which is required to describe geographic data	O	N	Association	MD_ExtendedElementInformation (B.2.11.1)



## B.2.11.1 Extended element information

306.	MD_ExtendedElementInfo rmination	ExtEleInfo	new metadata element, not found in ISO 19115, which is required to describe geographic data	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_MetadataExtensionInformation)	Lines 307-319
307.	name	extEleName	name of the extended metadata element.	M	1	CharacterString	Free text
308.	shortName	extShortName	short form suitable for use in an implementation method such as XML or SGML. NOTE other methods may be used	C / dataType notEqual "codeListElement"?	1	CharacterString	Free text
309.	domainCode	extDomCode	three digit code assigned to the extended element	C / is dataType "codeListElement"?	1	Integer	Integer
310.	definition	extEleDef	definition of the extended element	M	1	CharacterString	Free text
311.	obligation	extEleOb	obligation of the extended element	C / dataType not "codeList", "enumeration" or "codeListElement"?	1	Class	MD_ObligationCode <<enumeration>> (B.5.21)
312.	condition	extEleCond	condition under which the extended element is mandatory	C / obligation = "Conditional"?	1	CharacterString	Free text
313.	dataType	eleDataType	code which identifies the kind of value provided in the extended element	M	1	Class	MD_DataTypeCode <<CodeList>> (B.5.13)
314.	maximumOccurrence	extEleMxOc	maximum occurrence of the extended element	C / dataType not "codeList", "enumeration" or "codeListElement"?	1	CharacterString	N or any integer
315.	domainValue	extEleDomVal	valid values that can be assigned to the extended element	C / dataType not "codeList", "enumeration" or "codeListElement"?	1	CharacterString	Free text
316.	parentEntity	extEleParEnt	name of the metadata entity(s) under which this extended metadata element may appear. The name(s) may be standard metadata element(s) or other extended metadata element(s).	M	N	CharacterString	Free text
317.	rule	extEleRule	specifies how the extended element relates to other existing elements and entities	M	1	CharacterString	Free text
318.	rationale	extEleRat	reason for creating the extended element	O	N	CharacterString	Free text
319.	source	extEleSrc	name of the person or organization creating the extended element	M	N	Class	CI_ResponsibleParty <<DataType>> (B.3.2)

## B.2.12 Application schema information

- UML model shown in Figure A.14

	Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
320.	MD_ApplicationSchemaInformation	AppSchInfo	information about the application schema used to build the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_Metadatas)	Lines 321-328
321.	name	asName	name of the application schema used	M	1	Class	CI_Citation <<DataType>> (B.3.2)
322.	schemaLanguage	asSchLang	identification of the schema language used	M	1	CharacterString	Free text
323.	constraintLanguage	asCstLang	formal language used in Application Schema	M	1	CharacterString	Free text
324.	schemaAscii	asAscii	full application schema given as an ASCII file	O	1	CharacterString	Free text
325.	graphicsFile	asGraFile	full application schema given as a graphics file	O	1	CharacterString	Free text
326.	softwareDevelopmentFile	asSwDevFile	full application schema given as a software development file	O	1	Binary	Binary
327.	softwareDevelopmentFileFormat	asSwDevFt	software dependent format used for the application schema software dependent file	O	1	CharacterString	Free text
328.	Role name: featureCatalogueSupplement	featCatSup	information about the spatial attributes in the application schema for the feature types	O	1	Association	MD_SpatialAttributeSupplement (B.2.12.2)

### B.2.12.1 Feature type list information

329.	MD_FeatureTypeList	FeatTypList	list of names of feature types with the same spatial representation (same as spatial attributes)	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_SpatialAttributeSupplement)	Lines 330-331
330.	spatialObject	spatObj	instance of a type defined in the spatial schema	M	1	CharacterString	Free text
331.	spatialSchemaName	spatSchName	name of the spatial schema used	M	1	CharacterString	Free text

### B.2.12.2 Spatial attribute supplement information

332.	MD_SpatialAttributeSuppl ement	SpatAttSup	spatial attributes in the application schema for the feature types	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MD_ApplicationSche mainfo)	Line 333
333.	<i>Role name:</i> theFeatureTypeList	featTypeList	provides information about the list of feature types with the same spatial representation	M	N	Association	MD_FeatureTypeList (B.2.12.1)

## B.3 Data type information

### B.3.1 Extent information

- UML model shown in Figure A.15

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
334.	EX_Extent	Extent	information about spatial, vertical, and temporal extent	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 335-338
335.	description	exDesc	spatial and temporal extent for the referring object	C / geographicElement and temporalElement and verticalElement not documented?	1	CharacterString	Free text
336.	<i>Role name:</i> geographicElement	geoEle	provides geographic component of the extent of the referring object	C / description and temporalElement and verticalElement not documented?	N	Association	EX_GeographicExtent <<Abstract>> (B.3.1.1)
337.	<i>Role name:</i> temporalElement	tempEle	provides temporal component of the extent of the referring object	C / description and geographicElement and verticalElement not documented?	N	Association	EX_TemporalExtent (B.3.1.2)
338.	<i>Role name:</i> verticalElement	vertEle	provides vertical component of the extent of the referring object	C / description and geographicElement and temporalElement not documented?	N	Association	EX_VerticalExtent (B.3.1.3)

## B.3.1.1 Geographic extent information

339.	EX_GeographicExtent	GeoExtent	geographic area of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent and EX_SpatialExtent) <<Abstract>>	Line 340
340.	extentTypeCode	exTypeCode	indication of whether the bounding polygon encompasses an area covered by the data or an area where data is not present	O	1	Boolean	0 – exclusion 1 – inclusion
341.	EX_BoundingPolygon	BoundPoly	boundary enclosing the dataset, expressed as the closed set of (x,y) coordinates of the polygon (last point replicates first point)	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_GeographicExtent)	Line 342 and 340
342.	polygon	polygon	sets of points defining the bounding polygon	M	N	GM_Object (B.4.6)	-90 to 90 latitude. -180 to 180 longitude
343.	EX_GeographicBoundingBox	GeoBndBox	geographic position of the dataset NOTE This is only an approximate reference so specifying the co-ordinate system is unnecessary	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_GeographicExtent)	Lines 344-347 and 340
344.	westBoundLongitude	westBL	western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Angle (B.4.3)	-180,0 <= West Bounding Longitude Value <= 180,0
345.	eastBoundLongitude	eastBL	eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1	Angle (B.4.3)	-180,0 <= East Bounding Longitude Value <= 180,0
346.	southBoundLatitude	southBL	southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	M	1	Angle (B.4.3)	-90,0 <= South Bounding Latitude Value <= 90,0; South Bounding Latitude Value <= North bounding Latitude Value
347.	northBoundLatitude	northBL	northern-most, coordinate of the limit of the dataset extent expressed in latitude in decimal degrees (positive north)	M	1	Angle (B.4.3)	-90,0 <= North Bounding Latitude Value <= 90,0; North Bounding Latitude Value >= South Bounding Latitude Value

348.	EX_GeographicDescription	GeoDesc	Description of the geographic area using identifiers	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_GeographicExtent)	Line 349 and 340
349.	geographicIdentifier	geold	identifier used to represent a geographic area	M	1	Class	RS_Identifier (B.2.7.2)

### B.3.1.2 Temporal extent information

350.	EX_TemporalExtent	TempExtent	time period covered by the content of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent)	Line 351
351.	extent	exTemp	date and time for the content of the dataset	M	1	Class	TM_Primitive (B.4.5)
352.	EX_SpatialTemporalExtent	SpatTempEx	extent with respect to date/time and spatial boundaries	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_TemporalExtent)	Line 353 and 351
353.	role name: spatialExtent	exSpat	spatial extent component of composite spatial and temporal extent	M	N	Association	EX_GeographicExtent <<Abstract>> (B.3.1.1)

### B.3.1.3 Vertical extent information

354.	EX_VerticalExtent	VertExtent	vertical domain of dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Aggregated Class (EX_Extent)	Lines 355-358
355.	minimumValue	vertMinVal	lowest vertical extent contained in the dataset	M	1	Real	Real
356.	maximumValue	vertMaxVal	highest vertical extent contained in the dataset	M	1	Real	Real
357.	unitOfMeasure	vertUoM	vertical units used for vertical extent information Examples: metres, feet, millimetres, hectopascals	M	1	CharacterString	UomLength (B.4.3)

358.	<i>role name:</i> verticalDatum	vertDatum	provides information about the origin from which the maximum and minimum elevation values are measured	M	1	Association	SC_VerticalDatum (B.4.9)
------	------------------------------------	-----------	--	---	---	-------------	--------------------------

### B.3.2 Citation and responsible party information

- UML model shown in Figure A.16

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
359.	CI_Citation	Citation	standardized resource reference	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 360-373
360.	title	resTitle	name by which the cited resource is known	M	1	CharacterString	Free text
361.	alternateTitle	resAltTitle	short name or other language name by which the cited information is known. Example: "DCW" as an alternative title for "Digital Chart of the World"	O	N	CharacterString	Free text
362.	date	resRefDate	reference date for the cited resource	M	N	Class	CI_Date (B.3.2.3) <<DataType>>
363.	edition	resEd	version of the cited resource	O	1	CharacterString	Free text
364.	editionDate	resEdDate	date of the edition	O	1	Class	Date (B.4.2)
365.	identifier	citId	unique identifier for the resource EXAMPLE: Universal Product Code (UPC), National Stock Number (NSN)	O	N	CharacterString	Free text
366.	identifierType	citIdType	reference form of the unique identifier (ID) Example: Universal Product Code (UPC), National Stock Number (NSN)	O	N	CharacterString	Free text
367.	citedResponsibleParty	citRespParty	name and position information for an individual or organization that is responsible for the resource	O	N	Class	CI_ResponsibleParty <<DataType>> (B.3.2)
368.	presentationForm	presForm	mode in which the resource is represented	O	N	Class	CI_PresentationFormCode <<CodeList>> (B.5.4)
369.	series	datasetSeries	information about the series, or aggregate dataset, of which the dataset is a part	O	1	Class	CI_Series <<DataType>> (B.3.2.5)
370.	otherCitationDetails	otherCitDet	other information required to complete the citation that is not recorded elsewhere	O	1	CharacterString	Free text

371.	collectiveTitle	collTitle	common title with holdings note NOTE title identifies elements of a series collectively, combined with information about what volumes are available at the source cited	O	1	CharacterString	Free text
372.	ISBN	isbn	international Standard Book Number	O	1	CharacterString	Free text
373.	ISSN	issn	international Standard Serial Number	O	1	CharacterString	Free text

374.	CI_ResponsibleParty	RespParty	identification of, and means of communication with, person(s) and organizations associated with the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 375-379
375.	individualName	rpIndName	name of the responsible person- surname, given name, title separated by a delimiter	C / organisationName and positionName not documented?	1	CharacterString	Free text
376.	organisationName	rpOrgName	name of the responsible organization	C / individualName and positionName not documented?	1	CharacterString	Free text
377.	positionName	rpPosName	role or position of the responsible person	C / individualName and organisationName not documented?	1	CharacterString	Free text
378.	contactInfo	rpCntInfo	address of the responsible party	O	1	Class	CI_Contact <<DataType>> (B.3.2.2)
379.	role	role	function performed by the responsible party	M	1	Class	CI_RoleCode <<CodeList>> (B.5.5)

### B.3.2.1 Address information

380.	CI_Address	Address	location of the responsible individual or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 381-386
381.	deliveryPoint	delPoint	address line for the location (as described in ISO 11180, Annex A)	O	N	CharacterString	Free text
382.	city	city	city of the location	O	1	CharacterString	Free text
383.	administrativeArea	adminArea	state, province of the location	O	1	CharacterString	Free text
384.	postalCode	postCode	ZIP or other postal code	O	1	CharacterString	Free text
385.	country	country	country of the physical address	O	1	CharacterString	ISO 3166-3, other parts may be used

386.	electronicMailAddress	eMailAdd	address of the electronic mailbox of the responsible organization or individual	O	N	CharacterString	Free text
------	-----------------------	----------	---	---	---	-----------------	-----------

### B.3.2.2 Contact information

387.	CI_Contact	Contact	information required to enable contact with the responsible person and/or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 388-392
388.	phone	cntPhone	telephone numbers at which the organization or individual may be contacted	O	1	Class	CI_Telephone <<DataType>> (B.3.2.6)
389.	address	cntAddress	physical and email address at which the organization or individual may be contacted	O	1	Class	CI_Address <<DataType>> (B.3.2.1)
390.	onLineResource	cntOnlineRes	on-line information that can be used to contact the individual or organization	O	1	Class	CI_OnLineResource <<DataType>> (B.3.2.4)
391.	hoursOfService	cntHours	time period (including time zone) when individuals can contact the organization or individual	O	1	CharacterString	Free text
392.	contactInstructions	cntInstr	supplemental instructions on how or when to contact the individual or organization	O	1	CharacterString	Free text

### B.3.2.3 Date information

393.	CI_Date	Date	reference date and event used to describe it	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 394-395
394.	date	refDate	reference date for the cited resource	M	1	Class	Date (B.4.2)
395.	dateType	refDateType	event used for reference date	M	1	Class	CI_DateTypeCode <<CodeList>> (B.5.2)



### B.3.2.4 OnLine resource information

396.	CI_OnLineResource	OnlineRes	information about on-line sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	Lines 397-402
397.	linkage	linkage	location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme such as <a href="http://www.statkart.no/isotc211">http://www.statkart.no/isotc211</a>	M	1	Class	URL (IETF RFC1738 IETF RFC 2056)
398.	protocol	protocol	connection protocol to be used	O	1	CharacterString	Free text
399.	applicationProfile	appProfile	name of an application profile that can be used with the online resource	O	1	CharacterString	Free text
400.	name	orName	name of the online resource	O	1	CharacterString	Free text
401.	description	orDesc	detailed text description of what the online resource is/does	O	1	CharacterString	Free text
402.	function	orFunct	code for function performed by the online resource	O	1	Class	CI_OnLineFunctionCode <<CodeList>> (B.5.3)

### B.3.2.5 Series information

403.	CI_Series	DatasetSeries	information about the series, or aggregate dataset, to which a dataset belongs	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<Data Type>>	Lines 404-406
404.	name	seriesName	name of the series, or aggregate dataset, of which the dataset is a part	O	1	CharacterString	Free text
405.	issuelIdentification	issId	information identifying the issue of the series	O	1	CharacterString	Free text
406.	page	artPage	details on which pages of the publication the article was published	O	1	CharacterString	Free text

B.3.2.6 Telephone information

407.	CI_Telephone	Telephone	telephone numbers for contacting the responsible individual or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 408-409
408.	voice	voiceNum	telephone number by which individuals can speak to the responsible organization or individual	O	N	CharacterString	Free text
409.	facsimile	faxNum	telephone number of a facsimile machine for the responsible organization or individual	O	N	CharacterString	Free text

## B.4 Externally referenced entities

### B.4.1 Introduction

There are several entities referenced by this International Standard that are documented by another, external, standard. Those externally referenced entities are explained below.

### B.4.2 Date and DateTime information

Date: gives values for year, month and day. Character encoding of a date is a string which shall follow the format for date specified by ISO 8601. This class is documented in full in ISO TS 19103.

DateTime: combination of a date and a time type (given by an hour, minute and second). Character encoding of a DateTime shall follow ISO 8601. This class is documented in full in ISO TS 19103.

### B.4.3 Distance, angle, measure, number, record, recordType, scale and UomLength information

Distance: This class is documented in full in ISO 19103.

Angle: Amount of rotation need to bring one line or plane into coincidence with another, generally measured in radians or degrees. This class is documented in full in ISO TS 19103.

Measure: result from performing the act or process of ascertaining the extent, dimensions, or quantity of some entity. This class is documented in full in ISO TS 19103.

Number: abstract class that can be sub-typed to a specific number type (real, integer, decimal, double, float). This class is documented in full in ISO TS 19103.

Record: This class is documented in full in ISO TS 19103.

RecordType: This class is documented in full in ISO TS 19103.

Scale: This class is documented in full in ISO TS 19103.

UomLength: any of the measuring systems to measure the length, distance between two entities. This class is documented in full in ISO TS 19103.

### B.4.4 Feature type, property type, and attribute type information

GF\_AttributeType: class of attribute definitions of a feature type. This class is fully documented in ISO 19109.

GF\_FeatureType: textual information describing the concept of a feature type, containing all feature types. This class is documented in full in ISO 19109.

GF\_PropertyType: related to the feature type because its text comprises characteristics and behaviour of any property of a feature type, as well as its roles within associations between features. This class is documented in full in ISO 19109.

### B.4.5 PeriodDuration and primitive information

TM\_PeriodDuration: duration of a period as specified by ISO 8601. This class is fully documented in ISO 19108.

TM\_Primitive: an abstract class representing a non-decomposed element of geometry or topology. This class is fully documented in ISO 19108.

### B.4.6 Point and Object information

GM\_Point: 0-dimensional geometric primitive, representing a position, but not having extent. This class is fully documented in ISO 19107.

GM\_Object: root class of the geometric object taxonomy and supports interfaces common to all geographically referenced geometric objects. This class is fully documented in ISO 19107.

### B.4.7 Set and Sequence information

Set: finite collection of objects, where each object appears in the collection only once. A set shall not contain any duplicated instances. The order of the elements of the set is not specified. This class is documented in full in ISO TS 19103.

Sequence: A sequence refers to a collection of sequential ordering between its elements. Sequences can be repeated, and may be used as a list or an array. This class is documented in full in ISO TS 19103.

### B.4.8 Type name information

AttributeName: This class is documented in full in ISO TS 19103.

GenericName: This class is documented in full in ISO TS 19103.

### B.4.9 Vertical datum information

SC\_VerticalDatum: set of parameters describing the relation of gravity-related heights to the Earth. This class is fully documented in ISO 19111.

## B.5 CodeLists and enumerations

### B.5.1 Introduction

The stereotype classes <<CodeList>> and <<Enumeration>> can be found below. These two stereotype classes do not contain "obligation / condition", "maximum occurrence", "data type" and "domain" attributes. These two stereotype classes also do not contain any "other" values as <<Enumeration>>s are closed (not extendable) and <<CodeList>>s are extendable. Consult Annex C and Annex H for information about how to extend <<CodeList>>s.

### B.5.2 CI\_DateTypeCode <<CodeList>>

	Name	Domain code	Definition
1.	CI_DateTypeCode	DateTypCd	identification of when a given event occurred
2.	creation	001	date identifies when the resource was brought into existence
3.	publication	002	date identifies when the resource was issued
4.	revision	003	date identifies when the resource was examined or re-examined and improved or amended

### B.5.3 CI\_OnLineFunctionCode <<CodeList>>

	Name	Domain code	Definition
1.	CI_OnLineFunctionCode	OnFuncCd	function performed by the resource
2.	download	001	online instructions for transferring data from one storage device or system to another
3.	information	002	online information about the resource
4.	offlineAccess	003	online instructions for requesting the resource from the provider
5.	order	004	online order process for obtaining the resource
6.	search	005	online search interface for seeking out information about the resource

**B.5.4 CI\_PresentationFormCode <<CodeList>>**

	Name	Domain code	Definition
1.	CI_PresentationFormCode	PresFormCd	mode in which the data is represented
2.	documentDigital	001	digital representation of a primarily textual item (can contain illustrations also)
3.	documentHardcopy	002	representation of a primarily textual item (can contain illustrations also) on paper, photographic material, or other media
4.	imageDigital	003	likeness of natural or man-made features, objects, and activities acquired through the sensing of visual or any other segment of the electromagnetic spectrum by sensors, such as thermal infrared, and high resolution radar and stored in digital format
5.	imageHardcopy	004	likeness of natural or man-made features, objects, and activities acquired through the sensing of visual or any other segment of the electromagnetic spectrum by sensors, such as thermal infrared, and high resolution radar and reproduced on paper, photographic material, or other media for use directly by the human user
6.	mapDigital	005	map represented in raster or vector form
7.	mapHardcopy	006	map printed on paper, photographic material, or other media for use directly by the human user
8.	modelDigital	007	multi-dimensional digital representation of a feature, process, etc.
9.	modelHardcopy	008	3-dimensional, physical model
10.	profileDigital	009	vertical cross-section in digital form
11.	profileHardcopy	010	vertical cross-section printed on paper, etc.
12.	tableDigital	011	digital representation of facts or figures systematically displayed, especially in columns
13.	tableHardcopy	012	representation of facts or figures systematically displayed, especially in columns, printed on paper, photographic material, or other media
14.	videoDigital	013	digital video recording
15.	videoHardcopy	014	video recording on film

**B.5.5 CI\_RoleCode <<CodeList>>**

	Name	Domain code	Definition
1.	CI_RoleCode	RoleCd	function performed by the responsible party
2.	resourceProvider	001	party that supplies the resource
3.	custodian	002	party that accepts accountability and responsibility for the data and ensures appropriate care and maintenance of the resource
4.	owner	003	party that owns the resource
5.	user	004	party who uses the resource
6.	distributor	005	party who distributes the resource
7.	originator	006	party who created the resource
8.	pointOfContact	007	party who can be contacted for acquiring knowledge about or acquisition of the resource
9.	principalInvestigator	008	key party responsible for gathering information and conducting research
10.	processor	009	party who has processed the data in a manner such that the resource has been modified
11.	publisher	010	party who published the resource

**B.5.6 DQ\_EvaluationMethodTypeCode<<CodeList>>**

	Name	Domain code	Definition
1.	DQ_EvaluationMethodTypeCode	EvalMethTypeCd	type of method for evaluating an identified data quality measure
2.	directInternal	001	method of evaluating the quality of a dataset based on inspection of items within the dataset, where all data required is internal to the dataset being evaluated
3.	directExternal	002	method of evaluating the quality of a dataset based on inspection of items within the dataset, where reference data external to the dataset being evaluated is required
4.	indirect	003	method of evaluating the quality of a dataset based on external knowledge

**B.5.7 DS\_AssociationTypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	DS_AssociationTypeCode	AscTypeCd	justification for the correlation of two datasets

	Name	Domain code	Definition
2.	crossReference	001	reference from one dataset to another
3.	largerWorkCitation	002	reference to a master dataset of which this one is a part
4.	partOfSeamlessDatabase	003	part of same structured set of data held in a computer
5.	source	004	mapping and charting information from which the dataset content originates
6.	stereomate	005	part of a set of imagery that when used together, provides three-dimensional images

### B.5.8 DS\_InitiativeTypeCode <<CodeList>>

	Name	Domain code	Definition
1.	DS_InitiativeTypeCode	InitTypCd	type of aggregation activity in which datasets are related
2.	campaign	001	series of organized planned actions
3.	collection	002	accumulation of datasets assembled for a specific purpose
4.	exercise	003	specific performance of a function or group of functions
5.	experiment	004	process designed to find if something is effective or valid
6.	investigation	005	search or systematic inquiry
7.	mission	006	specific operation of a data collection system
8.	nonImageSensor	007	device or piece of equipment which detects or records
9.	operation	008	action that is part of a series of actions
10.	platform	009	vehicle or other support base that holds a sensor
11.	process	010	method of doing something involving a number of steps
12.	program	011	specific planned activity
13.	project	012	organized undertaking, research, or development
14.	study	013	examination or investigation
15.	task	014	piece of work
16.	trial	015	process of testing to discover or demonstrate something

### B.5.9 MD\_CellGeometryCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_CellGeometryCode	CellGeoCd	code indicating whether grid data is point or area
2.	point	001	each cell represents a point
3.	area	002	each cell represents an area

### B.5.10 MD\_CharacterSetCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_CharacterSetCode	CharSetCd	name of the character coding standard used for the resource
2.	ucs2	001	16-bit fixed size Universal Character Set, based on ISO 10646
3.	ucs4	002	32-bit fixed size Universal Character Set, based on ISO 10646
4.	utf7	003	7-bit variable size UCS Transfer Format, based on ISO 10646
5.	utf8	004	8-bit variable size UCS Transfer Format, based on ISO 10646
6.	utf16	005	16-bit variable size UCS Transfer Format, based on ISO 10646
7.	8859part1	006	latin-1, west European code set
8.	8859part2	007	latin-2, central European code set
9.	8859part3	008	latin-3, south European code set
10.	8859part4	009	latin-4, north European code set
11.	8859part5	010	cyrillic code set
12.	8859part6	011	arabic code set
13.	8859part7	012	greek code set
14.	8859part8	013	hebrew code set
15.	8859part9	014	latin-5, Turkish code set
16.	8859part11	015	thai code set
17.	8859part14	016	latin-8 code set
18.	8859part15	017	latin-9 code set
19.	jis	018	japanese code set used for electronic transmission
20.	shiftJIS	019	japanese code set used on MS-DOS based machines
21.	eucJP	020	japanese code set used on UNIX based machines
22.	usAscii	021	united states ASCII code set (ISO 646 US)
23.	ebcdic	022	ibm mainframe code set
24.	euckR	023	korean code set
25.	big5	024	taiwanese code set

**B.5.11 MD\_ClassificationCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_ClassificationCode	ClasscationCd	name of the handling restrictions on the dataset
2.	unclassified	001	available for general disclosure
3.	restricted	002	not for general disclosure
4.	confidential	003	available for someone who can be entrusted with information
5.	secret	004	kept or meant to be kept private, unknown, or hidden from all but a select group of people
6.	topsecret	005	of the highest secrecy

**B.5.12 MD\_CoverageContentTypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_CoverageContentTypeCode	ContentTypeCd	specific type of information represented in the cell
2.	image	001	meaningful numerical representation of a physical parameter that is not the actual value of the physical parameter
3.	thematicClassification	002	code value with no quantitative meaning, used to represent a physical quantity
4.	physicalMeasurement	003	value in physical units of the quantity being measured

**B.5.13 MD\_DatatypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_Datatypecode	DatatypeCd	datatype of element or entity
2.	class	001	descriptor of a set of objects that share the same attributes, operations, methods, relationships, and behavior
3.	codelist	002	flexible enumeration useful for expressing a long list of values, can be extended
4.	enumeration	003	data type whose instances form a list of named literal values, not extendable
5.	codelistElement	004	permissible value for a codelist or enumeration
6.	abstractClass	005	class that cannot be directly instantiated
7.	aggregateClass	006	class that is composed of classes it is connected to by an aggregate relationship
8.	specifiedClass	007	subclass that may be substituted for its superclass
9.	datatypeClass	008	class with few or no operations whose primary purpose is to hold the abstract state of another class for transmittal, storage, encoding or persistent storage
10.	interfaceClass	009	named set of operations that characterize the behavior of an element
11.	unionClass	010	class describing a selection of one of the specified types
12.	metaclass	011	class whose instances are classes
13.	typeClass	012	class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A type may have attributes and associations
14.	characterString	013	free text field
15.	integer	014	numerical field
16.	association	015	semantic relationship between two classes that involves connections among their instances

**B.5.14 MD\_DimensionNameTypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_DimensionNameTypeCode	DimNameTypCd	name of the dimension
2.	row	001	ordinate (y) axis
3.	column	002	abscissa (x) axis
4.	vertical	003	vertical (z) axis
5.	track	004	along the direction of motion of the scan point
6.	crossTrack	005	perpendicular to the direction of motion of the scan point
7.	line	006	scan line of a sensor
8.	sample	007	element along a scan line
9.	time	008	duration

**B.5.15 MD\_GeometricObjectTypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_GeometricObjectTypeCode	GeoObjTypCd	name of point and vector spatial objects used to locate zero-, one-, and two-dimensional spatial locations in the dataset
2.	complexes	001	set of geometric primitives such that their boundaries can be represented as a union of other primitives
3.	composites	002	connected set of curves, solids or surfaces
4.	curve	003	bounded, 1-dimensional geometric primitive, representing the continuous image of a line
5.	point	004	zero-dimensional geometric primitive, representing a position but not having an extent
6.	solid	005	bounded, connected 3-dimensional geometric primitive, representing the continuous image of a region of space
7.	surface	006	bounded, connected 2-dimensional geometric, representing the continuous image of a region of a plane

**B.5.16 MD\_ImagingConditionCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_ImagingConditionCode	ImgCondCd	code which indicates conditions which may affect the image
2.	blurredImage	001	portion of the image is blurred
3.	cloud	002	portion of the image is partially obscured by cloud cover
4.	degradingObliquity	003	acute angle between the plane of the ecliptic (the plane of the Earth's orbit) and the plane of the celestial equator
5.	fog	004	portion of the image is partially obscured by fog
6.	heavySmokeOrDust	005	portion of the image is partially obscured by heavy smoke or dust
7.	night	006	image was taken at night
8.	rain	007	image was taken during rainfall
9.	semiDarkness	008	image was taken during semi-dark conditions—twilight conditions
10.	shadow	009	portion of the image is obscured by shadow
11.	snow	010	portion of the image is obscured by snow
12.	terrainMasking	011	the absence of collection data of a given point or area caused by the relative location of topographic features which obstruct the collection path between the collector(s) and the subject(s) of interest

**B.5.17 MD\_KeywordTypeCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_KeywordTypeCode	KeyTypCd	methods used to group similar keywords
2.	discipline	001	keyword identifies a branch of instruction or specialized learning
3.	place	002	keyword identifies a location
4.	stratum	003	keyword identifies the layer(s) of any deposited substance
5.	temporal	004	keyword identifies a time period related to the dataset
6.	theme	005	keyword identifies a particular subject or topic

**B.5.18 MD\_MaintenanceFrequencyCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_MaintenanceFrequencyCode	MaintFreqCd	frequency with which modifications and deletions are made to the data after it is first produced
2.	continual	001	data is repeatedly and frequently updated
3.	daily	002	data is updated each day
4.	weekly	003	data is updated on a weekly basis
5.	fortnightly	004	data is updated every two weeks
6.	monthly	005	data is updated each month
7.	quarterly	006	data is updated every three months
8.	biannually	007	data is updated twice each year
9.	annually	008	data is updated every year
10.	asNeeded	009	data is updated as deemed necessary
11.	irregular	008	data is updated in intervals that are uneven in duration
12.	notPlanned	009	there are no plans to update the data
13.	unknown	998	frequency of maintenance for the data is not known



**B.5.19 MD\_MediumFormatCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_MediumFormatCode	MedFormCd	method used to write to the medium
2.	cpio	001	CoPy In / Out (UNIX file format and command)
3.	tar	002	Tap ARchive
4.	highSierra	003	high sierra file system
5.	iso9660	004	information processing – volume and file structure of CD-ROM
6.	iso9660RockRidge	005	rock ridge interchange protocol (UNIX)
7.	iso9660AppleHFS	006	hierarchical file system (Macintosh)

**B.5.20 MD\_MediumNameCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_MediumNameCode	MedNameCd	name of the medium
2.	cdRom	001	read-only optical disk
3.	dvd	002	digital versatile disk
4.	dvdRom	003	digital versatile disk, read only
5.	3halfInchFloppy	004	3,5 inch magnetic disk
6.	5quarterInchFloppy	005	5,25 inch magnetic disk
7.	7trackTape	006	7 track magnetic tape
8.	9trackTape	007	9 track magnetic tape
9.	3480Cartridge	008	3480 cartridge tape drive
10.	3490Cartridge	009	3490 cartridge tape drive
11.	3580Cartridge	010	3580 cartridge tape drive
12.	4mmCartridgeTape	011	4 millimetre magnetic tape
13.	8mmCartridgeTape	012	8 millimetre magnetic tape
14.	1quarterInchCartridgeTape	013	0,25 inch magnetic tape
15.	digitalLinearTape	014	half inch cartridge streaming tape drive
16.	onLine	015	direct computer linkage
17.	satellite	016	linkage through a satellite communication system
18.	telephoneLink	017	communication through a telephone network
19.	hardcopy	018	pamphlet or leaflet giving descriptive information

**B.5.21 MD\_ObligationCode <<enumeration>>**

	Name	Domain code	Definition
1.	MD_ObligationCode	ObCd	obligation of the element or entity
2.	mandatory	001	element is always required
3.	optional	002	element is not required
4.	conditional	003	element is required when specific a specific condition is met

**B.5.22 MD\_PixelOrientationCode <<Enumeration>>**

	Name	Domain code	Definition
1.	MD_PixelOrientationCode	PixOrientCd	point in a pixel corresponding to the Earth location of the pixel
2.	center	001	point halfway between the lower left and the upper right of the pixel
3.	lowerLeft	002	the corner in the pixel closest to the origin of the SRS; if two are at the same distance from the origin, the one with the smallest x-value
4.	lowerRight	003	next corner counterclockwise from the lower left
5.	upperRight	004	next corner counterclockwise from the lower right
6.	upperLeft	005	next corner counterclockwise from the upper right

**B.5.23 MD\_ProgressCode <<CodeList>>**

	Name	Domain code	Definition
1.	MD_ProgressCode	ProgCd	status of the dataset or progress of a review
2.	completed	001	production of the data has been completed

	Name	Domain code	Definition
3.	historicalArchive	002	data has been stored in an offline storage facility
4.	obsolete	003	data is no longer relevant
5.	onGoing	004	data is continually being updated
6.	planned	005	fixed date has been established upon or by which the data will be created or updated
7.	required	006	data needs to be generated or updated
8.	underdevelopment	007	data is currently in the process of being created

#### B.5.24 MD\_RestrictionCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_RestrictionCode	RestrictCd	limitation(s) placed upon the access or use of the data
2.	copyright	001	exclusive right to the publication, production, or sale of the rights to a literary, dramatic, musical, or artistic work, or to the use of a commercial print or label, granted by law for a specified period of time to an author, composer, artist, distributor
3.	patent	002	government has granted exclusive right to make, sell, use or license an invention or discovery
4.	patentPending	003	produced or sold information awaiting a patent
5.	trademark	004	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer
6.	license	005	formal permission to do something
7.	intellectualPropertyRights	006	rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity
8.	restricted	007	withheld from general circulation or disclosure
9.	otherRestictions	008	limitation not listed

#### B.5.25 MD\_ScopeCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_ScopeCode	ScopeCd	class of information to which the referencing entity applies
2.	attribute	001	information applies to the attribute class
3.	attributeType	002	information applies to the characteristic of a feature
4.	collectionHardware	003	information applies to the collection hardware class
5.	collectionSession	004	information applies to the collection session
6.	dataset	005	information applies to the dataset
7.	series	006	information applies to the series
8.	nonGeographicDataset	007	information applies to non-geographic data
9.	dimensionGroup	008	information applies to a dimension group
10.	feature	009	information applies to a feature
11.	featureType	010	information applies to a feature type
12.	propertyType	011	information applies to a property type
13.	fieldSession	012	information applies to a field session
14.	software	013	information applies to a computer program or routine
15.	service	014	information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case
16.	model	015	information applies to a copy or imitation of an existing or hypothetical object

#### B.5.26 MD\_SpatialRepresentationTypeCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_SpatialRepresentationTypeCode	SpatRepTypCd	method used to represent geographic information in the dataset
2.	vector	001	vector data is used to represent geographic data
3.	grid	002	grid data is used to represent geographic data
4.	textTable	003	textual or tabular data is used to represent geographic data
5.	tin	004	triangulated irregular network
6.	stereoModel	005	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
7.	video	006	scene from a video recording

## B.5.27 MD\_TopicCategoryCode &lt;&lt;CodeList&gt;&gt;

	Name	Domain code	Definition
1.	MD_TopicCategoryCode	TopicCatCd	high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets. Can be used to group keywords as well. Listed examples are not exhaustive. NOTE It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.
2.	farming	001	rearing of animals and/or cultivation of plants  Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
3.	biota	002	flora and/or fauna in natural environment  Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
4.	boundaries	003	legal land descriptions  Examples: political and administrative boundaries
5.	climatologyMeteorologyAtmosphere	004	processes and phenomena of the atmosphere  Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
6.	economy	005	economic activities, conditions and employment  Examples: production, labour, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas
7.	elevation	006	height above or below sea level  Examples: altitude, bathymetry, digital elevation models, slope, derived products
8.	environment	007	environmental resources, protection and conservation  Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape
9.	geoscientificInformation	008	information pertaining to earth sciences  Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
10.	health	009	health, health services, human ecology, and safety  Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services
11.	imageryBaseMapsEarthCover	010	base maps  Examples: land cover, topographic maps, imagery, unclassified images, annotations
12.	intelligenceMilitary	011	military bases, structures, activities  Examples: barracks, training grounds, military transportation, information collection
13.	inlandWaters	012	inland water features, drainage systems and their characteristics  Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts
14.	location	013	positional information and services  Examples: addresses, geodetic networks, control points, postal zones and services, place names
15.	oceans	014	features and characteristics of salt water bodies (excluding inland waters)  Examples: tides, tidal waves, coastal information, reefs
16.	planningCadastre	015	information used for appropriate actions for future use of the land  Examples: land use maps, zoning maps, cadastral surveys, land ownership
17.	society	016	characteristics of society and cultures  Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities, social impact assessments, crime and justice, census information

18.	structure	017	man-made construction  Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
19.	transportation	018	means and aids for conveying persons and/or goods  Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
20.	utilitiesCommunication	019	energy, water and waste systems and communications infrastructure and services  Examples: hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication networks

### B.5.28 MD\_TopologyLevelCode <<CodeList>>

	Name	Domain code	Definition
1.	MD_TopologyLevelCode	TopoLevCd	degree of complexity of the spatial relationships
2.	geometryOnly	001	geometry objects without any additional structure which describes topology
3.	topology1D	002	1-dimensional topological complex
4.	planarGraph	003	1-dimensional topological complex which is planar
5.	fullPlanarGraph	004	2-dimensional topological complex which is planar
6.	surfaceGraph	005	1-dimensional topological complex which is isomorphic to a subset of a surface
7.	fullSurfaceGraph	006	2-dimensional topological complex which is isomorphic to a subset of a surface
8.	topology3D	007	3-dimensional topological complex
9.	fullTopology3D	008	complete coverage of a 3D coordinate space
10.	abstract	009	topological complex without any specified geometric realization

## **Annex C** (normative)

### **Metadata extensions and profiles**

#### **C.1 Background**

Annexes A, B and clause 6 of this International Standard provide standard metadata and an associated structure that will serve a wide variety of digital geographic data. The definitions and domain values are intended to be sufficiently generic to satisfy the metadata needs of various disciplines. However, the very diversity of data means that generic metadata may not accommodate all applications. This annex provides the rules for defining and applying additional metadata to better serve special user needs.

#### **C.2 Types of extensions**

The following types of extensions shall be allowed:

- 1) adding a new metadata section;
- 2) creating a new metadata codelist to replace the domain of an existing metadata element that has “free text” listed as its domain value;
- 3) creating new metadata codelist elements (expanding a codelist);
- 4) adding a new metadata element;
- 5) adding a new metadata entity;
- 6) imposing a more stringent obligation on an existing metadata element;
- 7) imposing a more restrictive domain on an existing metadata element.

#### **C.3 Creating an extension**

Prior to the creation of extended metadata a careful review of the existing metadata within this International Standard must be performed to confirm that suitable metadata does not already exist. For each extended metadata section, entity, and/or element, the name, short name, definition, obligation, condition, maximum occurrence, data type, and domain values shall be defined. Relationships as provided in annex A shall be defined so a structure and schema can be determined.

#### **C.4 Rules for creating an extension**

- 1) Extended metadata elements shall not be used to change the name, definition or data type of an existing element.
- 2) Extended metadata may be defined as entities and may include extended and existing metadata elements as components.

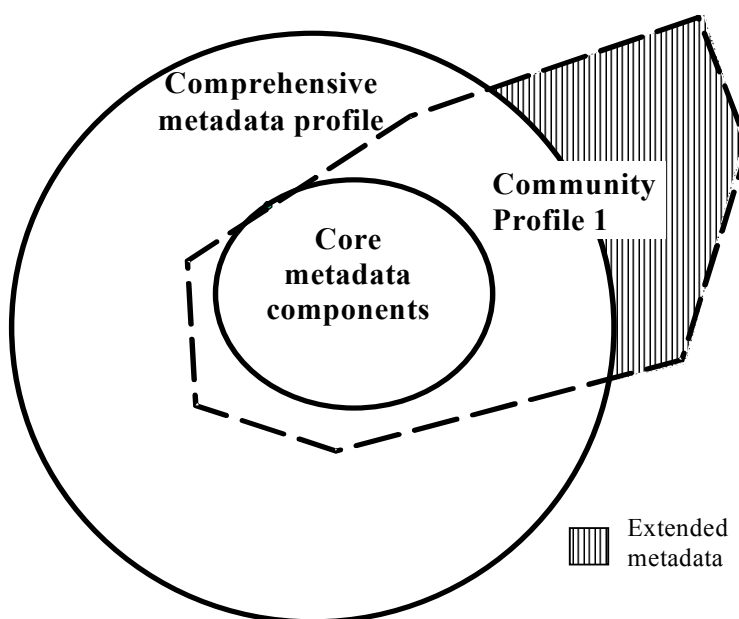
- 3) An extension is permitted to impose more stringent obligation on existing metadata elements than the standard requires. (Metadata elements that are optional in the standard may be mandatory in an extension.)
- 4) An extension is permitted to contain metadata elements with domains that are more restrictive than the standard. (Metadata elements whose domains have free text in the standard may have a closed list of appropriate values in the profile.)
- 5) An extension is permitted to restrict the use of domain values allowed by the standard. (If the standard contains five values in the domain of an existing metadata element, the extension may specify that its domain consists of three domain values. The extension shall require that the user select a value from the three domain values.)
- 6) An extension is permitted to expand the number of values in a codelist.
- 7) An extension shall not permit anything not allowed by the standard.

## C.5 Community profile

If the information to be added is extensive, involving the creation of many metadata elements within a metadata entity, specific to a discipline or application, co-ordination of the proposed extension via user groups and creation of a community profile is recommended.

This International Standard defines almost 300 metadata elements, with most of these being listed as "optional". They are explicitly defined in order to help users understand exactly what is being described. Individual communities, nations, or organizations may develop a "community profile" of this International Standard. They will make a select set of metadata elements mandatory. A given metadata element (e.g., the "price" of a dataset) may be established as "mandatory" for a certain community that will always want that metadata element reported. A community of users may want to establish additional metadata elements that are not in this International Standard. For example, a community may want to develop metadata elements for the status of datasets within their system to help manage production. However, these added elements will not be known outside the community unless they are published. A community profile should establish field sizes and domains for all metadata elements. If one system within a community uses thirty-two (32) characters for the title of a dataset and another system handles eight (8) characters, interoperability will not be achieved. Standardizing selected domains within a community is important to allow more efficient searches and better system control. See ISO 19106 for more information on community profiles.

Figure C.1 illustrates the relationship between the Core Metadata components, the comprehensive metadata application profile and national, regional, domain specific or organizational profiles.



**Figure C.1 — Metadata community profile**

The inner circle contains the core metadata components. The comprehensive metadata includes the core metadata components. A community profile shall contain the core metadata components, but not necessarily all the other metadata components. Additionally it may contain metadata extensions (shaded area) which shall be defined following the metadata extension rules in this annex.

## C.6 Rules for creating a profile

- 1) Before creating a profile, the user shall check registered profiles.
- 2) A profile must adhere to the rules for defining an extension.
- 3) A profile shall not change the name, definition, or data type of a metadata element.
- 4) A profile shall include:
  - the core metadata collected for a digital geographic dataset
  - all mandatory metadata elements in all mandatory sections
  - all conditional metadata elements in all mandatory sections, if the dataset meets the condition required by the metadata element
  - all mandatory metadata elements in all conditional sections, if the dataset meets the condition required by the section
  - all conditional metadata elements in all conditional sections, if the dataset meets the condition required by the metadata element and the section
- 5) Relationships, as provided in annex A, shall be defined so that a structure and schema can be determined.

- 6) A profile shall be made available to anyone receiving metadata that was created according to that profile.



## Annex D (normative)

### Abstract test suite

#### D.1 Abstract test suite

This abstract test suite applies to the comprehensive profile and any profile derived from this International Standard. Metadata shall be provided as specified in clause 6 and Annexes A and B. User-defined metadata shall be defined and provided as specified in Annex C. User-defined metadata shall satisfy the requirements as stated in D.3.

#### D.2 Metadata test suite

##### D.2.1 Test case identifier: Completeness test

- a) Test Purpose: to determine conformance by the inclusion of all metadata sections, metadata entities, and metadata elements that are specified with an obligation of “mandatory” or mandatory under the conditions specified.

NOTE Many elements designated as mandatory are contained within optional entities. These elements become mandatory only when their containing entity is used.

- b) Test Method: a comparison between this International Standard and a subject metadata set to be tested shall be performed to determine if all metadata defined as mandatory in annex B are present. A comparison test shall also be performed to determine if all metadata elements defined as conditional in annex B are present if the conditions set out in this International Standard apply.
- c) Reference: Annex B.
- d) Test Type: Basic

The following test cases apply at all levels of obligation – mandatory, conditional, and optional.

##### D.2.2 Test case identifier: Maximum occurrence test

- a) Test Purpose: to ensure each metadata element occurs no more than the number of times specified in this International Standard
- b) Test Method: examine a subject metadata set for the number of occurrences of each metadata section, metadata entity, and metadata element provided. The number of occurrences for each shall be compared with its “Maximum Occurrences” attribute specified in annex B.
- c) Reference: Annex B.
- d) Test Type: Basic

### **D.2.3 Test case identifier: Short name test**

- a) Test Purpose: to determine if short names used in a subject metadata set fall within the domain specified within this International Standard.
- b) Test Method: the short name for each metadata element in a subject metadata set is examined to determine if it is defined in this International Standard.
- c) Reference: Annex B.
- d) Test Type: Basic

### **D.2.4 Test case identifier: Data type test**

- a) Test Purpose: to determine if each metadata element within a subject metadata set uses the specified data type.
- b) Test Method: the value of each provided metadata element is tested to ensure its data type adheres to the data type specified.
- c) Reference: Annex B.
- d) Test Type: Basic

### **D.2.5 Test case identifier: Domain test**

- a) Test Purpose: to determine if each provided metadata element within a subject metadata set falls within the specified domain.
- b) Test Method: the values of each metadata element are tested to ensure they fall within the specified domain.
- c) Reference: Annex B.
- d) Test Type: Basic

### **D.2.6 Test case identifier: Schema test**

- a) Test Purpose: to determine if a subject metadata set follows the schema specified in this International Standard.
- b) Test Method: test each metadata element and ensure it is contained within the specified metadata entity.
- c) Reference: Annex B.
- d) Test Type: Basic

## **D.3 User-defined extension metadata test suite**

### **D.3.1 Test case identifier: Exclusiveness test**

- a) Test Purpose: to verify that each user-defined metadata section, metadata entity, and metadata element is unique and not already defined in this International Standard.
- b) Test Method: each user-defined metadata entity and metadata element is tested to ensure it is unique and not previously used.

- c) Reference: Annex B.
- d) Test Type: Basic

### **D.3.2 Test case identifier: Definition test**

- a) Test Purpose: to verify that user-defined metadata entities and metadata elements have been defined as specified in this International Standard.
- b) Test Method: each user-defined metadata entity and metadata element is tested to ensure that all attributes have been defined.
- c) Reference: Annex B.
- d) Test Type: Basic

### **D.3.3 Test case identifier: Standard metadata test**

- a) Test Purpose: to verify that user-defined metadata within a subject metadata set fulfils the same requirements as ISO 19115 standard metadata.
- b) Test Method: all user-defined metadata in a subject metadata set is tested in accordance with 2.3.2 of this International Standard.
- c) Reference: 2.3.
- d) Test Type: Basic

## **D.4 Metadata profiles**

### **D.4.1 Test case identifier: Metadata profiles**

- a) Test Purpose: to verify that a profile follows the rules specified in this standard
- b) Test Method: apply tested defined in clause D.2 of this standard
- c) Reference: 2.2
- d) Test Type: Basic

## **Annex E** (normative)

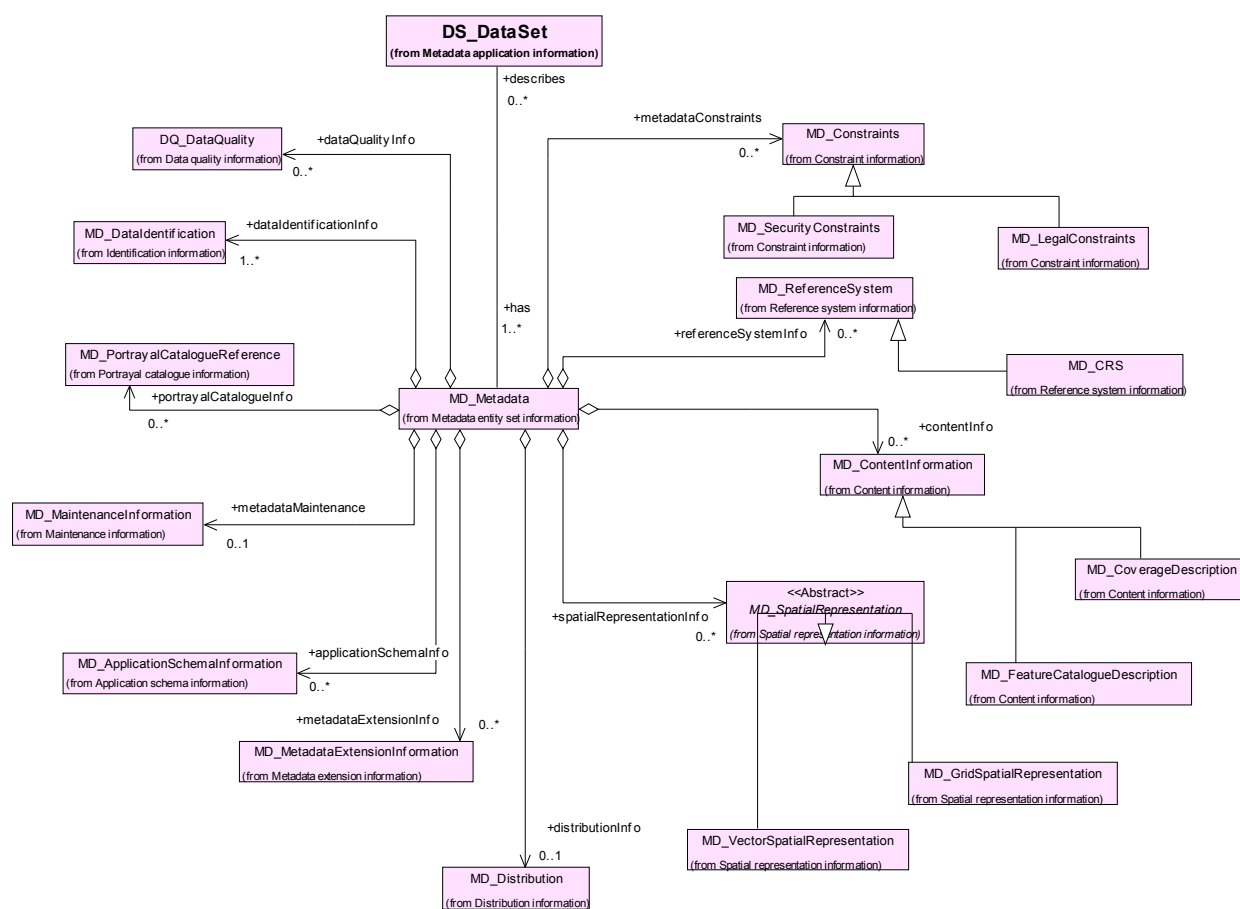
### **Comprehensive dataset metadata application profile**

#### **E.1 Comprehensive dataset metadata application schema**

The ISO 19100 series of geographic information standards define, in the abstract, the classes of information needed to: 1) model geographic phenomena; and 2) manipulate, manage, and understand these models. In order to implement these standards, profiles must be developed. Typically an information community with special requirements will develop profiles which use the appropriate parts provided by this series of standards. This Comprehensive Dataset Metadata Profile is a basic profile. It provides an international standardized profile applicable to a wide range of information communities. Use of this profile will promote interoperability between information communities. The Comprehensive dataset metadata profile is comprised of the packages, classes, attributes, and relationships defined annexes A and B. Only the classes, attributes and relationships necessary to fulfil the requirements for general-purpose dataset metadata are present.

#### **E.2 Comprehensive dataset metadata profile – UML model**

The Comprehensive Dataset Metadata Profile is presented in a UML metadata application schema, Figure E.1. The attributes within each class and codelists have not been displayed in the model in order to simplify the diagram.



### Figure E.1 — Comprehensive dataset metadata profile

## Annex F (informative)

### Dataset metadata – XML DTD

#### F.1 Comprehensive dataset metadata profile – XML DTD

The Comprehensive dataset metadata profile is presented in XML DTD form. Several DTDs are used to produce the complete DTD. The 19103-CSL.dtd is included here for convenience. The 19115-DatasetMetadata.dtd was derived from the Comprehensive dataset metadata application schema UML model using an automated process.

This International Standard refers to many elements that are defined in other standards. To reduce complexity, DTDs for those standards are not included. Where an element external to this International Standard is used, the XML value of “ANY” is used. A comment below that line indicates what element is being referred to and in which standard it is defined. The 19103 – Conceptual Schema Language DTD is included as it contains basic datatypes used throughout the standard. The 19103 DTD is only provided for informative purposes and should not be regarded as a normative version of that document.

Several of the metadata elements (derived from UML attributes) are not uniquely named (“name” is used several times). When the below DTDs were created, several of the elements had to be renamed to make them unique within the DTD. An alphabetic character and a dash (“-”) was added to the front of elements that were not unique. Each occurrence of the repeating element was assigned a different character i.e. a-name, b-name, c-name.

A “registrar” element was added to all metadata elements that have a Codelist as their domain. That “registrar” element is intended to give the location of the document that is the source of the Codelist.

#### F.2 ISO 19115 – Metadata DTD (19115-DatasetMetadata.dtd)

```
<?xml version="1.0" encoding="UTF-8"?>
<!ENTITY % _19103.dtd SYSTEM "19103-CSL.dtd">
%_19103.dtd;
<!-- TYPE - ENTITY DECLARATIONS -->
<!ENTITY % MD_Metadata '(fileIdentifier?, language?, characterSet?, parentIdentifier?, hierarchyLevel*,
hierarchyLevelName*, contact, dateStamp, metadataStandardName?, metadataStandardVersion?,
distributionInfo?, identificationInfo+, applicationSchemaInfo*, portrayalCatalogueInfo*, metadataMaintenance?,
metadataConstraints*, dataQualityInfo*, spatialRepresentationInfo*, referenceSystemInfo*, featureCatalogueInfo*,
contentInfo*, metadataExtensionInfo*)'>
<!ENTITY % MD_BrowseGraphic '(fileName, fileDescription?, fileType?)'>
<!ENTITY % MD_CharacterSetCode '(registrar, MD_CharacterSetCode)'>
<!ENTITY % MD_DataIdentification '(citation, abstract, purpose?, credit*, status*, pointOfContact*,
resourceFormat*, resourceSpecificUsage*, resourceMaintenance*, descriptiveKeywords*, resourceConstraints*,
graphicOverview*, spatialRepresentationType*, spatialResolution*, language+, characterSet?, topicCategory+,
geographicBox*, geographicDescription*, environmentDescription?, extent*, supplementalInformation?)'>
<!ENTITY % MD_ServiceIdentification '(citation, abstract, purpose?, credit*, status*, pointOfContact*,
resourceFormat*, resourceSpecificUsage*, resourceMaintenance*, descriptiveKeywords*, resourceConstraints*,
graphicOverview*, serviceType, typeProperties)'>
<!ENTITY % MD_SpatialRepresentationTypeCode '(registrar, MD_SpatialRepresentationTypeCode)'>
<!ENTITY % MD_RepresentativeFraction '(denominator)'>
<!ENTITY % MD_TopicCategoryCode '(registrar, MD_TopicCategoryCode)'>
<!ENTITY % MD_ProgressCode '(registrar, MD_ProgressCode)'>
<!ENTITY % MD_Resolution '(equivalentScale | a-distance)'>
<!ENTITY % MD_KeywordTypeCode '(registrar, MD_KeywordTypeCode)'>
```

```

<!ENTITY % MD_Usage '(specificUsage, usageDateTime?, userDeterminedLimitations?, userContactInfo+)>
<!ENTITY % MD_Keywords '(keyword+, type?, thesaurusName?)>
<!ENTITY % MD_Constraints '(useLimitation*)>
<!ENTITY % MD_LegalConstraints '(useLimitation*, accessConstraints*, useConstraints*, otherConstraints*)>
<!ENTITY % MD_SecurityConstraints '(useLimitation*, classification, userNote?, classificationSystem?,
handlingDescription?)>
<!ENTITY % MD_ClassificationCode '(registrar, MD_ClassificationCode)>
<!ENTITY % MD_RestrictionCode '(registrar, MD_RestrictionCode)>
<!ENTITY % DQ_EvaluationMethodCode '(registrar, DQ_EvaluationMethodTypeCode)>
<!ENTITY % LI_ProcessStep '(description, rationale?, dateTime?, processor*, source*)>
<!ENTITY % LI_Source '(description?, scaleDenominator?, datum?, sourceCitation?, sourceExtent*,
sourceStep*)>
<!ENTITY % LI_Lineage '(statement?, source*, processStep*)>
<!ENTITY % DQ_Scope '(level+, extent?, levelDescription*)>
<!ENTITY % DQ_DataQuality '(a-scope, report*, lineage?)>
<!ENTITY % DQ_Completeness '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_LogicalConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_PositionalAccuracy '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_ThematicAccuracy '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_TemporalAccuracy '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_CompletenessCommission '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_CompletenessOmission '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_ConceptualConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_DomainConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_FormatConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_TopologicalConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_AbsoluteExternalPositionalAccuracy '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_GriddedDataPositionalAccuracy '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_RelativeInternalPositionalAccuracy '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_ThematicClassificationCorrectness '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_NonQuantitativeAttributeAccuracy '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_QuantitativeAttributeAccuracy '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_AccuracyOfATimeMeasurement '(nameOfMeasure*, measureIdentification?,
measureDescription?, evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?,
result+)>
<!ENTITY % DQ_TemporalConsistency '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_TemporalValidity '(nameOfMeasure*, measureIdentification?, measureDescription?,
evaluationMethodType?, evaluationMethodDescription?, evaluationProcedure?, dateTime?, result+)>
<!ENTITY % DQ_ConformanceResult '(specification, explanation, pass)>
<!ENTITY % DQ_QuantitativeResult '(valueType?, valueUnit?, errorStatistic?, a-value+)>

```

```

<!ENTITY % DQ_Result '%CharacterString;'>
<!ENTITY % MD_MaintenanceInformation '(maintenanceAndUpdateFrequency, dateOfNextUpdate?,
userDefinedMaintenanceFrequency?, updateScope*, updateScopeDescription*, maintenanceNote*)'>
<!ENTITY % MD_MaintenanceFrequencyCode '(registrar, MD_MaintenanceFrequencyCode)'>
<!ENTITY % MD_ScopeCode '(registrar, MD_ScopeCode)'>
<!ENTITY % MD_ScopeDescription '(attributes | features | featureInstances | attributeInstances | dataset | other)'>
<!ENTITY % MD_GridSpatialRepresentation '(numberOfDimensions, axisDimensionProperties, cellGeometry,
transformationParameterAvailability)'>
<!ENTITY % MD_VectorSpatialRepresentation '(topologyLevel?, geometricObjects*)'>
<!ENTITY % MD_TopologyLevelCode '(registrar, MD_TopologyLevelCode)'>
<!ENTITY % MD_GeometricObjectTypeCode '(registrar, MD_GeometricObjectTypeCode)'>
<!ENTITY % MD_CellGeometryCode '(registrar, MD_CellGeometryCode)'>
<!ENTITY % MD_Georeferenceable '(numberOfDimensions, axisDimensionProperties, cellGeometry,
transformationParameterAvailability, controlPointAvailability, orientationParameterAvailability,
orientationParameterDescription?, parameters, parameterCitation*)'>
<!ENTITY % MD_Dimension '(dimensionName, dimensionSize, resolution?)'>
<!ENTITY % MD_DimensionNameTypeCode '(registrar, MD_DimensionNameTypeCode)'>
<!ENTITY % MD_PixelOrientationCode '(MD_PixelOrientationCode)'>
<!ENTITY % MD_Georectified '(numberOfDimensions, axisDimensionProperties, cellGeometry,
transformationParameterAvailability, checkPointAvailability, checkPointDescription?, cornerPoints, centerPoint?,
pointInPixel, transformationDimensionDescription?, transformationDimensionMapping*)'>
<!ENTITY % MD_GeometricObjects '(geometricObjectType, geometricObjectCount?)'>
<!ENTITY % RS_Identifier '(authority?, a-code)'>
<!ENTITY % MD_ReferenceSystem '(rsID)'>
<!ENTITY % MD_CRS '(rsID, projection?, ellipsoid?, datum?, projectionParameters?, ellipsoidParameters?)'>
<!ENTITY % MD_ProjectionParameters '(zoneNumber?, standardParallel*, longitudeOfCentralMeridian?,
latitudeOfProjectionOrigin?, falseEasting?, falseNorthing?, falseEastingNorthingUnits?, scaleFactorAtEquator?,
heightOfProspectivePointAboveSurface?, longitudeOfProjectionCenter?, latitudeOfProjectionCenter?,
scaleFactorAtCenterLine?, straightVerticalLongitudeFromPole?, scaleFactorAtProjectionOrigin?,
obliqueLineAzimuthParameter?, obliqueLinePointParameter*)'>
<!ENTITY % MD_ObliqueLineAzimuth '(azimuthAngle, azimuthMeasurePointLongitude)'>
<!ENTITY % MD_ObliqueLinePoint '(obliqueLineLatitude, obliqueLineLongitude)'>
<!ENTITY % MD_EllipsoidParameters '(semiMajorAxis, axisUnits, denominatorOfFlatteningRatio?)'>
<!ENTITY % MD_FeatureCatalogueDescription '(complianceCode?, language*, includedWithDataset,
featureTypes*, featureCatalogueCitation+)'>
<!ENTITY % MD_CoverageContentTypeCode '(registrar, MD_CoverageContentTypeCode)'>
<!ENTITY % MD_CoverageDescription '(attributeDescription, contentType, imageDescription*, dimension*)'>
<!ENTITY % MD_ImageDescription '(attributeDescription, contentType, imageDescription*, dimension*,
illuminationElevationAngle?, illuminationAzimuthAngle?, imagingCondition?, imageQualityCode?,
cloudCoverPercentage?, processingLevelCode?, compressionGenerationQuantity?, triangulationIndicator?,
radiometricCalibrationDataAvailability?, cameraCalibrationInformationAvailability?,
filmDistortionInformationAvailability?, lensDistortionInformationAvailability?)'>
<!ENTITY % MD_ContentInformation '%CharacterString;'>
<!ENTITY % MD_Identifier '(authority?, code)'>
<!ENTITY % MD_RangeDimension '(sequenceIdentifier?, descriptor?)'>
<!ENTITY % MD_ImagingConditionCode '(registrar, MD_ImagingConditionCode)'>
<!ENTITY % MD_Band '(sequenceIdentifier?, descriptor?, maxValue?, minValue?, units?, peakResponse?,
bitsPerValue?, toneGradation?, scaleFactor?, offset?)'>
<!ENTITY % MD_PortrayalCatalogueReference '(portrayalCatalogueCitation+)'>
<!ENTITY % MD_Medium '(a-name?, density*, densityUnits?, volumes?, mediumFormat*, mediumNote?)'>
<!ENTITY % MD_DigitalTransferOptions '(unitsOfDistribution?, transferSize?, onLine*, offLine?)'>
<!ENTITY % MD_StandardOrderProcess '(fees?, plannedAvailableDateTime?, orderingInstructions?,
turnaround?)'>
<!ENTITY % MD_Distributor '(distributorContact, distributionOrderProcess*, distributorFormat+,
distributorTransferOptions*)'>
<!ENTITY % MD_Distribution '(distributionFormat+, transferOptions*, distributor*)'>
<!ENTITY % MD_Format '(b-name, version, amendmentNumber?, specification?, fileDecompressionTechnique?,
formatDistributor*)'>
<!ENTITY % MD_MediumFormatCode '(registrar, MD_MediumFormatCode)'>
<!ENTITY % MD_MediumNameCode '(registrar, MD_MediumNameCode)'>
<!ENTITY % MD_ExtendedElementInformation '(c-name, shortName?, domainCode?, definition, obligation?,
condition?, dataType, maximumOccurrence?, domainValue?, parentEntity+, rule, rationale*, source+)'>
<!ENTITY % MD_MetadataExtensionInformation '(extensionOnLineResource?, extendedElementInformation*)'>

```



```

<!ENTITY % MD_ObligationCode '(MD_ObligationCode)'\>
<!ENTITY % MD_DatatypeCode '(registrar, MD_DatatypeCode)'\>
<!ENTITY % MD_ApplicationSchemaInformation '(d-name, schemaLanguage, constraintLanguage, schemaAscii?,
graphicsFile?, softwareDevelopmentFile?, softwareDevelopmentFileFormat?, featureCatalogueSupplement+)\>
<!ENTITY % MD_FeatureTypeList '(spatialObject, spatialSchemaName)'\>
<!ENTITY % MD_SpatialAttributeSupplement '(theFeatureTypeList+)\>
<!ENTITY % EX_TemporalExtent '(a-extent)'\>
<!ENTITY % EX_VerticalExtent '(minimumValue, maximumValue, unitOfMeasure)'\>
<!ENTITY % EX_BoundingPolygon '(extentTypeCode?, polygon+)\>
<!ENTITY % EX_Extent '(description?, temporalElement*, verticalElement*, geographicElement*)'\>
<!ENTITY % EX_GeographicBoundingBox '(extentTypeCode?, westBoundLongitude, eastBoundLongitude,
southBoundLatitude, northBoundLatitude)'\>
<!ENTITY % EX_SpatialTemporalExtent '(extent, spatialExtent+)\>
<!ENTITY % EX_GeographicDescription '(extentTypeCode?, geographicIdentifier)'\>
<!ENTITY % CI_ResponsibleParty '(individualName?, organisationName?, positionName?, contactInfo?, role)'\>
<!ENTITY % CI_Citation '(title, alternateTitle*, date+, edition?, editionDate?, identifier*, identifierType*,
citedResponsibleParty*, presentationForm*, series?, otherCitationDetails?, collectiveTitle?, ISBN?, ISSN?)'\>
<!ENTITY % CI_Address '(deliveryPoint*, city?, administrativeArea?, postalCode?, country?,
electronicMailAddress*)'\>
<!ENTITY % CI_RoleCode '(registrar, CI_RoleCode)'\>
<!ENTITY % CI_OnlineResource '(linkage, protocol?, applicationProfile?, e-name?, description?, functionCode?)'\>
<!ENTITY % CI_MandatoryParty '(individualName | organisationName | positionName)'\>
<!ENTITY % CI_Contact '(phone?, address*, onlineResource?, hoursOfService?, contactInstructions?)'\>
<!ENTITY % CI_Telephone '(voice*, facsimile*)'\>
<!ENTITY % CI_PresentationFormCode '(registrar, CI_PresentationFormCode)'\>
<!ENTITY % URL '%CharacterString;'\>
<!ENTITY % CI_OnLineFunctionCode '(registrar, CI_OnLineFunctionCode)'\>
<!ENTITY % CI_Date '(a-date, dateType)'\>
<!ENTITY % CI_DateTypeCode '(registrar, CI_DateTypeCode)'\>
<!ENTITY % CI_Series '(f-name?, issueIdentification?, page?)'\>
<!ENTITY % Sequence_ServiceTypeProperty_ '(ServiceTypeProperty)*'\>
<!ENTITY % Set_GF_AttributeType_ '(GF_AttributeType)*'\>
<!ENTITY % Set_GF_FeatureType_ '(GF_FeatureType)*'\>
<!ENTITY % Set_FE_Feature_ '(FE_Feature)*'\>
<!ENTITY % Set_FE_FeatureAttribute_ '(FE_FeatureAttribute)*'\>
<!ENTITY % Sequence_MD_Dimension_ '(MD_Dimension)*'\>
<!ENTITY % Sequence_GM_Point_ '(GM_Point)*'\>
<!ENTITY % MD_IdentificationTypes '(MD_DataIdentification | MD_ServiceIdentification )'\>
<!ENTITY % MD_ConstraintsTypes '(MD_SecurityConstraints | MD_LegalConstraints | MD_Constraints )'\>
<!ENTITY % MD_SpatialRepresentationTypes '(MD_Georectified | MD_GridSpatialRepresentation |
MD_Georeferenceable | MD_VectorSpatialRepresentation )'\>
<!ENTITY % DQ_ElementTypes '(DQ_QuantitativeAttributeAccuracy | DQ_ThematicAccuracy |
DQ_RelativeInternalPositionalAccuracy | DQ_PositionalAccuracy | DQ_DomainConsistency |
DQ_LogicalConsistency | DQ_TemporalValidity | DQ_TemporalAccuracy | DQ_GriddedDataPositionalAccuracy |
DQ_Completeness | DQ_AbsoluteExternalPositionalAccuracy | DQ_ConceptualConsistency |
DQ_AccuracyOfATimeMeasurement | DQ_TopologicalConsistency | DQ_FormatConsistency |
DQ_CompletenessCommission | DQ_NonQuantitativeAttributeAccuracy | DQ_ThematicClassificationCorrectness |
DQ_CompletenessOmission | DQ_TemporalConsistency )'\>
<!ENTITY % MD_IdentifierTypes '(RS_Identifier | MD_Identifier )'\>
<!ENTITY % DQ_ResultTypes '(DQ_ConformanceResult | DQ_QuantitativeResult | DQ_Result )'\>
<!ENTITY % MD_ReferenceSystemTypes '(MD_ReferenceSystem | MD_CRS)'\>
<!ENTITY % MD_RangeDimensionTypes '(MD_Band | MD_RangeDimension )'\>
<!ENTITY % EX_TemporalExtentTypes '(EX_TemporalExtent | EX_SpatialTemporalExtent)'\>
<!ENTITY % EX_GeographicExtentTypes '(EX_BoundingPolygon | EX_GeographicBoundingBox |
EX_GeographicDescription )'\>
<!-- OBJECT ELEMENT DECLARATIONS -->

```

```

<!ENTITY % Object '(MD_Metadata | MD_BrowseGraphic | MD_DataIdentification | MD_ServiceIdentification |
MD_RepresentativeFraction | MD_Usage | MD_Keywords | MD_Constraints | MD_LegalConstraints |
MD_SecurityConstraints | LI_ProcessStep | LI_Source | LI_Lineage | DQ_Scope | DQ_DataQuality |
DQ_Completeness | DQ_LogicalConsistency | DQ_PositionalAccuracy | DQ_ThematicAccuracy |
DQ_TemporalAccuracy | DQ_CompletenessCommission | DQ_CompletenessOmission |
DQ_ConceptualConsistency | DQ_DomainConsistency | DQ_FormatConsistency | DQ_TopologicalConsistency |
DQ_AbsoluteExternalPositionalAccuracy | DQ_GriddedDataPositionalAccuracy |
DQ_RelativeInternalPositionalAccuracy | DQ_ThematicClassificationCorrectness |
DQ_NonQuantitativeAttributeAccuracy | DQ_QuantitativeAttributeAccuracy | DQ_AccuracyOfATimeMeasurement |
DQ_TemporalConsistency | DQ_TemporalValidity | DQ_ConformanceResult | DQ_QuantitativeResult | DQ_Result
| MD_MaintenanceInformation | MD_GridSpatialRepresentation | MD_VectorSpatialRepresentation |
MD_Georeferenceable | MD_Dimension | MD_Georectified | MD_GeometricObjects | RS_Identifier |
MD_ReferenceSystem | MD_CRS | MD_ProjectionParameters | MD_ObliqueLineAzimuth | MD_ObliqueLinePoint |
MD_EllipsoidParameters | MD_FeatureCatalogueDescription | MD_CoverageDescription | MD_ImageDescription |
MD_ContentInformation | MD_Identifier | MD_RangeDimension | MD_Band | MD_PortrayalCatalogueReference |
MD_Medium | MD_DigitalTransferOptions | MD_StandardOrderProcess | MD_Distributor | MD_Distribution |
MD_Format | MD_ExtendedElementInformation | MD_MetadataExtensionInformation |
MD_ApplicationSchemaInformation | MD_FeatureTypeList | MD_SpatialAttributeSupplement | EX_TemporalExtent
| EX_VerticalExtent | EX_BoundingPolygon | EX_Extent | EX_GeographicBoundingBox |
EX_SpatialTemporalExtent | EX_GeographicDescription | CI_ResponsibleParty | CI_Citation | CI_Address |
CI_OnlineResource | CI_Contact | CI_Telephone | URL | CI_Date | CI_Series)'>
<!ELEMENT MD_Metadata %MD_Metadata;>
<!-- ATTLIST MD_Metadata
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_BrowseGraphic %MD_BrowseGraphic; -->
<!-- ATTLIST MD_BrowseGraphic
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_DataIdentification %MD_DataIdentification; -->
<!-- ATTLIST MD_DataIdentification
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_ServiceIdentification %MD_ServiceIdentification; -->
<!-- ATTLIST MD_ServiceIdentification
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_RepresentativeFraction %MD_RepresentativeFraction; -->
<!-- ATTLIST MD_RepresentativeFraction
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_Usage %MD_Usage; -->
<!-- ATTLIST MD_Usage
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_Keywords %MD_Keywords; -->
<!-- ATTLIST MD_Keywords
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_Constraints %MD_Constraints; -->
<!-- ATTLIST MD_Constraints
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_LegalConstraints %MD_LegalConstraints; -->
<!-- ATTLIST MD_LegalConstraints
      %IM_ObjectIdentification;
-->
<!-- ELEMENT MD_SecurityConstraints %MD_SecurityConstraints; -->
<!-- ATTLIST MD_SecurityConstraints
      %IM_ObjectIdentification;
-->
<!-- ELEMENT LI_ProcessStep %LI_ProcessStep; -->
<!-- ATTLIST LI_ProcessStep

```

```

    %IM_ObjectIdentification;
>
<!ELEMENT LI_Source %LI_Source;>
<!ATTLIST LI_Source
    %IM_ObjectIdentification;
>
<!ELEMENT LI_Lineage %LI_Lineage;>
<!ATTLIST LI_Lineage
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_Scope %DQ_Scope;>
<!ELEMENT DQ_DataQuality %DQ_DataQuality;>
<!ATTLIST DQ_DataQuality
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_Completeness %DQ_Completeness;>
<!ATTLIST DQ_Completeness
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_LogicalConsistency %DQ_LogicalConsistency;>
<!ATTLIST DQ_LogicalConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_PositionalAccuracy %DQ_PositionalAccuracy;>
<!ATTLIST DQ_PositionalAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_ThematicAccuracy %DQ_ThematicAccuracy;>
<!ATTLIST DQ_ThematicAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_TemporalAccuracy %DQ_TemporalAccuracy;>
<!ATTLIST DQ_TemporalAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_CompletenessCommission %DQ_CompletenessCommission;>
<!ATTLIST DQ_CompletenessCommission
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_CompletenessOmission %DQ_CompletenessOmission;>
<!ATTLIST DQ_CompletenessOmission
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_ConceptualConsistency %DQ_ConceptualConsistency;>
<!ATTLIST DQ_ConceptualConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_DomainConsistency %DQ_DomainConsistency;>
<!ATTLIST DQ_DomainConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_FormatConsistency %DQ_FormatConsistency;>
<!ATTLIST DQ_FormatConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_TopologicalConsistency %DQ_TopologicalConsistency;>
<!ATTLIST DQ_TopologicalConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_AbsoluteExternalPositionalAccuracy %DQ_AbsoluteExternalPositionalAccuracy;>
<!ATTLIST DQ_AbsoluteExternalPositionalAccuracy
    %IM_ObjectIdentification;
>

```

```

<!ELEMENT DQ_GriddedDataPositionalAccuracy %DQ_GriddedDataPositionalAccuracy;>
<!ATTLIST DQ_GriddedDataPositionalAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_RelativeInternalPositionalAccuracy %DQ_RelativeInternalPositionalAccuracy;>
<!ATTLIST DQ_RelativeInternalPositionalAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_ThematicClassificationCorrectness %DQ_ThematicClassificationCorrectness;>
<!ATTLIST DQ_ThematicClassificationCorrectness
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_NonQuantitativeAttributeAccuracy %DQ_NonQuantitativeAttributeAccuracy;>
<!ATTLIST DQ_NonQuantitativeAttributeAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_QuantitativeAttributeAccuracy %DQ_QuantitativeAttributeAccuracy;>
<!ATTLIST DQ_QuantitativeAttributeAccuracy
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_AccuracyOfATimeMeasurement %DQ_AccuracyOfATimeMeasurement;>
<!ATTLIST DQ_AccuracyOfATimeMeasurement
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_TemporalConsistency %DQ_TemporalConsistency;>
<!ATTLIST DQ_TemporalConsistency
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_TemporalValidity %DQ_TemporalValidity;>
<!ATTLIST DQ_TemporalValidity
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_ConformanceResult %DQ_ConformanceResult;>
<!ATTLIST DQ_ConformanceResult
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_QuantitativeResult %DQ_QuantitativeResult;>
<!ATTLIST DQ_QuantitativeResult
    %IM_ObjectIdentification;
>
<!ELEMENT DQ_Result %DQ_Result;>
<!ELEMENT MD_MaintenanceInformation %MD_MaintenanceInformation;>
<!ATTLIST MD_MaintenanceInformation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_GridSpatialRepresentation %MD_GridSpatialRepresentation;>
<!ATTLIST MD_GridSpatialRepresentation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_VectorSpatialRepresentation %MD_VectorSpatialRepresentation;>
<!ATTLIST MD_VectorSpatialRepresentation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Georeferenceable %MD_Georeferenceable;>
<!ATTLIST MD_Georeferenceable
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Dimension %MD_Dimension;>
<!ELEMENT MD_Georectified %MD_Georectified;>
<!ATTLIST MD_Georectified
    %IM_ObjectIdentification;
>
<!ELEMENT MD_GeometricObjects %MD_GeometricObjects;>

```

```

<!ATTLIST MD_GeometricObjects
    %IM_ObjectIdentification;
>
<!ELEMENT RS_Identifier %RS_Identifier;>
<!ATTLIST RS_Identifier
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ReferenceSystem %MD_ReferenceSystem;>
<!ATTLIST MD_ReferenceSystem
    %IM_ObjectIdentification;
>
<!ELEMENT MD_CRS %MD_CRS;>
<!ATTLIST MD_CRS
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ProjectionParameters %MD_ProjectionParameters;>
<!ATTLIST MD_ProjectionParameters
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ObliqueLineAzimuth %MD_ObliqueLineAzimuth;>
<!ATTLIST MD_ObliqueLineAzimuth
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ObliqueLinePoint %MD_ObliqueLinePoint;>
<!ATTLIST MD_ObliqueLinePoint
    %IM_ObjectIdentification;
>
<!ELEMENT MD_EllipsoidParameters %MD_EllipsoidParameters;>
<!ATTLIST MD_EllipsoidParameters
    %IM_ObjectIdentification;
>
<!ELEMENT MD_FeatureCatalogueDescription %MD_FeatureCatalogueDescription;>
<!ATTLIST MD_FeatureCatalogueDescription
    %IM_ObjectIdentification;
>
<!ELEMENT MD_CoverageDescription %MD_CoverageDescription;>
<!ATTLIST MD_CoverageDescription
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ImageDescription %MD_ImageDescription;>
<!ATTLIST MD_ImageDescription
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ContentInformation %MD_ContentInformation;>
<!ATTLIST MD_ContentInformation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Identifier %MD_Identifier;>
<!ELEMENT MD_RangeDimension %MD_RangeDimension;>
<!ATTLIST MD_RangeDimension
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Band %MD_Band;>
<!ATTLIST MD_Band
    %IM_ObjectIdentification;
>
<!ELEMENT MD_PortrayalCatalogueReference %MD_PortrayalCatalogueReference;>
<!ATTLIST MD_PortrayalCatalogueReference
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Medium %MD_Medium;>
<!ELEMENT MD_DigitalTransferOptions %MD_DigitalTransferOptions;>
<!ATTLIST MD_DigitalTransferOptions

```

```

    %IM_ObjectIdentification;
>
<!ELEMENT MD_StandardOrderProcess %MD_StandardOrderProcess;>
<!ATTLIST MD_StandardOrderProcess
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Distributor %MD_Distributor;>
<!ATTLIST MD_Distributor
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Distribution %MD_Distribution;>
<!ATTLIST MD_Distribution
    %IM_ObjectIdentification;
>
<!ELEMENT MD_Format %MD_Format;>
<!ATTLIST MD_Format
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ExtendedElementInformation %MD_ExtendedElementInformation;>
<!ATTLIST MD_ExtendedElementInformation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_MetadataExtensionInformation %MD_MetadataExtensionInformation;>
<!ATTLIST MD_MetadataExtensionInformation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_ApplicationSchemaInformation %MD_ApplicationSchemaInformation;>
<!ATTLIST MD_ApplicationSchemaInformation
    %IM_ObjectIdentification;
>
<!ELEMENT MD_FeatureTypeList %MD_FeatureTypeList;>
<!ATTLIST MD_FeatureTypeList
    %IM_ObjectIdentification;
>
<!ELEMENT MD_SpatialAttributeSupplement %MD_SpatialAttributeSupplement;>
<!ATTLIST MD_SpatialAttributeSupplement
    %IM_ObjectIdentification;
>
<!ELEMENT EX_TemporalExtent %EX_TemporalExtent;>
<!ATTLIST EX_TemporalExtent
    %IM_ObjectIdentification;
>
<!ELEMENT EX_VerticalExtent %EX_VerticalExtent;>
<!ATTLIST EX_VerticalExtent
    %IM_ObjectIdentification;
>
<!ELEMENT EX_BoundingPolygon %EX_BoundingPolygon;>
<!ATTLIST EX_BoundingPolygon
    %IM_ObjectIdentification;
>
<!ELEMENT EX_Extent %EX_Extent;>
<!ELEMENT EX_GeographicBoundingBox %EX_GeographicBoundingBox;>
<!ATTLIST EX_GeographicBoundingBox
    %IM_ObjectIdentification;
>
<!ELEMENT EX_SpatialTemporalExtent %EX_SpatialTemporalExtent;>
<!ATTLIST EX_SpatialTemporalExtent
    %IM_ObjectIdentification;
>
<!ELEMENT EX_GeographicDescription %EX_GeographicDescription;>
<!ATTLIST EX_GeographicDescription
    %IM_ObjectIdentification;
>

```

```

<!ELEMENT CI_ResponsibleParty %CI_ResponsibleParty;>
<!ELEMENT CI_Citation %CI_Citation;>
<!ELEMENT CI_Address %CI_Address;>
<!ELEMENT CI_OnlineResource %CI_OnlineResource;>
<!ELEMENT CI_Contact %CI_Contact;>
<!ELEMENT CI_Telephone %CI_Telephone;>
<!ELEMENT URL %URL;>
<!ATTLIST URL
    %IM_ObjectIdentification;
>
<!ELEMENT CI_Date %CI_Date;>
<!ELEMENT CI_Series %CI_Series;>
<!-- PROPERTY ELEMENT DECLARATIONS -->
<!ELEMENT fileIdentifier %CharacterString;>
<!ELEMENT language %CharacterString;>
<!ELEMENT characterSet %MD_CharacterSetCode;>
<!ELEMENT parentIdentifier %CharacterString;>
<!ELEMENT hierarchyLevel %MD_ScopeCode;>
<!ELEMENT hierarchyLevelName %CharacterString;>
<!ELEMENT contact %CI_ResponsibleParty;>
<!ELEMENT dateStamp %Date;>
<!ELEMENT metadataStandardName %CharacterString;>
<!ELEMENT metadataStandardVersion %CharacterString;>
<!ELEMENT distributionInfo %MD_Distribution;>
<!ATTLIST distributionInfo
    %IM_ObjectReference;
>
<!ELEMENT identificationInfo %MD_IdentificationTypes;>
<!ATTLIST identificationInfo
    %IM_ObjectReference;
>
<!ELEMENT applicationSchemaInfo %MD_ApplicationSchemaInformation;>
<!ATTLIST applicationSchemaInfo
    %IM_ObjectReference;
>
<!ELEMENT portrayalCatalogueInfo %MD_PortrayalCatalogueReference;>
<!ATTLIST portrayalCatalogueInfo
    %IM_ObjectReference;
>
<!ELEMENT metadataMaintenance %MD_MaintenanceInformation;>
<!ATTLIST metadataMaintenance
    %IM_ObjectReference;
>
<!ELEMENT metadataConstraints %MD_ConstraintsTypes;>
<!ATTLIST metadataConstraints
    %IM_ObjectReference;
>
<!ELEMENT dataQualityInfo %DQ_DataQuality;>
<!ATTLIST dataQualityInfo
    %IM_ObjectReference;
>
<!ELEMENT spatialRepresentationInfo %MD_SpatialRepresentationTypes;>
<!ATTLIST spatialRepresentationInfo
    %IM_ObjectReference;
>
<!ELEMENT referenceSystemInfo %MD_ReferenceSystemTypes;>
<!ATTLIST referenceSystemInfo
    %IM_ObjectReference;
>
<!ELEMENT featureCatalogueInfo %MD_FeatureCatalogueDescription;>
<!ATTLIST featureCatalogueInfo
    %IM_ObjectReference;
>

```

```

<!ELEMENT contentInfo %MD_ContentInformation;>
<!ATTLIST contentInfo
    %IM_ObjectReference;
>
<!ELEMENT metadataExtensionInfo %MD_MetadataExtensionInformation;>
<!ATTLIST metadataExtensionInfo
    %IM_ObjectReference;
>
<!ELEMENT fileName %CharacterString;>
<!ELEMENT fileDescription %CharacterString;>
<!ELEMENT fileType %CharacterString;>
<!ELEMENT citation %CI_Citation;>
<!ELEMENT abstract %CharacterString;>
<!ELEMENT purpose %CharacterString;>
<!ELEMENT credit %CharacterString;>
<!ELEMENT status %MD_ProgressCode;>
<!ELEMENT pointOfContact %CI_ResponsibleParty;>
<!ELEMENT resourceFormat %MD_Format;>
<!ATTLIST resourceFormat
    %IM_ObjectReference;
>
<!ELEMENT resourceSpecificUsage %MD_Usage;>
<!ATTLIST resourceSpecificUsage
    %IM_ObjectReference;
>
<!ELEMENT resourceMaintenance %MD_MaintenanceInformation;>
<!ATTLIST resourceMaintenance
    %IM_ObjectReference;
>
<!ELEMENT descriptiveKeywords %MD_Keywords;>
<!ATTLIST descriptiveKeywords
    %IM_ObjectReference;
>
<!ELEMENT resourceConstraints %MD_ConstraintsTypes;>
<!ATTLIST resourceConstraints
    %IM_ObjectReference;
>
<!ELEMENT graphicOverview %MD_BrowseGraphic;>
<!ATTLIST graphicOverview
    %IM_ObjectReference;
>
<!ELEMENT spatialRepresentationType %MD_SpatialRepresentationTypeCode;>
<!ELEMENT spatialResolution %MD_Resolution;>
<!ELEMENT topicCategory %MD_TopicCategoryCode;>
<!ELEMENT geographicBox %EX_GeographicBoundingBox;>
<!ELEMENT geographicDescription %CharacterString;>
<!ELEMENT environmentDescription %CharacterString;>
<!ELEMENT extent %EX_Extent;>
<!ELEMENT supplementalInformation %CharacterString;>
<!ELEMENT serviceType ANY>
<!--serviceType has a domain of "DistinguishedName", which is defined in ISO 19119 - Services-->
<!ELEMENT typeProperties ANY>
<!--typeProperties has a domain of "Sequence<ServiceTypeProperty>", where ServiceTypeProperty is defined in
ISO 19119 - Services-->
<!ELEMENT denominator %Integer;>
<!ELEMENT specificUsage %CharacterString;>
<!ELEMENT usageDateTime %DateTime;>
<!ELEMENT userDeterminedLimitations %CharacterString;>
<!ELEMENT userContactInfo %CI_ResponsibleParty;>
<!ELEMENT keyword %CharacterString;>
<!ELEMENT type %MD_KeywordTypeCode;>
<!ELEMENT thesaurusName %CI_Citation;>
<!ELEMENT equivalentScale %MD_RepresentativeFraction;>

```



```

<!ELEMENT a-distance %Distance;>
<!ELEMENT useLimitation %CharacterString;>
<!ELEMENT accessConstraints %MD_RestrictionCode;>
<!ELEMENT useConstraints %MD_RestrictionCode;>
<!ELEMENT otherConstraints %CharacterString;>
<!ELEMENT classification %MD_ClassificationCode;>
<!ELEMENT userNote %CharacterString;>
<!ELEMENT classificationSystem %CharacterString;>
<!ELEMENT handlingDescription %CharacterString;>
<!ELEMENT description %CharacterString;>
<!ELEMENT rationale %CharacterString;>
<!ELEMENT dateTime %DateTime;>
<!ELEMENT processor %CI_ResponsibleParty;>
<!ATTLIST processor
    %IM_ObjectReference;
>
<!ELEMENT source %LI_Source;>
<!ATTLIST source
    %IM_ObjectReference;
>
<!ELEMENT scaleDenominator %MD_RepresentativeFraction;>
<!ELEMENT datum %MD_ReferenceSystemTypes;>
<!ELEMENT sourceCitation %CI_Citation;>
<!ATTLIST sourceCitation
    %IM_ObjectReference;
>
<!ELEMENT sourceExtent %EX_Extent;>
<!ATTLIST sourceExtent
    %IM_ObjectReference;
>
<!ELEMENT sourceStep %LI_ProcessStep;>
<!ATTLIST sourceStep
    %IM_ObjectReference;
>
<!ELEMENT statement %CharacterString;>
<!ELEMENT processStep %LI_ProcessStep;>
<!ATTLIST processStep
    %IM_ObjectReference;
>
<!ELEMENT level %MD_ScopeCode;>
<!ELEMENT levelDescription %MD_ScopeDescription;>
<!ELEMENT a-scope %DQ_Scope;>
<!ELEMENT report %DQ_ElementTypes;>
<!ATTLIST report
    %IM_ObjectReference;
>
<!ELEMENT lineage %LI_Lineage;>
<!ATTLIST lineage
    %IM_ObjectReference;
>
<!ELEMENT nameOfMeasure %CharacterString;>
<!ELEMENT measureIdentification %MD_IdentifierTypes;>
<!ELEMENT measureDescription %CharacterString;>
<!ELEMENT evaluationMethodType %DQ_EvaluationMethodCode;>
<!ELEMENT evaluationMethodDescription %CharacterString;>
<!ELEMENT evaluationProcedure %CI_Citation;>
<!ELEMENT result %DQ_ResultTypes;>
<!ELEMENT specification %CI_Citation;>
<!ELEMENT explanation %CharacterString;>
<!ELEMENT pass %Boolean;>
<!ELEMENT valueType ANY>
<!--valueType should have a domain of "%RecordType;"-->
<!ELEMENT valueUnit %Measure;>

```

```

<!ELEMENT errorStatistic %CharacterString;>
<!ELEMENT a-value %Record;>
<!ELEMENT maintenanceAndUpdateFrequency %MD_MaintenanceFrequencyCode;>
<!ELEMENT dateOfNextUpdate %Date;>
<!ELEMENT userDefinedMaintenanceFrequency ANY>
<!--userDefinedMaintenanceFrequency has a domain of "TM_PeriodDuration", which is defined in ISO 19108 -
Temporal schema-->
<!ELEMENT updateScope %MD_ScopeCode;>
<!ELEMENT updateScopeDescription %MD_ScopeDescription;>
<!ELEMENT maintenanceNote %CharacterString;>
<!ELEMENT a-attributes ANY>
<!--attributes has a domain of "Set<GF_AttributeType>", where GF_AttributeType is defined in 19109 - Rules for
application schema-->
<!ELEMENT features ANY>
<!--features has a domain of "Set<GF_FeatureType>", where GF_FeatureType is defined in 19109 - Rules for
application schema-->
<!ELEMENT featureInstances ANY>
<!--featureInstances has a domain of "Set<FE_Feature>", where FE_Feature is defined in 19109 - Rules for
application schema-->
<!ELEMENT attributeInstances ANY>
<!--attributeInstances has a domain of "Set<FE_FeatureAttribute>", where FE_FeatureAttribute is defined in 19109
- Rules for application schema-->
<!ELEMENT dataset %CharacterString;>
<!ELEMENT other %CharacterString;>
<!ELEMENT numberOfDimensions %Integer;>
<!ELEMENT axisDimensionProperties %Sequence_MD_Dimension_;>
<!ELEMENT cellGeometry %MD_CellGeometryCode;>
<!ELEMENT transformationParameterAvailability %Boolean;>
<!ELEMENT topologyLevel %MD_TopologyLevelCode;>
<!ELEMENT geometricObjects %MD_GeometricObjects;>
<!ELEMENT controlPointAvailability %Boolean;>
<!ELEMENT orientationParameterAvailability %Boolean;>
<!ELEMENT orientationParameterDescription %CharacterString;>
<!ELEMENT parameters %Record;>
<!ELEMENT parameterCitation %CI_Citation;>
<!ELEMENT dimensionName %MD_DimensionNameTypeCode;>
<!ELEMENT dimensionSize %Integer;>
<!ELEMENT resolution %Measure;>
<!ELEMENT checkPointAvailability %Boolean;>
<!ELEMENT checkPointDescription %CharacterString;>
<!ELEMENT cornerPoints ANY>
<!--cornerPoints has a domain of "Sequence<GM_Point>", where GM_Poing is defined in ISO 19107 - Spatial
Schema-->
<!ELEMENT centerPoint ANY>
<!--centerPoint has a domain of "GM_Point", which is defined in ISO 19107 - Spatial schema-->
<!ELEMENT pointInPixel %MD_PixelOrientationCode;>
<!ELEMENT transformationDimensionDescription %CharacterString;>
<!ELEMENT transformationDimensionMapping %CharacterString;>
<!ELEMENT geometricObjectType %MD_GeometricObjectTypeCode;>
<!ELEMENT geometricObjectCount %Integer;>
<!ELEMENT authority %CI_Citation;>
<!ELEMENT a-code %CharacterString;>
<!ELEMENT rsID %RS_Identifier;>
<!ELEMENT projection %RS_Identifier;>
<!ELEMENT ellipsoid %RS_Identifier;>
<!ELEMENT projectionParameters %MD_ProjectionParameters;>
<!--ATTLIST projectionParameters
%IM_ObjectReference;
>
<!ELEMENT ellipsoidParameters %MD_EllipsoidParameters;>
<!--ATTLIST ellipsoidParameters
%IM_ObjectReference;
>

```

```

<!ELEMENT zoneNumber %Integer;>
<!ELEMENT standardParallel %Real;>
<!ELEMENT longitudeOfCentralMeridian %Real;>
<!ELEMENT latitudeOfProjectionOrigin %Real;>
<!ELEMENT falseEasting %Real;>
<!ELEMENT falseNorthing %Real;>
<!ELEMENT falseEastingNorthingUnits %UomLength;>
<!ELEMENT scaleFactorAtEquator %Real;>
<!ELEMENT heightOfProspectivePointAboveSurface %Real;>
<!ELEMENT longitudeOfProjectionCenter %Real;>
<!ELEMENT latitudeOfProjectionCenter %Real;>
<!ELEMENT scaleFactorAtCenterLine %Real;>
<!ELEMENT straightVerticalLongitudeFromPole %Real;>
<!ELEMENT scaleFactorAtProjectionOrigin %Real;>
<!ELEMENT obliqueLineAzimuthParameter %MD_ObliqueLineAzimuth;>
<!ATTLIST obliqueLineAzimuthParameter
    %IM_ObjectReference;
>
<!ELEMENT obliqueLinePointParameter %MD_ObliqueLinePoint;>
<!ATTLIST obliqueLinePointParameter
    %IM_ObjectReference;
>
<!ELEMENT azimuthAngle %Real;>
<!ELEMENT azimuthMeasurePointLongitude %Real;>
<!ELEMENT obliqueLineLatitude %Real;>
<!ELEMENT obliqueLineLongitude %Real;>
<!ELEMENT semiMajorAxis %Real;>
<!ELEMENT axisUnits %UomLength;>
<!ELEMENT denominatorOfFlatteningRatio %Real;>
<!ELEMENT complianceCode %Boolean;>
<!ELEMENT includedWithDataset %Boolean;>
<!ELEMENT featureTypes %GenericNameTypes;>
<!ELEMENT featureCatalogueCitation %CI_Citation;>
<!ATTLIST featureCatalogueCitation
    %IM_ObjectReference;
>
<!ELEMENT attributeDescription ANY>
<!--attributeDescription should have a domain of "%RecordType;"-->
<!ELEMENT contentType %MD_CoverageContentTypeCode;>
<!ELEMENT imageDescription %MD_ImageDescription;>
<!ATTLIST imageDescription
    %IM_ObjectReference;
>
<!ELEMENT dimension %MD_RangeDimensionTypes;>
<!ATTLIST dimension
    %IM_ObjectReference;
>
<!ELEMENT illuminationElevationAngle %Real;>
<!ELEMENT illuminationAzimuthAngle %Real;>
<!ELEMENT imagingCondition %MD_ImagingConditionCode;>
<!ELEMENT imageQualityCode %MD_IdentifierTypes;>
<!ELEMENT cloudCoverPercentage %Real;>
<!ELEMENT processingLevelCode %MD_IdentifierTypes;>
<!ELEMENT compressionGenerationQuantity %Integer;>
<!ELEMENT triangulationIndicator %Boolean;>
<!ELEMENT radiometricCalibrationDataAvailability %Boolean;>
<!ELEMENT cameraCalibrationInformationAvailability %Boolean;>
<!ELEMENT filmDistortionInformationAvailability %Boolean;>
<!ELEMENT lensDistortionInformationAvailability %Boolean;>
<!ELEMENT sequenceIdentifier %AttributeName;>
<!ELEMENT descriptor %CharacterString;>
<!ELEMENT maxValue %Real;>
<!ELEMENT minValue %Real;>

```

```

<!ELEMENT units %UomLength;>
<!ELEMENT peakResponse %Real;>
<!ELEMENT bitsPerValue %Integer;>
<!ELEMENT toneGradation %Integer;>
<!ELEMENT scaleFactor %Real;>
<!ELEMENT offset %Real;>
<!ELEMENT portrayalCatalogueCitation %CI_Citation;>
<!ELEMENT a-name %MD_MediumNameCode;>
<!ELEMENT density %Real;>
<!ELEMENT densityUnits %CharacterString;>
<!ELEMENT volumes %Integer;>
<!ELEMENT mediumFormat %MD_MediumFormatCode;>
<!ELEMENT mediumNote %CharacterString;>
<!ELEMENT unitsOfDistribution %CharacterString;>
<!ELEMENT transferSize %Real;>
<!ELEMENT onLine %CI_OnlineResource;>
<!ELEMENT offLine %MD_Medium;>
<!ELEMENT fees %CharacterString;>
<!ELEMENT plannedAvailableDateTime %DateTime;>
<!ELEMENT orderingInstructions %CharacterString;>
<!ELEMENT turnaround %CharacterString;>
<!ELEMENT distributorContact %CI_ResponsibleParty;>
<!ELEMENT distributionOrderProcess %MD_StandardOrderProcess;>
<!ATTLIST distributionOrderProcess
    %IM_ObjectReference;
>
<!ELEMENT distributorFormat %MD_Format;>
<!ATTLIST distributorFormat
    %IM_ObjectReference;
>
<!ELEMENT distributorTransferOptions %MD_DigitalTransferOptions;>
<!ATTLIST distributorTransferOptions
    %IM_ObjectReference;
>
<!ELEMENT distributionFormat %MD_Format;>
<!ATTLIST distributionFormat
    %IM_ObjectReference;
>
<!ELEMENT transferOptions %MD_DigitalTransferOptions;>
<!ATTLIST transferOptions
    %IM_ObjectReference;
>
<!ELEMENT distributor %MD_Distributor;>
<!ATTLIST distributor
    %IM_ObjectReference;
>
<!ELEMENT b-name %CharacterString;>
<!ELEMENT version %CharacterString;>
<!ELEMENT amendmentNumber %CharacterString;>
<!ELEMENT fileDecompressionTechnique %CharacterString;>
<!ELEMENT formatDistributor %MD_Distributor;>
<!ATTLIST formatDistributor
    %IM_ObjectReference;
>
<!ELEMENT c-name %CharacterString;>
<!ELEMENT shortName %CharacterString;>
<!ELEMENT domainCode %Integer;>
<!ELEMENT definition %CharacterString;>
<!ELEMENT obligation %MD_ObligationCode;>
<!ELEMENT condition %CharacterString;>
<!ELEMENT dataType %MD_DatatypeCode;>
<!ELEMENT maximumOccurence %CharacterString;>
<!ELEMENT domainValue %CharacterString;>

```

```

<!ELEMENT parentEntity %CharacterString;>
<!ELEMENT rule %CharacterString;>
<!ELEMENT extensionOnLineResource %CI_OnlineResource;>
<!ELEMENT extendedElementInformation %MD_ExtendedElementInformation;>
<!ATTLIST extendedElementInformation
    %IM_ObjectReference;
>
<!ELEMENT d-name %CharacterString;>
<!ELEMENT schemaLanguage %CharacterString;>
<!ELEMENT constraintLanguage %CharacterString;>
<!ELEMENT schemaAscii %CharacterString;>
<!ELEMENT graphicsFile %CharacterString;>
<!ELEMENT softwareDevelopmentFile %Binary;>
<!ELEMENT softwareDevelopmentFileFormat %CharacterString;>
<!ELEMENT featureCatalogueSupplement %MD_SpatialAttributeSupplement;>
<!ATTLIST featureCatalogueSupplement
    %IM_ObjectReference;
>
<!ELEMENT spatialObject %CharacterString;>
<!ELEMENT spatialSchemaName %CharacterString;>
<!ELEMENT theFeatureTypeList %MD_FeatureTypeList;>
<!ATTLIST theFeatureTypeList
    %IM_ObjectReference;
>
<!ELEMENT minimumValue %Real;>
<!ELEMENT maximumValue %Real;>
<!ELEMENT unitOfMeasure %UomLength;>
<!ELEMENT extentTypeCode %Boolean;>
<!ELEMENT polygon ANY>
<!--polygon has a domain of "GM_Object", which is defined in ISO 19107 - Spatial schema-->
<!ELEMENT temporalElement %EX_TemporalExtentTypes;>
<!ATTLIST temporalElement
    %IM_ObjectReference;
>
<!ELEMENT verticalElement %EX_VerticalExtent;>
<!ATTLIST verticalElement
    %IM_ObjectReference;
>
<!ELEMENT geographicElement %EX_GeographicExtentTypes;>
<!ATTLIST geographicElement
    %IM_ObjectReference;
>
<!ELEMENT westBoundLongitude %Angle;>
<!ELEMENT eastBoundLongitude %Angle;>
<!ELEMENT southBoundLatitude %Angle;>
<!ELEMENT northBoundLatitude %Angle;>
<!ELEMENT spatialExtent %EX_GeographicExtentTypes;>
<!ATTLIST spatialExtent
    %IM_ObjectReference;
>
<!ELEMENT geographicIdentifier %RS_Identifier;>
<!ELEMENT a-extent ANY>
<!--a-extent has a domain of "TM_Primitive", which is defined in ISO 19108 - Temporal schema-->
<!ELEMENT individualName %CharacterString;>
<!ELEMENT organisationName %CharacterString;>
<!ELEMENT positionName %CharacterString;>
<!ELEMENT contactInfo %CI_Contact;>
<!ELEMENT role %CI_RoleCode;>
<!ELEMENT title %CharacterString;>
<!ELEMENT alternateTitle %CharacterString;>
<!ELEMENT date %CI_Date;>
<!ELEMENT edition %CharacterString;>
<!ELEMENT editionDate %Date;>

```

```

<!ELEMENT identifier %CharacterString;>
<!ELEMENT identifierType %CharacterString;>
<!ELEMENT citedResponsibleParty %CI_ResponsibleParty;>
<!ELEMENT presentationForm %CI_PresentationFormCode;>
<!ELEMENT series %CI_Series;>
<!ELEMENT otherCitationDetails %CharacterString;>
<!ELEMENT collectiveTitle %CharacterString;>
<!ELEMENT ISBN %CharacterString;>
<!ELEMENT ISSN %CharacterString;>
<!ELEMENT deliveryPoint %CharacterString;>
<!ELEMENT city %CharacterString;>
<!ELEMENT administrativeArea %CharacterString;>
<!ELEMENT postalCode %CharacterString;>
<!ELEMENT country %CharacterString;>
<!ELEMENT electronicMailAddress %CharacterString;>
<!ELEMENT onlineResource %CI_OnlineResource;>
<!ATTLIST onlineResource
    %IM_ObjectReference;
>
<!ELEMENT linkage %URL;>
<!ELEMENT protocol %CharacterString;>
<!ELEMENT applicationProfile %CharacterString;>
<!ELEMENT e-name %CharacterString;>
<!ELEMENT functionCode %CI_OnLineFunctionCode;>
<!ELEMENT phone %CI_Telephone;>
<!ELEMENT address %CI_Address;>
<!ELEMENT hoursOfService %CharacterString;>
<!ELEMENT contactInstructions %CharacterString;>
<!ELEMENT voice %CharacterString;>
<!ELEMENT facsimile %CharacterString;>
<!ELEMENT a-date %Date;>
<!ELEMENT dateType %CI_DateTypeCode;>
<!ELEMENT f-name %CharacterString;>
<!ELEMENT issueIdentification %CharacterString;>
<!ELEMENT page %CharacterString;>
<!--Codelist and Enumeration Information-->
<!ELEMENT CI_DateTypeCode EMPTY>
<!ATTLIST CI_DateTypeCode
    value (creation | publication | revision) #REQUIRED
>
<!ELEMENT CI_OnLineFunctionCode EMPTY>
<!ATTLIST CI_OnLineFunctionCode
    value (download | information | offlineAccess | order | search) #REQUIRED
>
<!ELEMENT CI_PresentationFormCode EMPTY>
<!ATTLIST CI_PresentationFormCode
    value (documentDigital | documentHardcopy | imageDigital | imageHardcopy | mapDigital | mapHardcopy |
modelDigital | modelHardcopy | profileDigital | profileHardcopy | tableDigital | tableHardcopy | videoDigital |
videoHardcopy) #REQUIRED
>
<!ELEMENT CI_RoleCode EMPTY>
<!ATTLIST CI_RoleCode
    value (resourceProvider | custodian | owner | user | distributor | originator | pointOfContact |
principallInvestigator | processor | publisher) #REQUIRED
>
<!ELEMENT DQ_EvaluationMethodTypeCode EMPTY>
<!ATTLIST DQ_EvaluationMethodTypeCode
    value (directInternal | directExternal | indirect) #REQUIRED
>
<!ELEMENT MD_CellGeometryCode EMPTY>
<!ATTLIST MD_CellGeometryCode
    value (point | area) #REQUIRED
>

```

```

<!ELEMENT MD_CharacterSetCode EMPTY>
<!ATTLIST MD_CharacterSetCode
    value (ucs2 | ucs4 | utf7 | utf8 | utf16 | 8859part1 | 8859part2 | 8859part3 | 8859part4 | 8859part5 | 8859part6
    | 8859part7 | 8859part8 | 8859part9 | 8859part11 | 8859part14 | 8859part15 | jis | shiftJIS | eucJP | usAscii | ebcdic |
    eucKR | big5) #REQUIRED
>
<!ELEMENT MD_ClassificationCode EMPTY>
<!ATTLIST MD_ClassificationCode
    value (unclassified | restricted | confidential | secret | topsecret) #REQUIRED
>
<!ELEMENT MD_CoverageContentTypeCode EMPTY>
<!ATTLIST MD_CoverageContentTypeCode
    value (image | thematicClassification | physicalMeasurement) #REQUIRED
>
<!ELEMENT MD_DatatypeCode (#PCDATA)>
<!ATTLIST MD_DatatypeCode
    value (class | codelist | enumeration | codelistElement | abstractClass | aggregateClass | specifiedClass |
    datatypeClass | interfaceClass | unionClass | metaclass | typeClass | characterString | integer | association)
    #REQUIRED
>
<!ELEMENT MD_DimensionNameTypeCode EMPTY>
<!ATTLIST MD_DimensionNameTypeCode
    value (row | column | vertical | track | crossTrack | line | sample | time) #REQUIRED
>
<!ELEMENT MD_GeometricObjectTypeCode EMPTY>
<!ATTLIST MD_GeometricObjectTypeCode
    value (complexes | composites | curve | point | solid | surface) #REQUIRED
>
<!ELEMENT MD_ImagingConditionCode EMPTY>
<!ATTLIST MD_ImagingConditionCode
    value (blurredImage | cloud | degradingObliquity | fog | heavySmokeOrDust | night | rain | semiDarkness |
    shadow | snow | terrainMasking) #REQUIRED
>
<!ELEMENT MD_KeywordTypeCode EMPTY>
<!ATTLIST MD_KeywordTypeCode
    value (discipline | place | stratum | temporal | theme) #REQUIRED
>
<!ELEMENT MD_MaintenanceFrequencyCode EMPTY>
<!ATTLIST MD_MaintenanceFrequencyCode
    value (continual | daily | weekly | fortnightly | monthly | quarterly | biannually | annually | asNeeded | irregular |
    notPlanned | unknown) #REQUIRED
>
<!ELEMENT MD_MediumFormatCode EMPTY>
<!ATTLIST MD_MediumFormatCode
    value (cpio | tar | highSierra | iso9660 | iso9660RockRidge | iso9660AppleHFS) #REQUIRED
>
<!ELEMENT MD_MediumNameCode EMPTY>
<!ATTLIST MD_MediumNameCode
    value (cdRom | dvd | dvdRom | 3halfInchFloppy | 5quarterInchFloppy | 7trackTape | 9trackTape |
    3480Cartridge | 3490Cartridge | 3580Cartridge | 4mmCartridgeTape | 8mmCartridgeTape |
    1quarterInchCartridgeTape | digitalLinearTape | online | satellite | telephoneLink | hardcopy) #REQUIRED
>
<!ELEMENT MD_ObligationCode EMPTY>
<!ATTLIST MD_ObligationCode
    value (mandatory | optional | conditional) #REQUIRED
>
<!ELEMENT MD_PixelOrientationCode EMPTY>
<!ATTLIST MD_PixelOrientationCode
    value (center | lowerLeft | lowerRight | upperRight | upperLeft) #REQUIRED
>
<!ELEMENT MD_ProgressCode EMPTY>
<!ATTLIST MD_ProgressCode

```

```

        value (completed | historicalArchive | obsolete | onGoing | planned | required | underdevelopment)
#REQUIRED
>
<!ELEMENT MD_RestrictionCode EMPTY>
<!ATTLIST MD_RestrictionCode
        value (copyright | patent | patentPending | trademark | license | intellectualPropertyRights | restricted |
otherRestictions) #REQUIRED
>
<!ELEMENT MD_ScopeCode EMPTY>
<!ATTLIST MD_ScopeCode
        value (attribute | attributeType | collectionhardware | collectionSession | dataset | series |
nonGeographicDataset | dimensionGroup | feature | featureType | propertyType | fieldSession | software | service |
model) #REQUIRED
>
<!ELEMENT MD_SpatialRepresentationTypeCode EMPTY>
<!ATTLIST MD_SpatialRepresentationTypeCode
        value (vector | grid | textTable | tin | stereoModel | video) #REQUIRED
>
<!ELEMENT MD_TopicCategoryCode EMPTY>
<!ATTLIST MD_TopicCategoryCode
        value (farming | biota | boundaries | climatologyMeteorologyAtmosphere | economy | elevation | environment
| geoscientificInformation | health | imageryBaseMapsEarthCover | intelligenceMilitary | inlandWaters | location |
oceans | planningCadastre | society | structure | transportation | utilitiesCommunication) #REQUIRED
>
<!ELEMENT MD_TopologyLevelCode EMPTY>
<!ATTLIST MD_TopologyLevelCode
        value (geometryOnly | topology1D | planarGraph | fullPlanarGraph | surfaceGraph | fullSurfaceGraph |
topology3D | fullTopology3D | abstract) #REQUIRED
>
<!--The language codelist below comes from ISO 639-2, as various parts of that standard can be used, the codelist
is not present in 19115.-->
<!ELEMENT languageCode EMPTY>
<!ATTLIST languageCode
        value (aa | ab | af | am | ar | as | ay | az | ba | be | bg | bh | bi | bn | bo | br | ca | co | cs | cy | da | de | dz | el |
en | eo | es | et | eu | fa | fi | fj | fo | fr | fy | ga | gd | gl | gn | gu | ha | hi | hr | hu | hy | ia | ie | ik | in | is | it | iw | ja | ji |
jw | ka | kk | kl | km | kn | ko | ks | ku | ky | la | ln | lo | lt | lv | mg | mi | mk | ml | mn | mo | fr | ms | mt | my | na | ne | nl
| no | oc | om | or | pa | pl | ps | pt | qu | rm | rn | ro | ru | rw | sa | sd | sg | sh | si | sk | sl | sm | sn | so | sq | sr | ss | st
| su | sv | sw | ta | te | tg | th | ti | tk | tl | tn | to | tr | ts | tt | tw | uk | ur | uz | vi | vo | wo | xh | yo | zh | zu) "en"
>

```

### F.3 ISO TS 19103 – Conceptual Schema Language DTD (19103-CSL.dtd)

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- Object identification -->
<!ENTITY % IM_ObjectIdentification 'id ID #REQUIRED
        uuid CDATA #IMPLIED'>
<!-- Object Reference -->
<!ENTITY % IM_ObjectReference 'idref IDREF #IMPLIED
        uuidref CDATA #IMPLIED
        uriref CDATA #IMPLIED'>
<!-- TYPE - ENTITY DECLARATIONS -->
<!ENTITY % UomAngle '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % UomLength '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % UomScale '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % Measure '(value)'>
<!ENTITY % Length '(value, uom)'>
<!ENTITY % Angle '(value, uom)'>
<!ENTITY % Scale '(value, uom, sourceUnits, targetUnits)'>
<!ENTITY % Area '(value, uom)'>
<!ENTITY % Velocity '(value, time, distance, uom)'>

```



```

<!ENTITY % Time '(value, uom)'>
<!ENTITY % UomTime '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % UomArea '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % Distance '(value, uom)'>
<!ENTITY % Volume '(value, uom)'>
<!ENTITY % UomVolume '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % ISOStandardUnits '(registrar, code)'>
<!ENTITY % UomVelocity '(uomName, conversionToISOstandarUnit)'>
<!ENTITY % Record '(attributes, recordType+)'>
<!ENTITY % Any 'ANY'>
<!ENTITY % NameSpace '(isGlobal, acceptableClassList, name)'>
<!ENTITY % GenericName '(scope)'>
<!ENTITY % LocalName '(scope)'>
<!ENTITY % TypeName '(scope, aName)'>
<!ENTITY % ScopedName '(scope)'>
<!ENTITY % AttributeName '(scope, aName, attributeType)'>
<!ENTITY % DateTime '(century, year?, month?, day?, precision?, hour, minute?, second?)'>
<!ENTITY % Date '(#PCDATA)'>
<!ENTITY % DatePrecision '(precision, determinationMethod)'>
<!ENTITY % Sign '(#PCDATA)'>
<!ENTITY % SignAttribute '(Positive | Negative )'>
<!ENTITY % Boolean '(#PCDATA)'>
<!ENTITY % BooleanAttribute '(TRUE | FALSE )'>
<!ENTITY % Logical '(#PCDATA)'>
<!ENTITY % LogicalAttribute '(TRUE | FALSE | MAYBE )'>
<!ENTITY % Probablility '(value)'>
<!ENTITY % CharacterString '(#PCDATA)'>
<!ENTITY % Character '(#PCDATA)'>
<!ENTITY % Number '(#PCDATA)'>
<!ENTITY % Real '(#PCDATA)'>
<!ENTITY % Integer '(#PCDATA)'>
<!ENTITY % Decimal '(#PCDATA)'>
<!ENTITY % Binary '(#PCDATA)'>
<!ENTITY % URI '(#PCDATA)'>
<!ENTITY % Dictionary_AttributeName_Any_ '(AttributeName, Any)*'>
<!ENTITY % Set_TypeName_ '(TypeName)*'>
<!ENTITY % NumberTypes '(Integer | Number | Real)'>
<!ENTITY % GenericNameTypes '(TypeName | LocalName | ScopedName | GenericName )'>
<!-- CODELIST ELEMENTS -->
<!ELEMENT registrar %URI;>
<!ELEMENT code %CharacterString;>
<!-- OBJECT ELEMENT DECLARATIONS -->
<!ENTITY % Object '(UomAngle | UomLength | UomScale | Measure | Length | Angle | Scale | Area | Velocity |
Time | UomTime | UomArea | Distance | Volume | UomVolume | UomVelocity | Record | Any | NameSpace |
GenericName | LocalName | TypeName | ScopedName | AttributeName | DateTime | Date | DatePrecision |
Probablility | CharacterString | Character | Number | Real | Integer | Decimal | Binary | URI)'>
<!ELEMENT UomAngle %UomAngle;>
<!ELEMENT UomLength %UomLength;>
<!ELEMENT UomScale %UomScale;>
<!ELEMENT Measure %Measure;>
<!ELEMENT Length %Length;>
<!ELEMENT Angle %Angle;>
<!ELEMENT Scale %Scale;>
<!ELEMENT Area %Area;>
<!ELEMENT Velocity %Velocity;>
<!ELEMENT Time %Time;>
<!ELEMENT UomTime %UomTime;>
<!ELEMENT UomArea %UomArea;>
<!ELEMENT Distance %Distance;>
<!ELEMENT Volume %Volume;>
<!ELEMENT UomVolume %UomVolume;>
<!ELEMENT UomVelocity %UomVelocity;>
<!ELEMENT Record %Record;>

```

```

<!ATTLIST Record
    %IM_ObjectIdentification;
>
<!ELEMENT Any %Any;>
<!ELEMENT NameSpace %NameSpace;>
<!ATTLIST NameSpace
    %IM_ObjectIdentification;
>
<!ELEMENT GenericName %GenericName;>
<!ATTLIST GenericName
    %IM_ObjectIdentification;
>
<!ELEMENT LocalName %LocalName;>
<!ATTLIST LocalName
    %IM_ObjectIdentification;
>
<!ELEMENT TypeName %TypeName;>
<!ATTLIST TypeName
    %IM_ObjectIdentification;
>
<!ELEMENT ScopedName %ScopedName;>
<!ATTLIST ScopedName
    %IM_ObjectIdentification;
>
<!ELEMENT AttributeName %AttributeName;>
<!ATTLIST AttributeName
    %IM_ObjectIdentification;
>
<!ELEMENT DateTime %DateTime;>
<!ELEMENT Date %Date;>
<!ELEMENT DatePrecision %DatePrecision;>
<!ATTLIST DatePrecision
    %IM_ObjectIdentification;
>
<!ELEMENT Probablility %Probablility;>
<!ELEMENT CharacterString %CharacterString;>
<!ELEMENT Character %Character;>
<!ELEMENT Number %Number;>
<!ELEMENT Real %Real;>
<!ELEMENT Integer %Integer;>
<!ELEMENT Decimal %Decimal;>
<!ELEMENT Binary %Binary;>
<!ELEMENT URI %URI;>
<!-- PROPERTY ELEMENT DECLARATIONS -->
<!ELEMENT uomName %CharacterString;>
<!ELEMENT conversionToISOstandarUnit %Real;>
<!ELEMENT value %NumberTypes;>
<!ELEMENT uom %UomLength;>
<!ELEMENT sourceUnits %UomLength;>
<!ELEMENT targetUnits %UomLength;>
<!ELEMENT time %UomTime;>
<!ELEMENT distance %UomLength;>
<!ELEMENT attributes %Dictionary_AttributeName_Any_;>
<!ELEMENT recordType EMPTY>
<!-- Reference to RecordType -->
<!ATTLIST recordType
    %IM_ObjectReference;
>
<!ELEMENT isGlobal %Boolean;>
<!ELEMENT acceptableClassList %Set_TypeName_;>
<!ELEMENT name EMPTY>
<!-- Reference to GenericNameTypes -->
<!ATTLIST name

```

```

    %IM_ObjectReference;
>
<!ELEMENT scope EMPTY>
<!-- Reference to NameSpace -->
<!ATTLIST scope
    %IM_ObjectReference;
>
<!--ELEMENT scope EMPTY > Ref: NameSpace -->
<!--ELEMENT scope EMPTY > Ref: NameSpace -->
<!--ELEMENT scope EMPTY > Ref: NameSpace -->
<!--ELEMENT scope EMPTY > Ref: NameSpace -->
<!ELEMENT aName %CharacterString;>
<!ELEMENT attributeType %TypeName;>
<!ELEMENT century %CharacterString;>
<!ELEMENT year %CharacterString;>
<!ELEMENT month %CharacterString;>
<!ELEMENT day %CharacterString;>
<!ELEMENT precision EMPTY>
<!-- Reference to DatePrecision -->
<!ATTLIST precision
    %IM_ObjectReference;
>
<!ELEMENT hour %CharacterString;>
<!ELEMENT minute %CharacterString;>
<!ELEMENT second %CharacterString;>
<!ELEMENT determinationMethod %CharacterString;>

```

## Annex G (informative)

### Metadata extension methodology

#### G.1 Metadata extensions methodology

The following nine-stage methodology should be followed in order to define additional metadata.

#### G.2 Review of existing metadata elements (Stage 1)

Stage 1 of the methodology is intended to ensure that only valid extensions are made to the standard set defined by ISO 19115. A full review of the standard set of metadata described in annex B and any formally documented/published profiles should be conducted. This review should not only cover the metadata entity/element name, but also the definition, data type, obligation, domain, and the maximum number of occurrences. It is possible that a new entity/element is not required as an existing entity/element meets the requirements.

If a suitable entity/element can be identified, then the relationships of this entity/element should be reviewed with those in Annex A to ensure that the candidate entity/element is not precluded by excluded combinations with other entities/elements.

METHOD:

EITHER

- I) An existing metadata element or entity is identified as meeting the requirement. ACTION - Utilize the existing metadata entity/element, no metadata extensions are required.
- II) A new section of metadata entities is needed to meet the new requirement. ACTION - Go to Stage 2.
- III) An existing metadata element is identified whose domain could logically be restricted to meet the identified requirement by taking the action of limiting the existing "free text" domain. ACTION – Go to Stage 3.
- IV) An existing metadata element is identified whose domain could logically be expanded to meet the identified requirement by taking the action of adding values to the existing codelist. ACTION – Go to Stage 4.
- V) A new metadata element is needed to meet the requirement. Check that no existing metadata element could be modified to meet the requirement. ACTION - Go to Stage 5.
- VI) A new metadata entity is needed to meet the requirement. A metadata entity is a group of related elements, that in conjunction, meet the needs of the new requirement. Check that no existing metadata entity could be modified to meet the requirements by the addition of metadata elements. ACTION - Go to Stage 6.
- VII) An existing metadata element or entity or section meets the requirement, but the profile requires that a more stringent obligation is applied than that defined in this International Standard. The

metadata obligations defined in the ISO 19115 cannot be relaxed in a profile. ACTION - Go to Stage 7.

VIII) An existing metadata element meets the requirements, but the domain required by the profile is a sub-set of the ISO 19115 domain. ACTION - Go to Stage 7.

### G.3 Definition of a new metadata section (Stage 2)

A new metadata section is to be defined, but no existing metadata section from ISO 19115 is suitable, nor can any existing section be expanded to meet the requirement. In this case, a new metadata section may be defined.

The new metadata section should be defined in a style consistent with that of ISO 19115 (which is based on ISO 11179-3).

METHOD:

- I) Go to Stage 5 to define the new metadata elements required to populate the section.
- II) Go to Stage 6 to define the new metadata entities required to populate the section.
- III) Go to Stage 9.

### G.4 Definition of a new metadata codelist (Stage 3)

An existing metadata element is suitable, given that the “free text” domain of the identified element is restricted. No existing metadata codelist can be identified within the metadata standard that meets the requirements. In this circumstance a new metadata codelist may be defined to meet the specific requirements of the profile.

The new metadata codelist should be defined in a style consistent with that of ISO 19115 (which is based on ISO 11179-3).

METHOD:

- I) Define the new metadata codelist in terms of Definition (B.1.4), Name (B.1.2), and Short Name (B.1.3). The definition of the new codelist should be done so as to be consistent with the existing codelists which can be found in clause B.5.
- II) Define the new metadata codelist elements in terms of Definition (B.1.4) and Domain code and Short Name (B.1.3). This definition should also be done so as to be consistent with the existing codelist elements found in clause B.5.

### G.5 Definition of a new metadata codelist element (Stage 4)

An existing metadata element is suitable, given that the metadata codelist of the identified element is expanded. The new metadata codelist elements should be defined with reference to the existing set of elements. The expanded metadata codelist must be a logical expansion of the standard set of values.

If the proposed new metadata domain element does not logically build upon the original domain then it may be that the identified element is not suitable for expansion, and the developer should return to Stage 1.

To document the new metadata codelist element go to Stage 9.

## G.6 Definition of a new metadata element (Stage 5)

No existing metadata element can be identified within the metadata standard that meets the requirements. In this circumstance a new metadata element may be defined to meet the specific requirements of the profile.

The new metadata element should be defined in a style consistent with that of ISO 19115 (which is based on ISO 11179-3).

METHOD:

- I) Using the metadata schema described in annex A and the data dictionary given in annex B and any existing extensions to the metadata standard, identify the existing metadata entity to which the new element should be added. If no suitable grouping can be found then go to Stage 6.
- II) Define the new metadata element in terms of the extended element information as described in B.2.11.1: name, shortName, domainCode, definition, obligation, condition, dataType, domain-Value, maximumOccurrence, parentEntity, rule, rationale and source. Identify any excluded metadata relationships with the newly defined element. See annex A for the metadata UML model.
- III) Utilize the new metadata element to meet the requirement.
- IV) Go to Stage 9.

## G.7 Definition of a new metadata entity (Stage 6)

No existing metadata element or entity can be identified within the metadata standard that meets the requirements, nor can an existing metadata entity be modified by the addition of simple metadata elements to meet the requirements. In this circumstance a new metadata entity may be defined to meet the specific requirements of the profile.

The new metadata entity should be defined in a style consistent with that of ISO 19115 (which is based on ISO 11179-3).

METHOD:

- I) Using the schema described in annex A and the data dictionary given in annex B and any existing extensions to the metadata standard, identify which grouping of metadata best describe the function of the new Metadata entity. Choose from:
 

6.3.2.1	Metadata entity set
6.3.2.2	Identification
6.3.2.3	Constraints
6.3.2.4	Data quality
6.3.2.5	Maintenance
6.3.2.6	Spatial representation
6.3.2.7	Reference system
6.3.2.8	Content
6.3.2.9	Portrayal catalogue
6.3.2.10	Distribution
6.3.2.11	Metadata extension
6.3.2.12	Application schema
6.4.1	Extent
6.4.2	Citation and responsible party

If no suitable grouping can be found then go to Stage 2

- II) Define the new metadata entity in terms of the extended element information as described in B.2.11.1: name, shortName, domainCode, definition, obligation, condition, dataType, domain-Value, maximumOccurrence, parentEntity, rule, rationale and source. Data type is 'Class' for a metadata entity.
- III) Identify the elements that form the metadata entity, by following the steps outlined in stage 5.
- IV) Identify any excluded metadata relationships with the newly defined entity. See annex A for the UML metadata schema models.
- V) Utilize the new metadata entity to meet the requirement.
- VI) Go to Stage 9.

### G.8 Definition of a more stringent metadata obligation (Stage 7)

An existing metadata element, entity or section meets the requirement, but the profile requires that the obligation category is more stringent than that defined in the ISO standard. (Where optional (O) is the least and mandatory (M) the most stringent obligation category)

METHOD:

- I) Identify the new Obligation/Condition (B.1.5) value to be applied to the element, entity or section. If the chosen obligation is conditional, then the conditions under which the metadata is to be applied should be identified. The rules for creating conditions can be found in B.1.5.2.
- II) Go to Stage 9.

### G.9 Definition of more restrictive metadata codelist (Stage 8)

An existing metadata codelist meets the requirement, but the profile requires that the elements defined for the entity be a restricted sub-set of the standard domain defined in the ISO standard.

METHOD:

- I) Identify the restricted elements needed to meet the new requirement.
- II) Go to Stage 9.

### G.10 Documentation of metadata extensions (Stage 9)

Once new metadata entities/elements have been defined, it is essential that the changes from the base standard be recorded clearly. The modifications must be recorded in the profile document, in a standard format, which is derived from the ISO 19115 document itself and issued as a document along with the dataset and the metadata.

Metadata issued according to the profile must also record the changes to the standard metadata set by completing the metadata extension fields defined in ISO 19115 (B.2.11.1).

Seven possible types of extensions may be documented:

- Definition of a new metadata section.
- Definition of new metadata codelist to replace a "free text" domain.
- Definition of additional metadata codelist elements.

- Definition of a new metadata element.
- Definition of new metadata entity.
- Definition of a restricted metadata domain.
- Definition of more stringent metadata obligation.

METHOD:

- I) Update the metadata extension information field in the metadata for the product. This field should describe the extensions made to the metadata, including a definition of new elements.

- II) IF a new metadata section is defined:

Create a UML schema for the new metadata section based on those from annex A.

- III) IF new metadata entities defined:

In accordance with ISO 11179 and using B.2.11.1 as a template, record the new metadata entity description in terms of name, shortName, domainCode, definition, obligation, condition, dataType, domainValue, maximumOccurrence, parentEntity, rule, rationale and source.

Update the appropriate UML schemas in annex A with the new extension information.

- IV) IF new metadata elements defined:

In accordance with ISO 11179 and using B.2.11.1 as a template, record the new metadata elements description in terms of name, shortName, definition, obligation, condition, dataType, domainValue, maximumOccurrence, parentEntity, rule, rationale and source.

Update the appropriate UML schemas in annex A with the new extension information.

- V) IF an existing metadata codelist expanded:

In accordance with ISO 11179 and using B.2.11.1 and B.5 identify the metadata code list and record the new domain elements as described in B.2.11.1.

- VI) IF new metadata codelist created:

In accordance with ISO 11179 and using B.2.11.1 and B.5 as a template, record the new metadata codelist in terms of name, shortName, definition and dataType. Record any new metadata codelist elements as described in B.2.11.1.

- VII) IF an existing metadata element domain restricted:

In accordance with ISO 11179 and using clause B.1 identify the metadata element and record the modified domain set in terms of dataType and domainValue.

- VIII) IF an existing metadata element or entity obligation made more stringent.

In accordance with ISO 11179 and using annex B identify the metadata entity/element and record the modified obligation characteristics in terms of Obligation/Condition (B.1.5).

Update the appropriate UML schemas in annex A with the new extension information.



## **Annex H** (informative)

### **Metadata implementation**

#### **H.1 Background**

##### **H.1.1 Problem statement**

The body of this International Standard defines the content of a set of metadata elements, their definitions, data types, and inherent dependencies. The logical model of the metadata specifies the content and not the form of implementation or the form of presentation. A primary goal in the management of metadata for geographic data is the ability to access the metadata and the related spatial data it describes. This requires software implementations using common encoding methods to achieve operational use of the metadata for geographic data.

Implementation methods are required to provide for the exchange of metadata between data management systems, the presentation of the metadata element tags in a variety of forms and languages, and to ensure means to assess the conformance of metadata produced and made available.

##### **H.1.2 Scope and objectives**

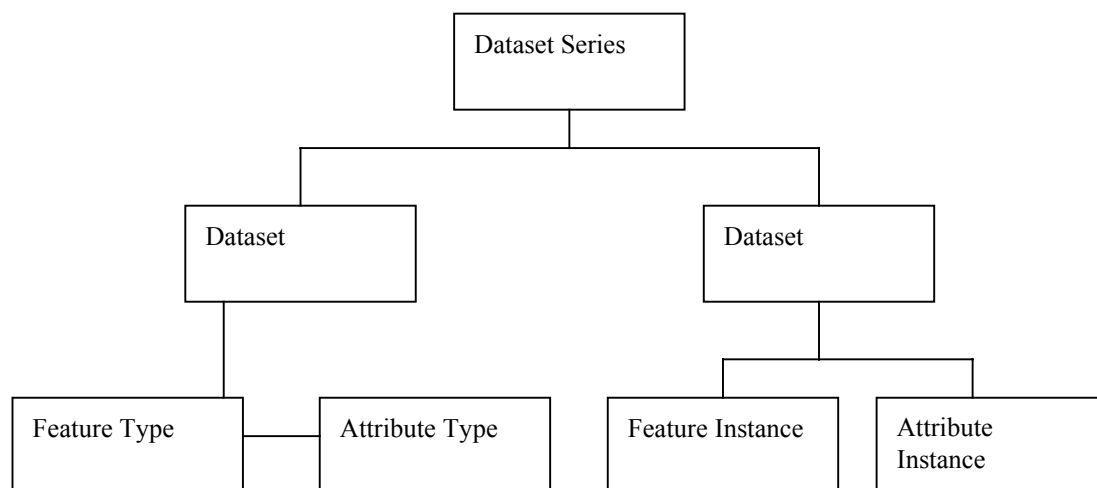
This Annex provides an overview of methods for the encoding of metadata element structure and content for the purposes of search and retrieval, metadata exchange, and presentation. The intent of this International Standard is to permit flexibility in the local management of the metadata while standardizing the understanding of metadata for geographic data. The intent of this implementation Annex is to provide guidance on the creation of a metadata for geographic data service (Clearinghouse) on a local or wide-area network.

##### **H.1.3 Granularity of spatial data supported**

The notion of cataloguing a set of related documents together in a discoverable series is common in map catalogues. With digital spatial data, the definition of what constitutes a “dataset” is more problematic and reflects the institutional and software environments of the originating organization. Common metadata can be derived for a series of related spatial datasets, and such metadata is generally relevant or can be inherited by each of the dataset instances. Software to support this inheritance of metadata for geographic data within a cataloguing system can simplify data entry, update and reporting.

There is a potential hierarchy of re-usable metadata that can be employed in implementing a metadata collection. By creating several levels of abstraction, a linked hierarchy can assist in filtering or targeting user queries to the requested level of detail. The hierarchy should not necessarily be interpreted to require multiple copies of metadata being managed on-line. Conversely, the definition of general metadata can be supplemented by spatially specific metadata that, when queried, either inherits or overrides the general case. Through use of pointers this method can reduce the redundancy of metadata managed at a site and provide for different views of the holdings by users.

This hierarchy of metadata can be graphically represented as shown in Figure H.1.



**Figure H.1 — Metadata hierarchy**

## H.2 Metadata hierarchy levels

### H.2.1 Data series metadata (optional)

A series or collection of spatial data which share similar characteristics of theme, source date, resolution, and methodology. The exact definition of what constitutes a series entry will be determined by the data provider. Examples of data series metadata entries may include:

- A flight line of digital aerial photographs collected during a single flight with one camera and film type. A continuous scan swathe collected from a satellite using the same sensors on a single orbital pass.
- A collection of raster map data captured from a common series of paper maps.
- A collection of vector datasets depicting surface hydrography with associated attribution for multiple administrative areas within a country.

The creation of a “data series” metadata level is an optional feature that allows users to consult higher-level characteristics for data search. The definition of this type of metadata may be adequate for the initial characterization of available spatial data, but may not be adequate for detailed assessment of data quality of specific datasets.

### H.2.2 Dataset metadata

For the purposes of this International Standard, a dataset should be a consistent spatial data product instance that can be generated or made available by a spatial data distributor. A dataset may be a member of a data series, as defined in the previous subclause. A dataset may be composed of a set of identified feature types and instances, and attribute types and instances as described in the following four subclauses.

On a demand basis, metadata from series and dataset information will be merged to present the user with a view of the metadata at the dataset level of abstraction. Metadata for which no hierarchy is listed are interpreted to be “dataset” metadata, by default.

### H.2.3 Feature type metadata (optional)

Spatial constructs known as features are grouped spatial primitives (0-, 1- and 2-dimensional geometric objects) that have a common identity. Spatial data services may elect to support feature type-level metadata where it is available and make such metadata available for query or retrieval. Feature Type -level metadata, together with feature instance-, attribute type- and attribute instance-level metadata, will be grouped into datasets, as defined in the previous subclause. Examples of feature type metadata entries may include:

- All bridges within a dataset.

### H.2.4 Feature instance metadata (optional)

Feature instances are spatial constructs (features) that have a direct correspondence with a real world object. Spatial data services may elect to support feature instance-level metadata where it is available and make such metadata available for query or retrieval. Feature Instance-level metadata, together with feature type-, attribute type- and attribute instance-level metadata, will be grouped into datasets, as defined in H.2.2. Examples of feature instance metadata entries may include:

- The Sydney harbour bridge.
- The Golden Gate bridge, in San Francisco.

### H.2.5 Attribute type metadata (optional)

Attribute types are the digital parameters that describe a common aspect of grouped spatial primitives (0-, 1- and 2-dimensional geometric objects). Spatial data services may elect to support attribute type-level metadata where it is available and make such metadata available for query or retrieval. Attribute type-level metadata, together with feature type-, feature instance and attribute instance-level metadata, will be grouped into datasets, as defined in H.2.2. Examples of attribute type metadata entries may include:

- Overhead clearance associated with a bridge.

### H.2.6 Attribute instance metadata (optional)

Attribute instances are the digital parameters that describe an aspect of a feature instance. Spatial data services may elect to support attribute instance-level metadata where it is available and make such metadata available for query or retrieval. Attribute instance-level metadata, together with feature type-, feature instance and attribute type-level metadata, will be grouped into datasets, as defined in H.2.2. Examples of attribute instance metadata entries may include:

- The overhead clearance associated with a specific bridge across a road.

## Annex I (informative)

### Hierarchical levels of metadata

#### I.1 Levels of metadata

At first sight, it can appear that there are many levels of metadata to be maintained. In the majority of cases, this is not so, as only metadata exceptions are defined at lower levels. If the metadata values are not changed, then the metadata is aggregated at a high level. It is anticipated that this situation would be the most common, with additional levels of metadata only being defined as the original data is maintained over a period of time.

When the lower levels of the metadata hierarchy are populated, only the revised metadata values are recorded. So, if the distributor of the data remains the same, this need not be carried down the structure.

In order to clarify this concept, the following example follows the life cycle of an example set of geographic data.

#### I.2 Example

- 1) Consider a geographic data provider generating vector mapping data for three Administrative areas (A, B and C). Initially the vector mapping was generated using a common series of paper maps, which were processed in the same way into a vector format. The bulk of the metadata for this initial data could be carried at a single level, (Dataset series). This metadata would describe the quality, citation, source, processing, of the data for the three administrative areas.

So, the metadata could be carried exclusively at Dataset Series level.

Dataset series – Administrative areas A, B & C

- Metadata entity set
- Identification
- Constraints
- Data quality
- Maintenance
- Spatial representation
- Reference system
- Content
- Portrayal catalogue
- Distribution
- Metadata extension
- Application schema
- Extent
- Citation and responsible party

- 2) After some time alternate vector mapping of Administrative area A becomes available. The metadata would then be extended for Administrative area A, to describe the new quality date values. These values would supersede those given for the Dataset series, but only for Administrative area A. The metadata for B and C would remain unchanged. This new metadata would be recorded at Dataset level.

So, additional metadata is required at Dataset level to describe the new Administrative area A data. The minimum level of metadata required to reflect this change would be:

Dataset series – Administrative areas A, B & C

- Metadata entity set
- Identification
- Constraints
- Data quality
- Maintenance
- Spatial representation
- Reference system
- Content
- Portrayal catalogue
- Distribution
- Metadata extension
- Application schema
- Extent
- Citation and responsible party

Dataset - Administrative area A

- Dataset Identification
- Citation and Responsible Party
- Extent

- 3) Eventually further data becomes available for Administrative area A, with a complete re-survey of the road network. Again this implies new metadata for the affected feature types. This metadata would be carried at Feature type level for Administrative area A. All other metadata relating to other feature types remains unaffected. Only the metadata for roads in Administrative area A is modified. This road metadata is recorded at Feature type level.

So, additional metadata is required at Feature type level to describe the new Administrative area A road data. The minimum level of metadata required to reflect this change would be:

Dataset series – Administrative areas A, B & C

- Metadata entity set
- Identification
- Constraints
- Data quality
- Maintenance
- Spatial representation
- Reference system
- Content
- Portrayal catalogue
- Distribution
- Metadata extension
- Application schema
- Extent
- Citation and responsible party

Dataset – Administrative area A

- Dataset Identification
- Citation and Responsible Party
- Extent

Feature type - Administrative area A - Road network

- Dataset Identification
- Citation and Responsible Party

- 4) An anomaly in the road survey is identified, in that all Overhead clearances for the Administrative area A have been surveyed to the nearest metre. These are re-surveyed to the nearest decimetre. This re-survey

implies new metadata for the affected attribute type 'Overhead Clearance'. All other metadata for Administrative area A remains unaffected. This 'Overhead Clearance' metadata is recorded at Attribute Type level.

So, additional metadata is required at Attribute type level to describe the new Administrative area A 'Overhead Clearance' data. The minimum level of metadata required reflecting this change would be:

Dataset series – Administrative areas A, B & C

- Metadata entity set
- Identification
- Constraints
- Data quality
- Maintenance
- Spatial representation
- Reference system
- Content
- Portrayal catalogue
- Distribution
- Metadata extension
- Application schema
- Extent
- Citation and responsible party

Dataset - Administrative area A

- Dataset Identification
- Citation and Responsible Party
- Extent

Feature type - Administrative area A - Road network

- Dataset Identification
- Citation and Responsible Party

Attribute type - Administrative area A - 'Overhead Clearance'

- Dataset Identification
- Citation and Responsible Party
- Data quality

- 5) A new bridge is constructed in Administrative area A. This new data is reflected in the geographic data for Administrative area A, and new metadata is required to record this new feature. All other metadata for Administrative area A remains unaffected. This new feature metadata is recorded at Feature instance level.

So, additional metadata is required at Feature instance level to describe the new Bridge. The minimum level of metadata required reflecting this change would be:

Dataset series – Administrative areas A, B & C

- Metadata entity set
- Identification
- Constraints
- Data quality
- Maintenance
- Spatial representation
- Reference system
- Content
- Portrayal catalogue
- Distribution
- Metadata extension
- Application schema
- Extent
- Citation and responsible party

- Dataset - Administrative area A
  - Dataset Identification
    - Citation and Responsible Party
    - Extent
  - Feature type - Administrative area A - Road network
    - Dataset Identification
      - Citation and Responsible Party
  - Attribute type - Administrative area A - 'Overhead Clearance'
    - Dataset Identification
      - Citation and Responsible Party
      - Data Quality
  - Feature instance - Administrative area A - New bridge
    - Dataset Identification
      - Citation and Responsible Party
      - Extent

- 6) The overhead clearance attribute of the new bridge was wrongly recorded, and is modified. Again this new attribute requires new metadata to describe the modification. All other metadata for Administrative area A remains unaffected. This new attribute metadata is recorded at Attribute instance level.

So, additional metadata is required at Attribute Instance level to describe the new Overhead Clearance. The minimum level of metadata required reflecting this change would be:

Dataset series – Administrative areas A, B & C

- Metadata entity set
  - Identification
  - Constraints
  - Data quality
  - Maintenance
  - Spatial representation
  - Reference system
  - Content
  - Portrayal catalogue
  - Distribution
  - Metadata extension
  - Application schema
  - Extent
  - Citation and responsible party

- Dataset - Administrative area A
  - Dataset Identification
    - Citation and Responsible Party
    - Extent
  - Feature type - Administrative area A - Road network
    - Dataset Identification
    - Citation and Responsible Party
  - Attribute type - Administrative area A - 'Overhead Clearance'
    - Dataset Identification
    - Citation and Responsible Party
    - Data Quality
  - Feature instance - Administrative area A - New bridge
    - Dataset Identification
    - Citation and Responsible Party
    - Extent
  - Attribute instance - Administrative area A - New bridge - Overhead clearance
    - Dataset Identification
    - Citation and Responsible Party
    - Data Quality



## Annex J (informative)

### Implementation examples

#### J.1 Core metadata examples

Two examples are provided. One for a dataset titled “Exploration Licences for Minerals“, the other for a dataset titled “Digital Chart of the World”.

Examples are presented in English. However, countries and users are allowed to use their own natural language(s) in the implementation of this International Standard.

#### J.2 Example 1 – Exploration Licences for Minerals

This example is provided in a tabbed-outline format. Element values are underlined and role names are denoted with a “+”.

```
MD_Metadata
fileIdentifier: ANZSA1000001233
language: en
characterSet: 001
contact:
  CI_ResponsibleParty
  organisationName: Department of Primary Industries and Resources SA
  role: 002
dateStamp: 20000803
metadataStandardName: ISO 19115
metadataStandardVersion: DIS
+referenceSystemInfo
  MD_ReferenceSystem
  rsID:
    .RS_Identifier
    .code: GDA 94
+identificationInfo
  MD_DataIdentification
  citation:
    .CI_Citation
    .title: Exploration Licences for Minerals
    .date:
      . CI_Date
      . date: 193001
      . dateType: 001
  abstract: Location of all current mineral Exploration Licences issued under the Mining Act, 1971. Exploration
Licences provide exclusive tenure rights to explore for mineral resources for up to a maximum of 5 years.
Comment is sought on applications for Exploration Licences from numerous sources before granting.
Exploration programs are subject to strict environmental and heritage conditions. Exploitation of identified
resources must be made under separate mineral production leases.
  purpose: The dataset was developed to record information necessary for the administration of the Mining
Act.
  status: 004
  pointOfContact:
    .CI_RespParty
```

```

..organisationName: Department of Primary Industries and Resources SA
..positionName: GIS Coordinator
..contactInfo:
..  CI_Contact
..  phone:
..    .....CI_Telephone
..    .....voice: 61 8 8463 3306
..    .....facsimile: 61 8 8463 3268
..  address:
..    .....CI_Address
..    .....deliveryPoint: GPO Box 167
..    .....city: Adelaide
..    .....administrativeArea: South Australia
..    .....postalCode: 5001
..    .....country: Australia
..    .....electronicMailAddress: pirsa.spatial@saugov.sa.gov.au
..  onlineResource:
..    .....CI_OnlineResource
..    .....linkage: http://www.pir.sa.gov.au
..  role: 007
spatialRepresentationType: 001
spatialResolution:
..MD_Resolution
..equivalentScale:
..  MD_RepresentativeFraction
..  denominator: 50000
language: en
characterSet: 001
topicCategory: 003
topicCategory: 008
geographicBox:
..EX_GeoBoundingBox
..westBoundLongitude: 129.0
..eastBoundLongitude: 141.0
..southBoundLatitude: -26.0
..northBoundLatitude: -38.5
geographicDescription: South Australia
+resourceMaintenance
..MD_MaintenanceInformation
..maintenanceAndUpdateFrequency: 002
+resourceFormat
..MD_Format
..name: ArcInfo Export
..version: 8.0.2
+resourceFormat
..MD_Format
..name: MapInfo
..version: 6.0
+resourceFormat
..MD_Format
..name: DXF
..version: 14
+resourceFormat
..MD_Format
..name: Plotted Maps
..version: Not applicable
+descriptiveKeywords
..MD_Keywords
..keyword: BOUNDARIES Administrative
..keyword: INDUSTRY Mining Exploration
..keyword: MINERALS Exploration
..thesaurusName:
..  CI_Citation

```

```

..   title: ANZLIC Search Words
.   date:
.     .....CI_Date
.     .....date: 199607
.     .....dateType: 002
+resourceSpecificUsage
.  MD_Usage
.  specificUsage: Used to supply government, industry and the general public with an up-to-date status and extent of mineral exploration activities throughout the State.
.  userContactInfo:
.    CI_ResponsibleParty
.    positionName: GIS Coordinator
.    role: 007
+resourceConstraints
.  MD_Constraints
.  useLimitation: The data should not be used at a scale larger than 1:50 000.
+dataQualityInformation
DQ_DataQuality
scope:
.  DQ_Scope
.  level: dataset
+lineage
.  LI_Lineage
.  statement: Source Data History: Exploration Licence boundaries were sourced from the official Mining Register licence documents. Licence boundaries are legally defined to follow lines of latitude and longitude. The register has existed since 1930. Processing Steps: Coordinates entered by keyboard from licence documents. Linework cleaned to remove duplicate arcs. Data adjusted for accurate state border and coastline. Where appropriate, cadastral parcels removed from licence polygons. Associated attribute data also captured from licence documents.
+report
.  DQ_Completeness
.  result:
.    DQ_QuantitativeResult
.    value: Spatial data is 100% complete. Associated attribute data is 100% complete.
.  DQ_TopologicalConsistency
.  result:
.    DQ_QuantitativeResult
.    value: The dataset contains no overshoots, undershoots or duplicate lines. All polygons representing licences contain only one label.
.  DQ_PositionalAccuracy
.  result:
.    DQ_ConformanceResult
.    explanation: Most boundary locations are constructed from lines of latitude and longitude, hence are scale independent. The accuracy of other boundaries is dependent upon the source, eg. state border, coastline, cadastre.
.    pass: 1
.  DQ_ThematicAccuracy
.  result:
.    DQ_QuantitativeResult
.    value: Validation checks are performed periodically, resulting in an estimated 99% accuracy. These checks include comparisons between reports from the spatial dataset and the digital Mining Register.

```

### J.3 Example 2 – Digital chart of the world (vmap0.xml)

The following implementation example is presented as an XML data file created using the XML DTDs provided in Annex E.

```

<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE MD_Metadata SYSTEM "19115-DatasetMetadat.dtd">
<MD_Metadata id="root">
  <fileIdentifier>19115-ex-vmap0</fileIdentifier>
  <language>en</language>
  <characterSet>
    <registrar/>
    <MD_CharacterSetCode value="ucs2"/>
  </characterSet>
  <contact>
    <organisationName>National Imagery and Mapping Agency</organisationName>
    <contactInfo>
      <address>
        <deliveryPoint>4600 Sangamore Road</deliveryPoint>
        <city>Bethesda</city>
        <administrativeArea>Maryland</administrativeArea>
        <postalCode>20816-5003</postalCode>
        <country>United States</country>
      </address>
      <onlineResource>
        <linkage>http://www.nima.mil</linkage>
      </onlineResource>
    </contactInfo>
    <role>
      <registrar/>
      <CI_RoleCode value="pointOfContact"/>
    </role>
  </contact>
  <dateStamp>20000526</DateStamp>
  <metadataStandardName>ISO 19115 Geographic Information - Metadata</metadataStandardName>
  <metadataStandardVersion>DIS</metadataStandardVersion>
  <distributionInfo>
    <distributionFormat>
      <b-name>VPF</b-name>
      <version>1.0</version>
    </distributionFormat>
    <transferOptions>
      <onLine>
        <linkage>http://www.nima.mil</linkage>
      </onLine>
    </transferOptions>
  </distributionInfo>
  <identificationInfo>
    <MD_DataIdentification id="dataIdent">
      <citation>
        <title>Digital Chart of the World</title>
        <date>
          <a-date>199208</a-date>
          <dateType>
            <registrar/>
            <CI_DateTypeCode value="publication"/>
          </dateType>
        </date>
      </citation>
      <citedResponsibleParty>
        <organisationName>Defense Mapping Agency</organisationName>
        <contactInfo>
          <address>
            <deliveryPoint>8613 Lee Highway</deliveryPoint>
            <city>Fairfax</city>
            <administrativeArea>Virginia</administrativeArea>
            <postalCode>22031</postalCode>
            <country>United States</country>
          </address>
        </contactInfo>
      </citedResponsibleParty>
    </MD_DataIdentification>
  </identificationInfo>
</MD_Metadata>

```

```

        </contactInfo>
        <role>
            <registrar/>
            <CI_RoleCode value="originator"/>
        </role>
    </citedResponsibleParty>
    <citedResponsibleParty>
        <organisationName>National Imagery and Mapping Agency</organisationName>
        <contactInfo>
            <address>
                <deliveryPoint>4600 Sangamore Road</deliveryPoint>
                <city>Bethesda</city>
                <administrativeArea>Maryland</administrativeArea>
                <postalCode>20816-5003</postalCode>
                <country>United States</country>
            </address>
            <onlineResource>
                <linkage>http://www.nima.mil</linkage>
            </onlineResource>
        </contactInfo>
        <role>
            <registrar/>
            <CI_RoleCode value="owner"/>
        </role>
    </citedResponsibleParty>
    <presentationForm>
        <registrar/>
        <CI_PresentationFormCode value="mapDigital"/>
    </presentationForm>
</citation>

```

<abstract>The Digital Chart of the World is a comprehensive 1:1,000,000 scale vector basemap of the world. It consists of cartographic, attribute, and textual data stored on compact disc read only memory (CD-ROM). The primary source for the database is the Defense Mapping Agency's (DMA) Operational Navigation Chart (ONC) series. This is the largest scale unclassified map series in existence that provides consistent, continuous global coverage of essential basemap features. The database contains more than 1,500 megabytes of vector data and is organized into 17 thematic layers. The data includes major road and rail networks, major hydrologic drainage systems, major utility networks (cross-country pipelines and communication lines), all major airports, elevation contours (1000 foot(ft), with 500ft and 250ft supplemental contours), coastlines, international boundaries and populated places. The DCW also has an index of geographic names to aid in locating areas of interest. The database can be accessed directly from the four optical CD-ROMs that store the database or can be transferred to a magnetic media.

</abstract>

```

    <pointOfContact>
        <role>
            <registrar/>
            <CI_RoleCode value="resourceProvider"/>
        </role>
    </pointOfContact>
    <resourceFormat>
        <b-name>VPF</b-name>
        <version>1.0</version>
    </resourceFormat>
    <spatialRepresentationType>
        <registrar/>
        <MD_SpatialRepresentationTypeCode value="vector"/>
    </spatialRepresentationType>
    <spatialResolution>
        <equivalentScale>
            <denominator>1000000</denominator>
        </equivalentScale>
    </spatialResolution>
    <language>en</language>
    <characterSet>

```

```

        <registrar/>
        <MD_CharacterSetCode value="ucs2"/>
    </characterSet>
    <topicCategory>
        <registrar/>
        <MD_TopicCategoryCode value="imageryBaseMapsEarthCover"/>
    </topicCategory>
    <geographicBox>
        <westBoundLongitude>
            <value>
                <Real>-180.0</Real>
            </value>
            <uom>
                <uomName>decimal degrees</uomName>
                <conversionToISOstandardUnit/>
            </uom>
        </westBoundLongitude>
        <eastBoundLongitude>
            <value>
                <Real>180.0</Real>
            </value>
            <uom>
                <uomName>decimal degrees</uomName>
                <conversionToISOstandardUnit/>
            </uom>
        </eastBoundLongitude>
        <southBoundLatitude>
            <value>
                <Real>-90.0</Real>
            </value>
            <uom>
                <uomName>decimal degrees</uomName>
                <conversionToISOstandardUnit/>
            </uom>
        </southBoundLatitude>
        <northBoundLatitude>
            <value>
                <Real>90.0</Real>
            </value>
            <uom>
                <uomName>decimal degrees</uomName>
                <conversionToISOstandardUnit/>
            </uom>
        </northBoundLatitude>
    </geographicBox>
    <extent>
        <temporalElement>
            <EX_TemporalExtent id="temporalExtent">
                <a-extent>1988/1992</a-extent>
            </EX_TemporalExtent>
        </temporalElement>
    </extent>
</MD_DataIdentification>
</identificationInfo>
<dataQualityInfo>
    <a-scope>
        <level>
            <registrar/>
            <MD_ScopeCode value="dataset"/>
        </level>
    </a-scope>
</lineage>

```

<statement>The DCW was compiled from the following sources: the entire series of Operational Navigational Charts (primary source), Joint Navigational Charts (geographic features - Antarctica), AVHRR (vegetation), and NIMA Digital Flight Information File (airport information).</statement>

```

</lineage>
</dataQualityInfo>
<referenceSystemInfo>
  <MD_ReferenceSystem id="referenceSystem">
    <rsID>
      <a-code>WGS 84</a-code>
    </rsID>
  </MD_ReferenceSystem>
</referenceSystemInfo>
</MD_Metadata>

```

#### J.4 Example 3 – Example of extended metadata

This example illustrates the addition of new metadata entities and an extended codelist that can be used to document a hierarchical classification-based taxonomy. Figure J.1 presents a UML model of the extension information, clauses J.3 and J.4 provide data dictionary entries for the extended entities and elements.

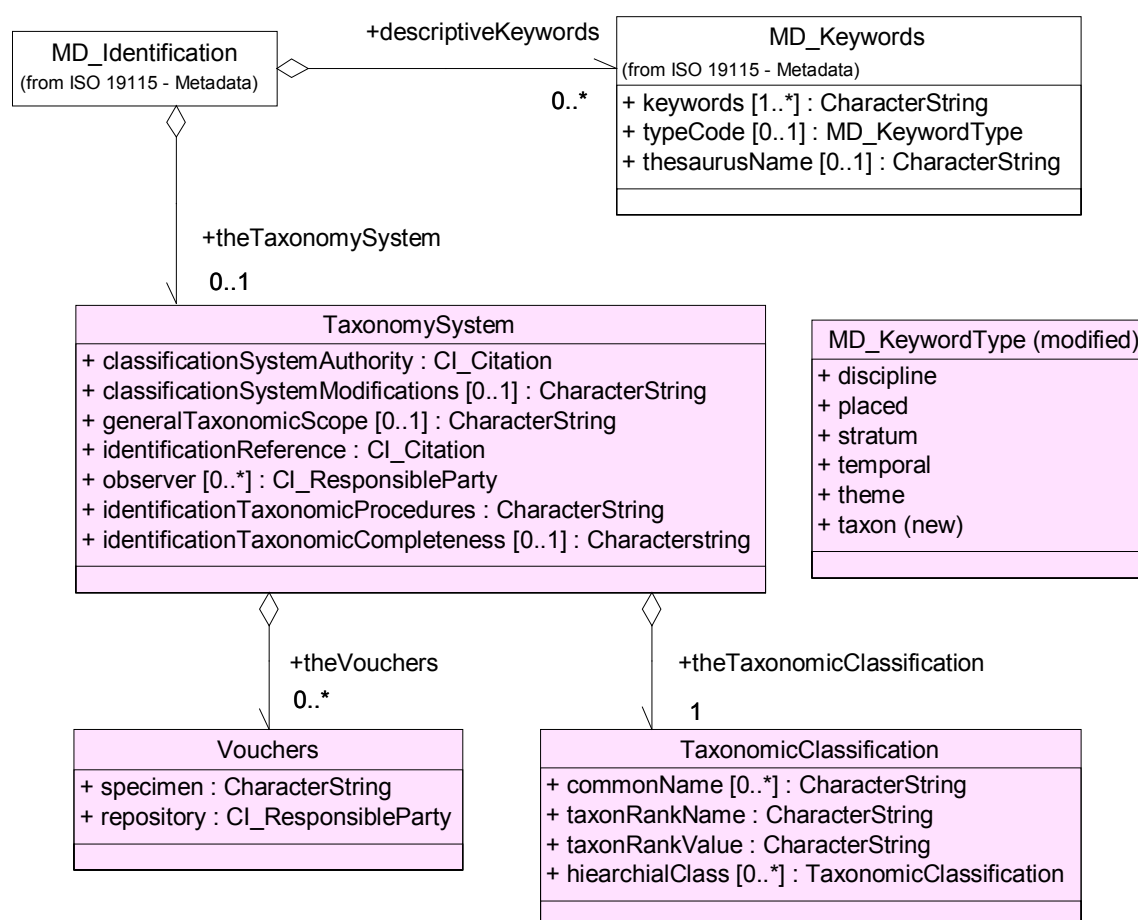


Figure J.1 — Examples of extended metadata





## J.5 Data dictionary for the extended elements

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
Role name: the taxonomy system	taxonomy		Information on the taxa (1 or more) included in the data set, including keywords, taxonomic system and coverage information, and taxonomic classification system.	O		Association		1	MD_Identification	New Metadata section	To provide for documentation of taxonomic information	National Biological Information Infrastructure (NBII)
Taxonomy system	Taxons		Documentation of taxonomic sources, procedures, and treatments.	O		Class		1	MD_Identification	New Metadata section as a class to MD_Identification	The set of data elements contained within this class element represents an attempt to provide better documentation of taxonomic sources, procedures, and treatments.	National Biological Information Infrastructure (NBII)
classification System Authority	Classs		Information about the Classification system or authority used	M		Class	Classification	N	TaxonomySystem	New Metadata class	Together, the Classification system and any modifications made to it represent a significant piece of information concerning the data being documented.	National Biological Information Infrastructure (NBII)
classification System Modifications	Classmod		A description of any modifications or exceptions made to the Classification system or authority used	C	taxonomic classification system modified	Character string	Free text	1	classificationSystem Authority	New Metadata attribute	Many times a standard system is used, but exceptions are made to specific taxa or groups, this element allows for exceptions or modifications to be described.	National Biological Information Infrastructure (NBII)

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
generalTaxonomicScope	Taxon		A description of the range of taxa addressed in the data set or collection. For example, "all vascular plants were identified to family or species, mosses and lichens were identified as moss or lichen."	O		Character string	Free text	1	TaxonomySystem	New Metadata attribute	To provide the capability to document the taxa addressed in the data set or collection via a free text description. This is especially important with data sets or collections which contain examples of a many taxonomic levels.	National Biological Information Infrastructure (NBII)
identificationReference	Idref		Information on any non-authoritative materials (e.g. field guides) useful for reconstructing the actual process	M		Class		N	TaxonomySystem	New Metadata class	This information can be useful for someone who wishes to make use of a data set, and perhaps expand on it, following similar procedures	National Biological Information Infrastructure (NBII)
observer	Obs		Information about the individual(s) responsible for the identification(s) of the specimens or sightings, etc.	O		Class	CI_ResponsibleParty	N	TaxonomySystem	New Metadata class	If there are any questions on the identification of specimens or field sightings, this should provide some insight into the data creator.	National Biological Information Infrastructure (NBII)
identificationTaxonomicProcesses	Taxonpro		Description of the methods used for taxonomic identification. Could include specimen processing, comparison with museum materials, keys, and key characters, chemical or genetic analyses, etc.	M		Character string	Free text	1	TaxonomySystem	New Metadata attribute		National Biological Information Infrastructure (NBII)

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
identification Taxonomic templates	Taxonomic		Information concerning the proportions and treatment of unidentified materials (i.e. materials sent to experts, and not yet determined); estimates of the importance, and identities of misidentifications, uncertain determinations, synonyms or other incorrect usages; taxa not well treated or requiring further work; and expertise of field workers.	O		Character string	Free text	1	TaxonomicSystem	New Metadata attribute		National Biological Information Infrastructure (NBII)
Role name: theVoucher	voucher		Information about the voucher			Association						
Vouchers	Vouchers		Information on the types of specimen, the repository, and the individuals who identified the vouchers.	C	vouchers used	Class		N	TaxonomicSystem	New Metadata class		National Biological Information Infrastructure (NBII)

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
specimen	Specimen		A word or phrase describing the type of specimen collected (e.g. herbarium specimens, blood samples, photographs, individuals, or batches). Example: "herbarium specimens" "blood samples" "photographs" "individuals" free text	M		Character string	free text	1	Vouchers	New Metadata attribute		National Biological Information Infrastructure (NBII)
repository	Repository		Information about the curator or contact person and/or agency responsible for the specimens.	M		Class	CI_Responsibility	1	Vouchers	New Metadata class	If, for any reason, the specimens should need to be referred to, information about where they are being housed and who is responsible for them should be kept along with the documentation of the data set. If they have not been archived, this should be noted.	National Biological Information Infrastructure (NBII)
Role name: the Taxonomic Classification			Information about the taxonomic classification	M				1				

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
Taxonomic Classification	Taxoncl		Information about the range of taxa addressed in the data set or collection. It is recommended that one provide information starting from the taxonomic rank of kingdom, to a level which reflects the data set or collection being documented. The levels of Kingdom, Division/Phylum, Class, Order, Family, Genus, and Species should be included as ranks as appropriate. For example, if the data set deals with the species "red maple" or <i>Acer rubrum</i> var. <i>rubrum</i> , then the contents might look like the following:	M		Class		1	TaxonomicClassification	New Metadata class	To provide the capability to describe precisely the taxa addressed in the data set or collection. This can be accomplished using a hierarchical structure to specify from Kingdom down to the appropriate taxonomic level.	National Biological Infrastructure (NBI)
commonName	Common		Specification of applicable common names. These common names may be general descriptions of a group of organisms if appropriate (e.g. insects, vertebrate, grasses, waterfowl, vascular plants, etc.)	O		Character string	free text	N	TaxonomicClassification	New Metadata attribute	To provide the capability to describe precisely the taxa addressed in the data set or collection.	National Biological Infrastructure (NBI)

Name	Short Name	Domain Code	Definition	Obligation	Condition	Data Type	Domain Value	Max Occur	Parent Entity	Rule	Rationale	Source
taxon Rank Name	Taxonr n		The name of the taxonomic rank for which the Taxon_Rank_Value is provided. See the example included in the definition of Taxonomic_Classification.  Example: "Kingdom" "Division" "Phylum" "Subphylum" "SuperClass" "Class" "SubClass" "Infraclass" "Superorder" "Order" "Suborder" "Infracorder" "Superfamily" "Family" "Subfamily" "Tribe" "Subtribe" "Genus" "Species"	M		Character string	free text	1	TaxonomicClassification	New Metadata attribute	To provide the capability to describe precisely the taxa addressed in the data set or collection.	National Biological Information Infrastructure (NBII)
taxon Rank Value	Taxonr y		The name representing the taxonomic rank of the taxon being described. See the example included in the definition of TaxonomicClassification.	M		Character string	Free text	1	TaxonomicClassification	New Metadata attribute	To provide the capability to describe precisely the taxa addressed in the data set or collection.	National Biological Information Infrastructure (NBII)
hierarchical class	hiclass		The number of recursive sets of taxonomic classification systems	O		Character string	Free text	N	TaxonomicClassification	New Metadata attribute	To provide the capability to declare the number of recursive taxonomic classification systems	National Biological Information Infrastructure (NBII)

## J.6 MD\_KeywordType (Modified)

Name	Domain code	Definition
MD_KeywordType		Methods used to group similar keywords
discipline	001	Keyword identifies a branch of instruction or specialized learning
place	002	Keyword identifies a place
stratum	003	Keyword identifies the layer(s) of any deposited subsurface
temporal	004	Keyword identifies a time period related to the dataset
theme	005	Keyword identifies a particular subject or topic
taxon	006	Keyword identifies a taxonomy of the dataset

## **Annex K** (informative)

### **Multi-lingual support for free text metadata element**

#### **K.1 Free text metadata elements**

In this International Standard a free text element may include multiple instances of information in different languages. Where the language is different from the language defined for the whole dataset, it may be identified, along with an optional attribute that specifies the variant of the language used in a particular country, and the character set used when that differs from the default for the whole dataset.

Defined in clause K.2 are metadata elements that allow for the specification of free text in multiple languages. Optionally, everywhere in this International Standard where “free text” is specified as the domain the class PT\_FreeText can be used.

An example of how the free text metadata elements may be used is described in K.3. The metadata element “useLimitation” is used in the example. It can be found in annex B.2.2 of this International Standard.



## K.2 Data structure for handling multi-languages support in free text metadata elements

	Name / Role name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
1x	PT_FreeText	PtFreeText	description of a multi-language free text metadata element	Use obligation from referencing object	Use maximum occurrence from referencing object	Class	Line 2x
2x	<i>Role name:</i> textGroup	textGroup	information about the metadata elements required to support multi-lingual free text fields	M	N	Association	PT_Group
3x	PT_Group	PtGroup	description of metadata elements required to support multi-languages in free text metadata elements	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (PT_FreeText)	Lines 2x and 4x-7x
4x	languageCode	PtLangCode	language used for documenting a plain text	O	1	Class	LanguageCode <<CodeList>> (ISO 639, recommended 3-alphabetic digits code)
5x	country	PtCountry	country of language used for documenting a plain text	O	1	CharacterString	Country <<CodeList>> (ISO 3166 recommended 3-numeric digits code)
6x	characterSetCode	PtCharCode	full name of the ISO character coding standard used for documenting a plain text	O	1	Class	MD_CharacterSetCode <<CodeList>> (B 6.16)
7x	plainText	PtText	Content of a free text metadata element	M	1	CharacterString	Free text

K.3 Example of multi-languages free text in a metadata element

The metadata element “useLimitation” is used in the following example (B.2.2 line 70).

Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
70 useLimitation	useLimit	any limitation affecting the fitness for use of the resource Example: “not to be used for navigation”	O	N	CharacterString	Free text

Example of multi-languages occurrences on free text metadata element titled “useLimitation”				
Language code (Optional)	Country code (Optional)	Character set code (Optional)	Plain text (Mandatory)	
eng (English) (see Note)	826 (United Kingdom) (see Note)	017 (ISO/IEC 8859-15) (see Note)	Weight restriction on bridges Lorries exceeding five metric tonnes gross weight are not permitted on bridges	
fra (French)		017 (ISO/IEC 8859-15)	Limitation de poids sur les ponts: Les camions dont le poids total excède 5 tonnes métriques ne sont pas autorisés à circuler sur les ponts.	
ara (Arabic)		011 (ISO/IEC 8859-6)		محدود الثقل على الجسور ممنوع على الحافلات بمقدار أكثر من ٥٠٠٠ كيلوغرام متري العبور على الجسور
zho (Chinese)		004 (utf8)	桥梁承重限制: 卡车毛重超过五公吨不得上桥	
NOTE If “English”, “United Kingdom” and “ISO/IEC 8859-15” would have been specified as default values for the entire metadata file, it would not have been necessary to specify them in this occurrence.				

## Bibliography

- [1] ISO 690:1996, *Documentation — Bibliographic references — Content, form and structure*
- [2] ISO 8601:1987, *Data elements and interchange formats — Information interchange — Representation of dates and times*
- [3] ISO 19116:—<sup>2)</sup>, *Geographic information — Positioning services*
- [4] ISO 19119:—<sup>2)</sup>, *Geographic information — Services*
- [5] ISO 19123:—<sup>2)</sup>, *Geographic information — Schema for coverage geometry and functions*
- [6] ISO 23950:1998, *Information and documentation — Information retrieval (Z39.50) — Application service definition and protocol specification*
- [7] ISO TR 19121:2000, *Geographic information — Imagery and gridded data*

---

2) To be published.