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**Geoinformation –
Metadaten (ISO 19115:2003);
Englische Fassung EN ISO 19115:2005**

Geographic information –
Metadata (ISO 19115:2003);
English version EN ISO 19115:2005

Information géographique –
Métadonnées (ISO 19115:2003);
Version anglaise EN ISO 19115:2005

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Nationales Vorwort

Der Text von ISO 19115:2003 wurde vom Technischen Komitee ISO/TC 211 „Geoinformation/Geomatik“ erarbeitet und als EN ISO 19115:2005 vom Technischen Komitee CEN/TC 287 „Geoinformation“ übernommen, dessen Sekretariat vom NEN gehalten wird.

Der Text von ISO 19115:2003 wurde von CEN als EN ISO 19115:2005 ohne Änderungen angenommen.

Der für die deutsche Mitarbeit zuständige Arbeitsausschuss im DIN Deutsches Institut für Normung e. V. ist der als Spiegelausschuss zum CEN/TC 287 und ISO/TC 211 eingesetzte Arbeitsausschuss 03.03.00 „Kartographie und Geoinformation“ des Normenausschusses Bauwesen (NABau).

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den Regeln der europäischen Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach Europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmefällen abgewichen und auf die deutsche Sprachfassung verzichtet werden kann.

Die Genehmigung dafür hat die DIN-Geschäftsleitung entsprechend ihren in Anlage 1 zu dem DIN-Rundschreiben A 5/2004 festgelegten Kriterien für die vorliegende Norm auf Antrag des NABau-FB 03 „Vermessungswesen; Geoinformation“ erteilt.

Allgemeines

DIN EN ISO 19115 definiert ein Regelwerk zur Beschreibung von geographischen Informationen und Diensten. Diese Norm bietet Informationen zur Identifizierung, über die Ausdehnung, die Qualität, das räumliche und zeitliche System, den Raumbezug und zur Abgabe digitaler geographischer Daten.

Diese Norm ist anwendbar für:

- Objektartenkataloge, Brokerdienste (clearinghouse) und die vollständige Beschreibung von Datensätzen;
- Geographische Datensätze, zusammengehörende Datensätze und einzelne geographische Objekte und Objekteigenschaften.

Diese Norm definiert:

- Verpflichtend und bedingt zu führende Metadatenbereiche, Metadateneinheiten und Metadatenelemente;
- Den Minimalumfang der Metadaten, die notwendig sind, um die Gesamtheit aller Metadatenanwendungen zu bedienen (Datensuche, Überprüfung der Brauchbarkeit, Datenzugang, Datenübermittlung und Anwendung digitaler Daten);
- Optionale Metadatenelemente, um umfangreichere Standardbeschreibungen von geographischen Daten zu ermöglichen, sofern erforderlich;
- Regeln zur Definition von weiteren Metadatenelementen für spezielle Anforderungen.

Auf diese Weise ist diese Norm nicht nur auf digitale Daten anwendbar, sondern ihre Grundsätze sind auf viele andere geographische Daten übertragbar, wie z. B. Landkarten, thematische Karten und beschreibende Informationen sowie nicht geographische Daten.

Nationaler Anhang NA

(informativ)

Englisch-deutsche Fachwörterliste

Data type	Datentyp
Dataset	Datensatz
Dataset series	Serie von Datensätzen
Grid	Gitter
Metadata	Metadaten
Metadata element	Metadatenelement Element, das die Eigenschaften der Metadaten beschreibt
Metadata entity	Metadateneinheit Satz von Metadatenelementen, die dieselben Aspekte von Daten beschreiben
Metadata section	Metadatenbereich Bestimmte Menge von Metadaten, die aus Metadateneinheiten und Metadatenelementen besteht

— Leerseite —

English version

Geographic information - Metadata (ISO 19115:2003)

Information géographique - Métadonnées (ISO
19115:2003)

Geoinformation - Metadaten (ISO 19115:2003)

This European Standard was approved by CEN on 24 December 2004.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Page

Foreword	6
Introduction	7
1 Scope	8
2 Conformance	8
2.1 Conformance requirements	8
2.2 Metadata Profiles	8
2.3 Obligation and condition	9
3 Normative references	9
4 Terms and definitions	10
5 Symbols and abbreviated terms	11
5.1 Abbreviations	11
5.2 UML notations	11
5.3 UML model relationships	12
5.3.1 Associations	12
5.3.2 Generalization	12
5.3.3 Instantiation/Dependency	12
5.3.4 Roles	12
5.4 UML model stereotypes	13
5.5 Package abbreviations	14
5.6 UML model/data dictionary relationships	15
6 Requirements	15
6.1 Metadata for geographic data requirement	15
6.2 Metadata application information	15
6.3 Metadata packages	16
6.3.1 Metadata package and entity relationship	16
6.3.2 Package descriptions	18
6.4 Metadata datatypes	21
6.4.1 Extent information (EX_Extent)	21
6.4.2 Citation and responsible party information (CI_Citation and CI_ResponsibleParty)	22
6.5 Core metadata for geographic datasets	22
6.6 Unified Modelling Language (UML) diagrams	23
6.7 Data dictionary	23
6.8 Metadata extensions and profiles	24
6.9 Abstract test suite	24
6.10 Comprehensive dataset metadata application profile	24
6.11 Metadata extension methodology	24
6.12 Metadata implementation	24
6.13 Hierarchical levels of metadata	24
6.14 Implementation examples	24
6.15 Multilingual support for free text fields	24
Annex A (normative) Metadata schemas	25
A.1 Metadata UML models	25
A.2 Metadata package UML diagrams	26
A.2.1 Metadata entity set information	26
A.2.2 Identification information	26
A.2.3 Constraint information	28
A.2.4 Data quality information	30
A.2.5 Maintenance information	32
A.2.6 Spatial representation information	33

A.2.7	Reference system information	34
A.2.8	Content information.....	35
A.2.9	Portrayal catalogue information.....	36
A.2.10	Distribution information	37
A.2.11	Metadata extension information.....	38
A.2.12	Application schema information	39
A.3	Metadata data types	40
A.3.1	Extent information	40
A.3.2	Citation and responsible party information	41
Annex B	(normative) Data dictionary for geographic metadata.....	42
B.1	Data dictionary overview	42
B.1.1	Introduction	42
B.1.2	Name/role name	42
B.1.3	Short name and domain code	42
B.1.4	Definition	42
B.1.5	Obligation/Condition	43
B.1.6	Maximum occurrence	43
B.1.7	Data type.....	43
B.1.8	Domain.....	43
B.2	Metadata package data dictionaries	45
B.2.1	Metadata entity set information.....	45
B.2.2	Identification information (includes data and service identification).....	47
B.2.3	Constraint information (includes legal and security)	53
B.2.4	Data quality information.....	55
B.2.5	Maintenance information	64
B.2.6	Spatial representation information (includes grid and vector representation).....	66
B.2.7	Reference system information (includes temporal, coordinate and geographic identifiers).....	70
B.2.8	Content information (includes Feature catalogue and Coverage descriptions).....	75
B.2.9	Portrayal catalogue information.....	80
B.2.10	Distribution information	80
B.2.11	Metadata extension information.....	85
B.2.12	Application schema information	87
B.3	Data type information	88
B.3.1	Extent information	88
B.3.2	Citation and responsible party information	92
B.4	Externally referenced entities.....	98
B.4.1	Introduction	98
B.4.2	Date and DateTime information.....	98
B.4.3	Distance, angle, measure, number, record, recordType, scale and UomLength information....	98
B.4.4	Feature type, property type, and attribute type information	98
B.4.5	PeriodDuration and temporal primitive information	98
B.4.6	Point and Object information	99
B.4.7	Set and Sequence information	99
B.4.8	Type name information	99
B.4.9	Vertical datum information	99
B.5	CodeLists and enumerations	99
B.5.1	Introduction	99
B.5.2	CI_DateTypeCode <<CodeList>>	99
B.5.3	CI_OnLineFunctionCode <<CodeList>>	100
B.5.4	CI_PresentationFormCode <<CodeList>>	100
B.5.5	CI_RoleCode <<CodeList>>.....	100
B.5.6	DQ_EvaluationMethodTypeCode <<CodeList>>	101
B.5.7	DS_AssociationTypeCode <<CodeList>>	101
B.5.8	DS_InitiativeTypeCode <<CodeList>>	101
B.5.9	MD_CellGeometryCode <<CodeList>>	102
B.5.10	MD_CharacterSetCode <<CodeList>>	102
B.5.11	MD_ClassificationCode <<CodeList>>	103
B.5.12	MD_CoverageContentTypeCode <<CodeList>>	103
B.5.13	MD_DatatypeCode <<CodeList>>	104

B.5.14	MD_DimensionNameTypeCode <<CodeList>>	104
B.5.15	MD_GeometricObjectTypeCode <<CodeList>>	104
B.5.16	MD_ImagingConditionCode <<CodeList>>	105
B.5.17	MD_KeywordTypeCode <<CodeList>>	105
B.5.18	MD_MaintenanceFrequencyCode <<CodeList>>	106
B.5.19	MD_MediumFormatCode <<CodeList>>	106
B.5.20	MD_MediumNameCode <<CodeList>>	106
B.5.21	MD_ObligationCode <<Enumeration>>	107
B.5.22	MD_PixelOrientationCode <<Enumeration>>	107
B.5.23	MD_ProgressCode <<CodeList>>	107
B.5.24	MD_RestrictionCode <<CodeList>>	108
B.5.25	MD_ScopeCode <<CodeList>>	108
B.5.26	MD_SpatialRepresentationTypeCode <<CodeList>>	109
B.5.27	MD_TopicCategoryCode << Enumeration>>	109
B.5.28	MD_TopologyLevelCode <<CodeList>>	111
Annex C	(normative) Metadata extensions and profiles	112
C.1	Background	112
C.2	Types of extensions	112
C.3	Creating an extension	112
C.4	Rules for creating an extension	112
C.5	Community profile	113
C.6	Rules for creating a profile	114
Annex D	(normative) Abstract test suite	115
D.1	Abstract test suite	115
D.2	Metadata test suite	115
D.2.1	Test case identifier: Completeness test	115
D.2.2	Test case identifier: Maximum occurrence test	115
D.2.3	Test case identifier: Short name test	115
D.2.4	Test case identifier: Data type test	116
D.2.5	Test case identifier: Domain test	116
D.2.6	Test case identifier: Schema test	116
D.3	User-defined extension metadata test suite	116
D.3.1	Test case identifier: Exclusiveness test	116
D.3.2	Test case identifier: Definition test	117
D.3.3	Test case identifier: Standard metadata test	117
D.4	Metadata profiles	117
D.4.1	Test case identifier: Metadata profiles	117
Annex E	(normative) Comprehensive dataset metadata application profile	118
E.1	Comprehensive dataset metadata application schema	118
E.2	Comprehensive dataset metadata profile – UML model	119
Annex F	(informative) Metadata extension methodology	120
F.1	Metadata extensions methodology	120
F.2	Review of existing metadata elements (Stage 1)	120
F.3	Definition of a new metadata section (Stage 2)	121
F.4	Definition of a new metadata codelist (Stage 3)	121
F.5	Definition of a new metadata codelist element (Stage 4)	121
F.6	Definition of a new metadata element (Stage 5)	122
F.7	Definition of a new metadata entity (Stage 6)	122
F.8	Definition of a more stringent metadata obligation (Stage 7)	123
F.9	Definition of more restrictive metadata codelist (Stage 8)	123
F.10	Documentation of metadata extensions (Stage 9)	124
Annex G	(informative) Metadata implementation	126
G.1	Background	126
G.1.1	Problem statement	126
G.1.2	Scope and objectives	126
G.1.3	Granularity of spatial data supported	126
G.2	Metadata hierarchy levels	127

G.2.1	Dataset series metadata (optional)	127
G.2.2	Dataset metadata	127
G.2.3	Feature type metadata (optional)	128
G.2.4	Feature instance metadata (optional)	128
G.2.5	Attribute type metadata (optional)	128
G.2.6	Attribute instance metadata (optional)	128
Annex H	(informative) Hierarchical levels of metadata	129
H.1	Levels of metadata	129
H.2	Example	129
Annex I	(informative) Implementation examples	133
I.1	Metadata examples	133
I.2	Example 1 – Exploration Licences for Minerals	133
I.3	Example 2 – Example of extended metadata	136
I.4	Data dictionary for the extended elements	137
I.5	MD_KeywordType (Modified)	137
Annex J	(informative) Multilingual support for free text metadata element	144
J.1	Free text metadata elements	144
J.2	Data structure for handling multi-languages support in free text metadata elements	145
J.3	Example of multi-languages free text in a metadata element	146
	Bibliography	147

Foreword

The text of ISO 19115:2003 has been prepared by Technical Committee ISO/TC 211 „Geographic information/Geomatics“ of the International Organization for Standardization (ISO) and has been taken over as EN ISO 19115:2005 by Technical Committee CEN/TC 287 „Geographic Information“, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2005, and conflicting national standards shall be withdrawn at the latest by July 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 19115:2003 has been approved by CEN as EN ISO 19115:2005 without any modifications.

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.

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

ISO 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 4217:2001, *Codes for the representation of currencies and funds*

ISO 8859 (parts 1 to 16), *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 19106:—¹⁾, *Geographic information — Profiles*

ISO 19107:—¹⁾, *Geographic information — Spatial schema*

ISO 19108:2002, *Geographic information — Temporal schema*

ISO 19109:—¹⁾, *Geographic information — Rules for application schema*

ISO 19110:—¹⁾, *Geographic information — Methodology for feature cataloguing*

ISO 19111:2003, *Geographic information — Spatial referencing by coordinates*

ISO 19112:—¹⁾, *Geographic information — Spatial referencing by geographic identifiers*

ISO 19113:2002, *Geographic information — Quality principles*

ISO 19114:—¹⁾, *Geographic information — Quality evaluation procedures*

ISO 19117:—¹⁾, *Geographic information — Portrayal*

ISO 19118:—¹⁾, *Geographic information — Encoding*

1) To be published.

4 Terms and definitions

For the purposes of this document, 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 a value domain with operations allowed on values in this domain [ISO 19103]

EXAMPLE Integer, Real, Boolean, String, Date, and GM_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 an algorithmic way [ISO 19123]

4.5

metadata

data about data

4.6

metadata element

discrete unit of metadata

NOTE 1 Metadata elements are unique within a metadata entity.

NOTE 2 Equivalent to an attribute in UML terminology.

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

NOTE Equivalent to a package in UML terminology.

4.9

model

abstraction of some aspects of a universe of discourse [ISO 19109]

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 [ISO 19108]

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.

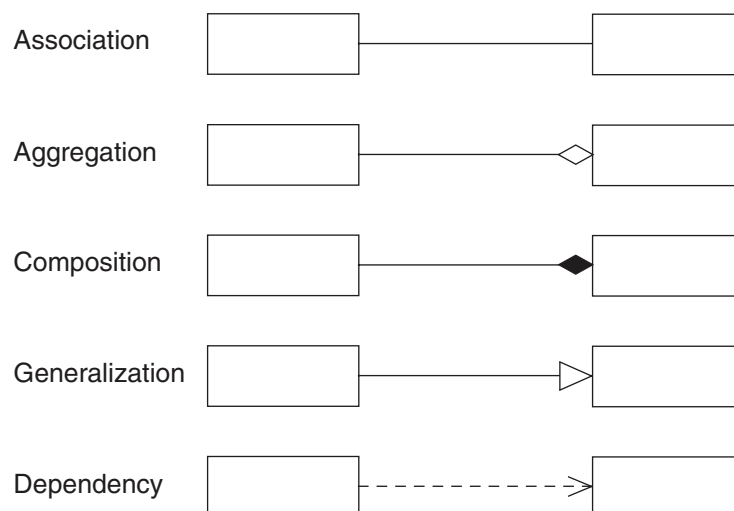


Figure 1 — UML notation

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 superclass 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 represents how role names and cardinalities are expressed in UML diagrams.

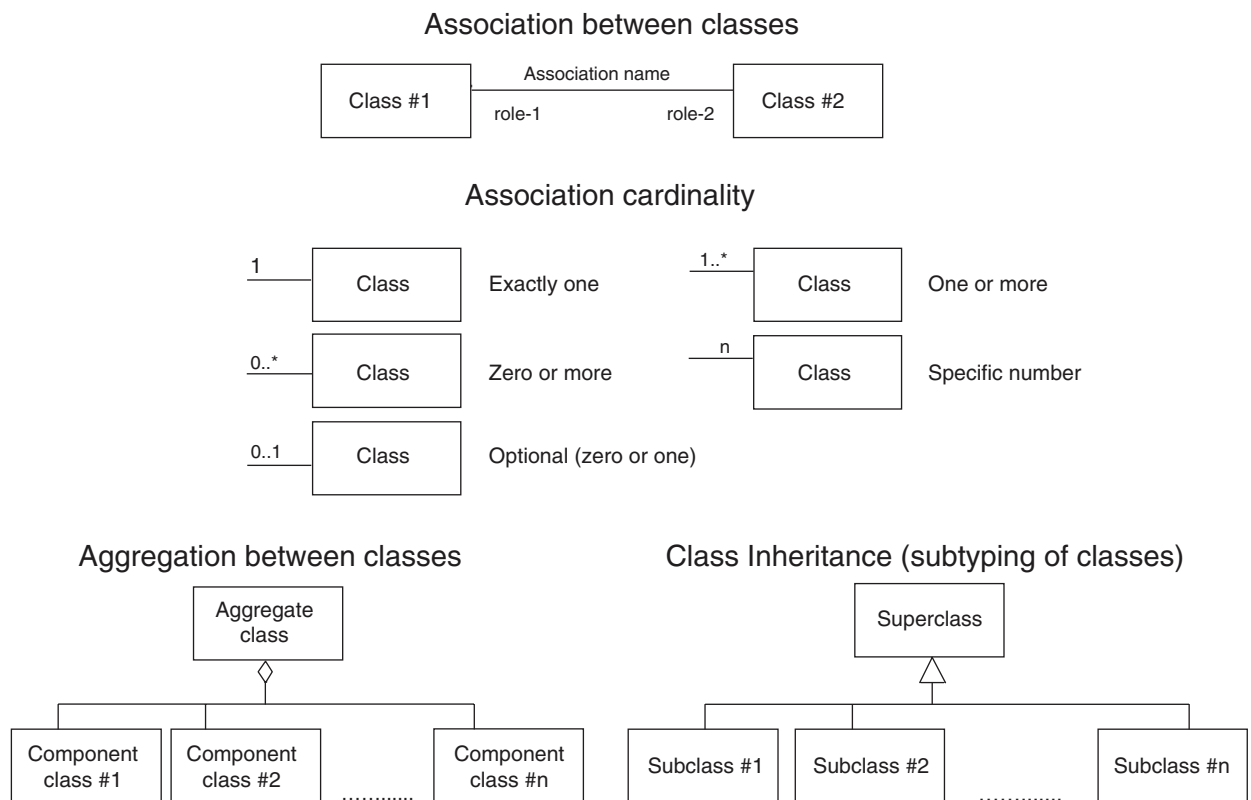


Figure 2 — UML roles

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/TS 19103.

In this International Standard the following stereotypes are used:

- a) <<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.
- b) <<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.
- c) <<DataType>> a descriptor of a set of values that lack identity and whose operations do not have side effects. Datatypes include primitive pre-defined types and user-definable types. Pre-defined types include numbers, string, and time. User-definable types include enumerations.
- 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 metamodels. 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).

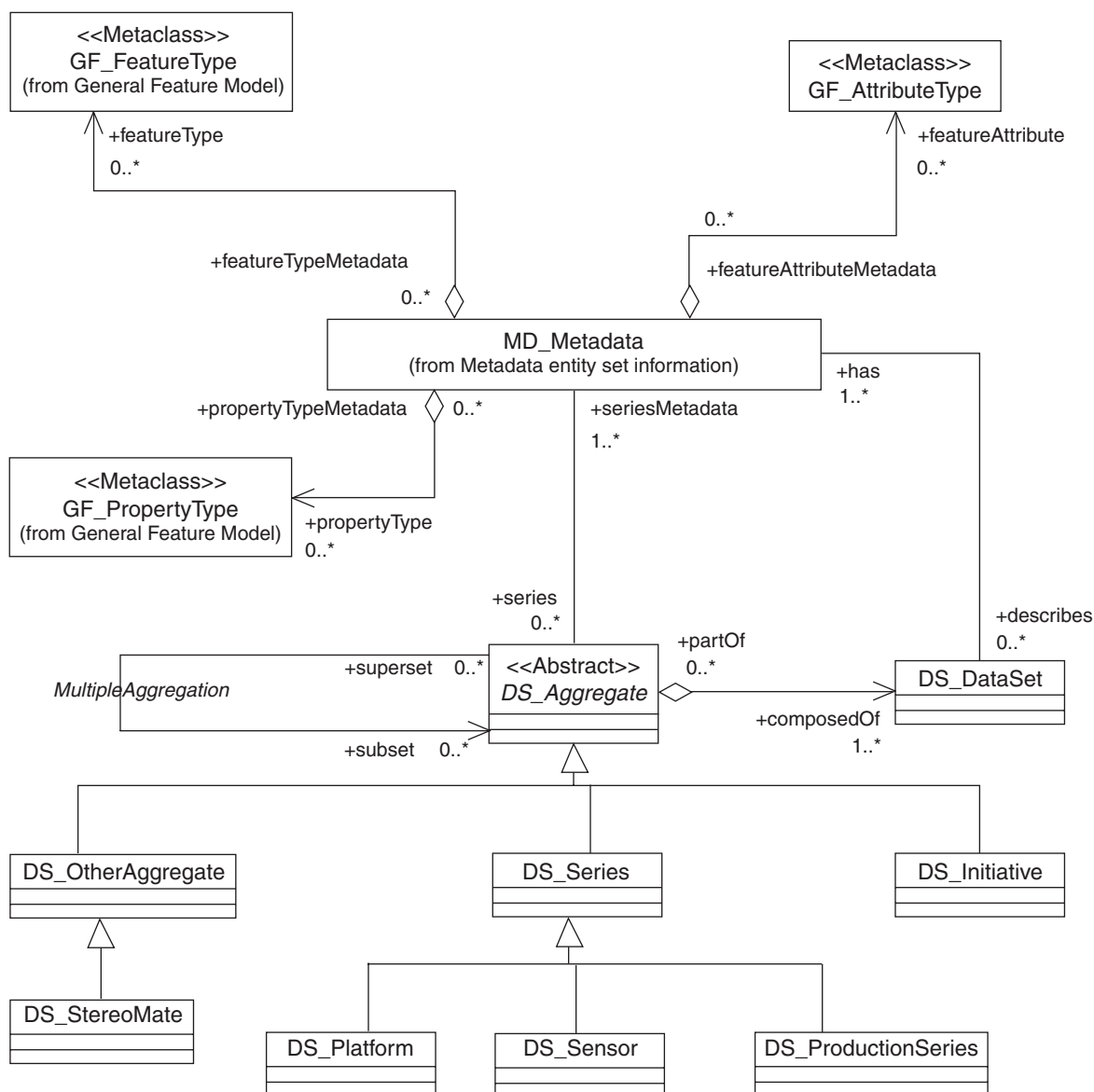


Figure 3 — Metadata application

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.

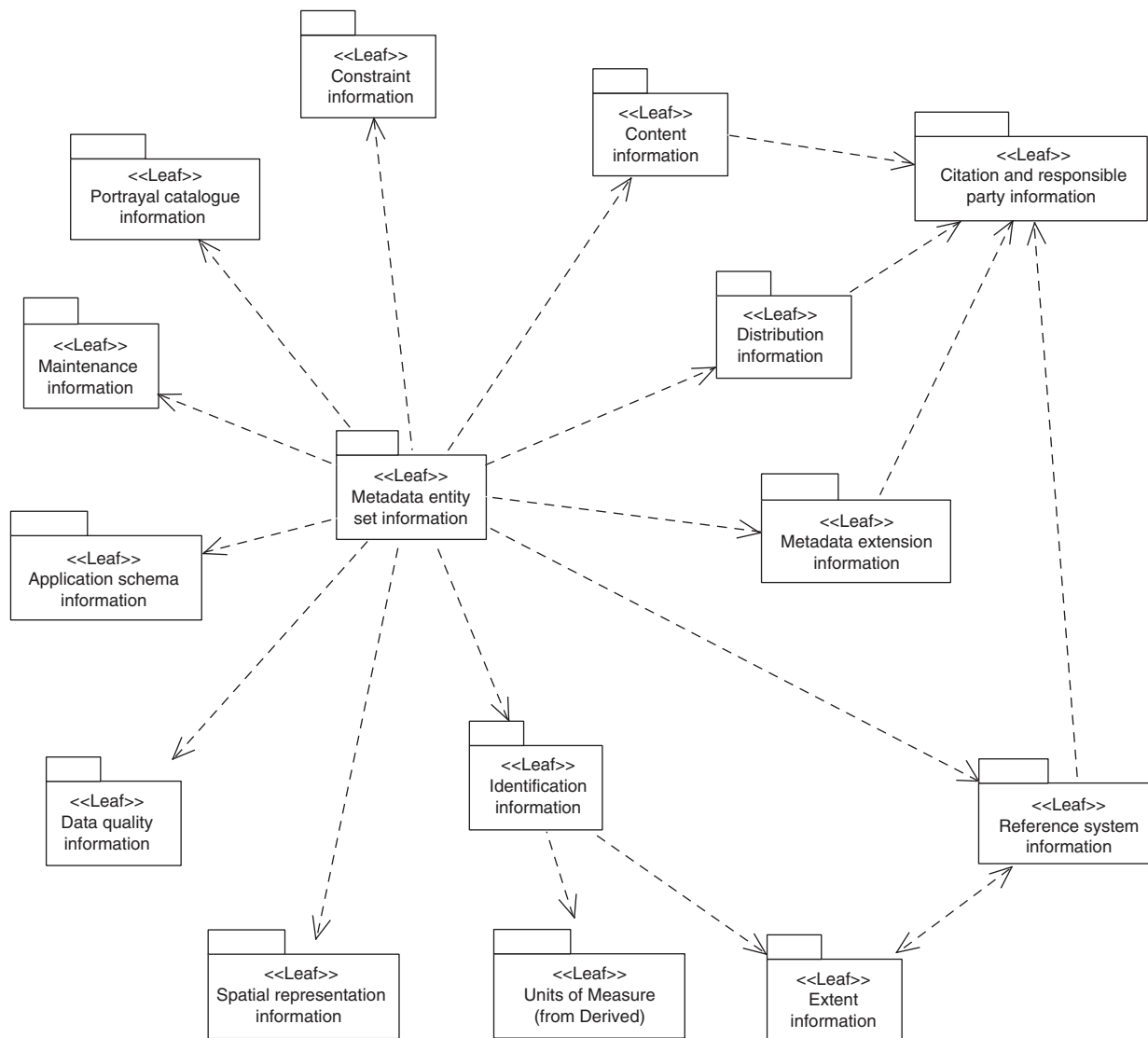


Figure 4 — Metadata packages

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 Number column.

Table 2 — Relationship between packages of metadata and metadata entities

Subclause Number	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.2.4.1 A.2.4.2 A.2.4.3	B.2.4.1 B.2.4.2 B.2.4.3
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
- MD_AggregateInformation, information about datasets that are aggregate parts of the dataset that the metadata describes

The extent element of MD_DataIdentification is conditional; either the EX_GeographicBoundingBox or the EX_GeographicDescription subclass of extent's geographicElement Role shall be included if the dataset is spatially referenced. If necessary both may be used.

The characterSet element of MD_DataIdentification is conditional; it is documented if ISO/IEC 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_RestrictionCode 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.

Either the "report" or "lineage" roles of DQ_DataQuality must be present 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.

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 has 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 contains mandatory and optional elements. MD_DigitalTransferOptions contains the medium used for the distribution (MD_Medium) of a dataset, and is an aggregate of

MD_Distributor. MD_Distributor's other aggregate is 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. The entity contains 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 (see Table 3) 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

Dataset title (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.title)	Spatial representation type (O) (MD_Metadata > MD_DataIdentification.spatialRepresentationType)
Dataset reference date (M) (MD_Metadata > MD_DataIdentification.citation > CI_Citation.date)	Reference system (O) (MD_Metadata > MD_ReferenceSystem)
Dataset responsible party (O) (MD_Metadata > MD_DataIdentification.pointOfContact > CI_ResponsibleParty)	Lineage (O) (MD_Metadata > DQ_DataQuality.lineage > LI_Lineage)
Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription)	On-line resource (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource)
Dataset language (M) (MD_Metadata > MD_DataIdentification.language)	Metadata file identifier (O) (MD_Metadata.fileIdentifier)
Dataset character set (C) (MD_Metadata > MD_DataIdentification.characterSet)	Metadata standard name (O) (MD_Metadata.metadataStandardName)
Dataset topic category (M) (MD_Metadata > MD_DataIdentification.topicCategory)	Metadata standard version (O) (MD_Metadata.metadataStandardVersion)
Spatial resolution of the dataset (O) (MD_Metadata > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	Metadata language (C) (MD_Metadata.language)
Abstract describing the dataset (M) (MD_Metadata > MD_DataIdentification.abstract)	Metadata character set (C) (MD_Metadata.characterSet)
Distribution format (O) (MD_Metadata > MD_Distribution > MD_Format.name and MD_Format.version)	Metadata point of contact (M) (MD_Metadata.contact > CI_ResponsibleParty)
Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_TemporalExtent or EX_VerticalExtent)	Metadata date stamp (M) (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/IEC 11179-6. ISO/IEC 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.

6.11 Metadata extension methodology

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

6.12 Metadata implementation

Annex G 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.

6.13 Hierarchical levels of metadata

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

6.14 Implementation examples

Annex I provides an example of the use of this International Standard, utilizing the core components of the comprehensive profile, for a geographic dataset. An example of extended metadata elements, as may be developed by a specific information community, is provided (I.3).

6.15 Multilingual support for free text fields

Annex J 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.

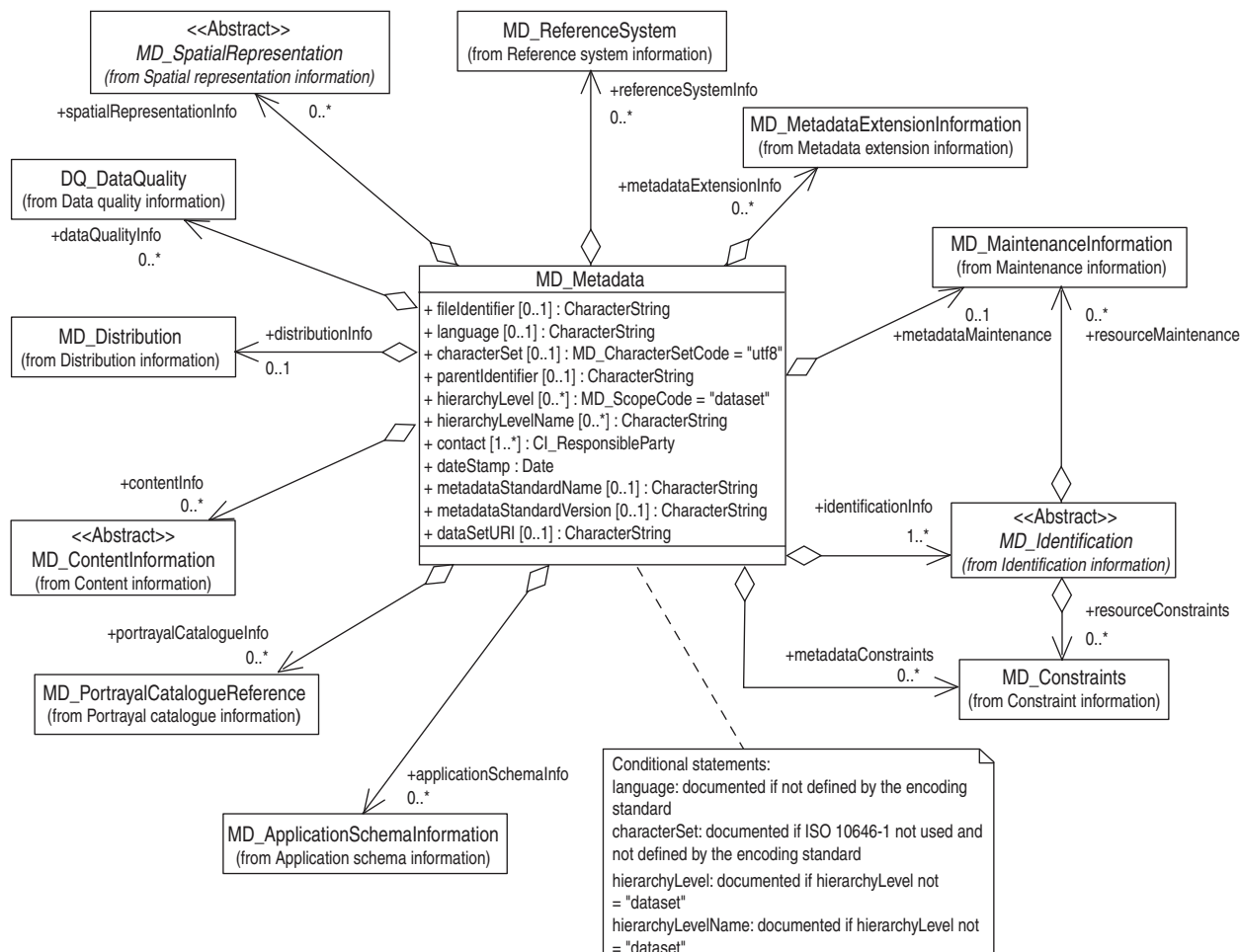


Figure A.1 — Metadata entity set information

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.

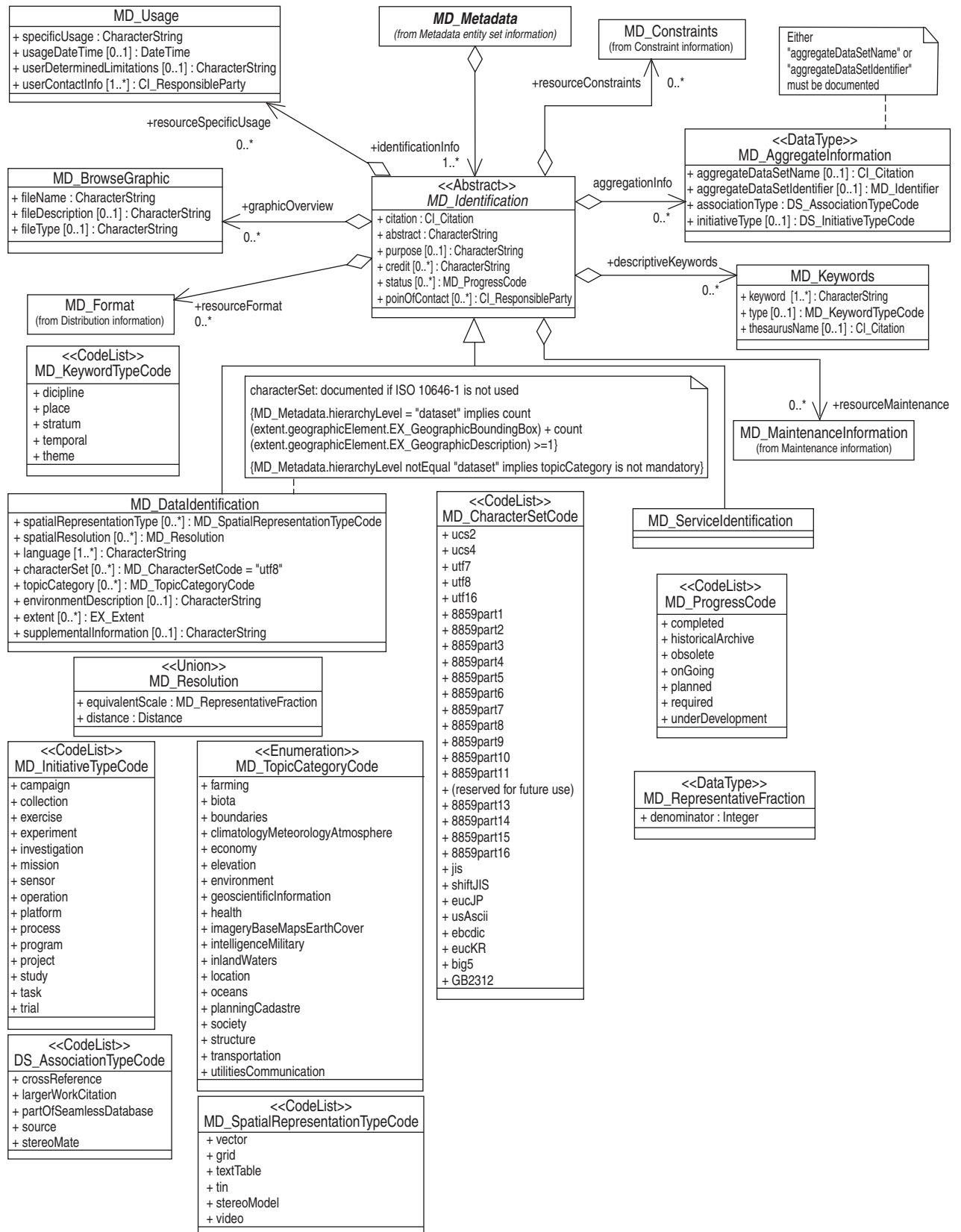


Figure A.2 — Identification information

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.

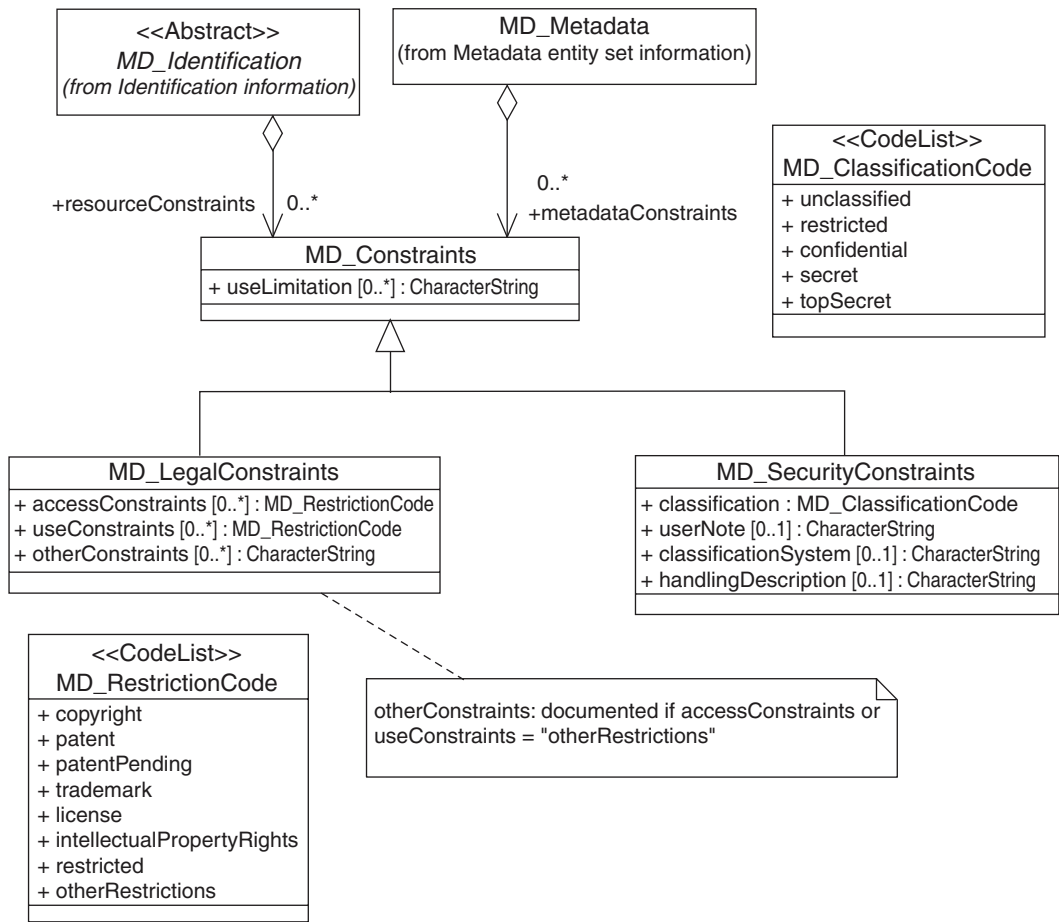


Figure A.3 — Constraint information

A.2.4 Data quality information

A.2.4.1 General

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.

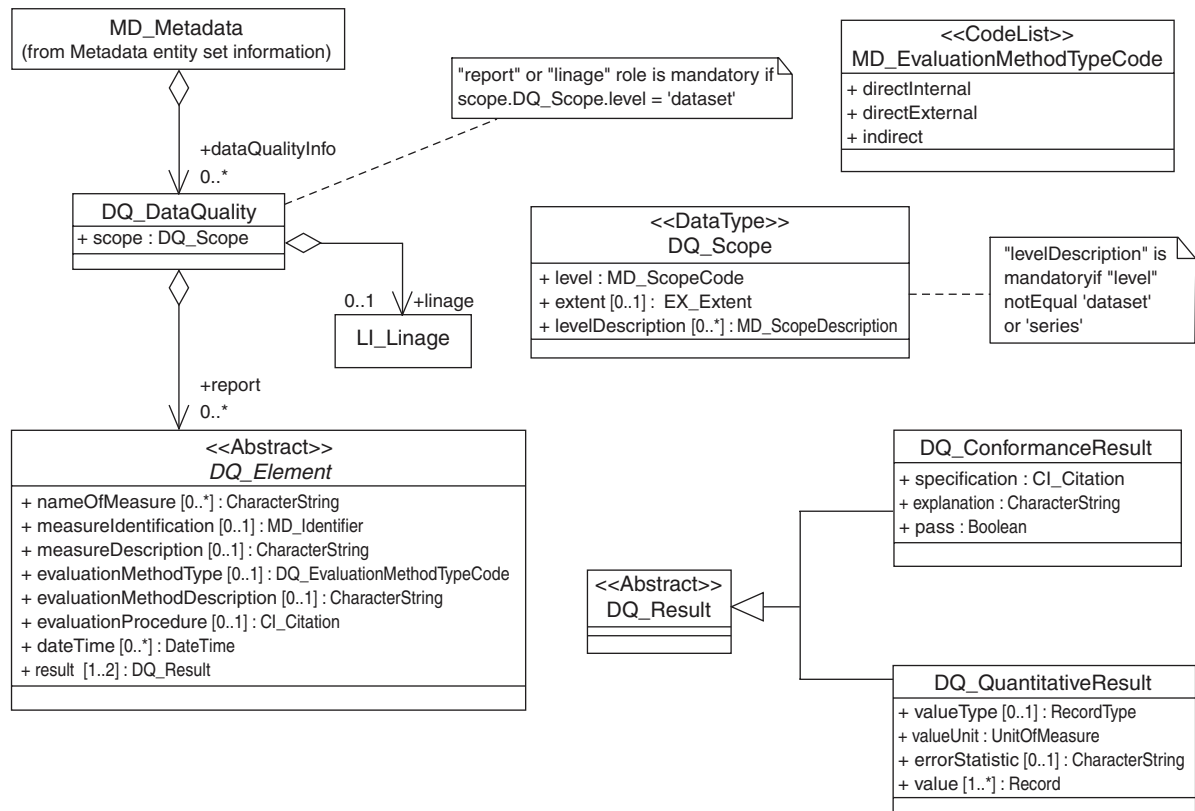


Figure A.4 — Data quality information

A.2.4.2 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.2.4.2.

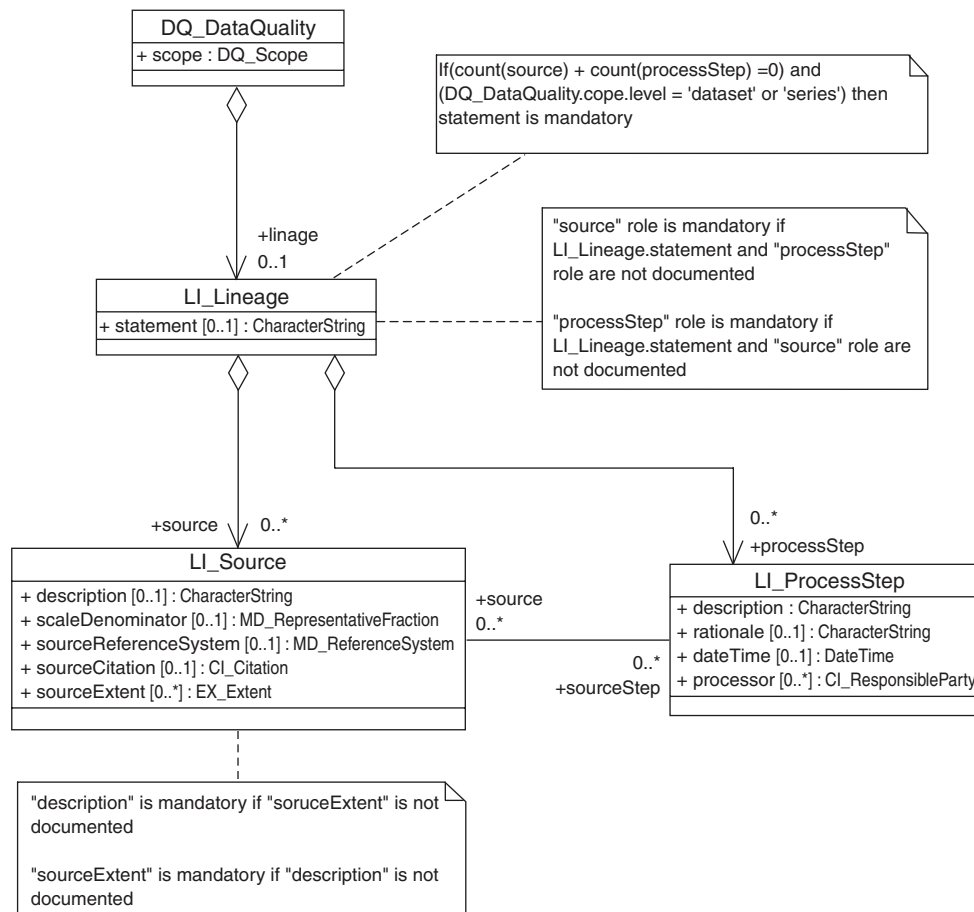


Figure A.5 — Lineage information

A.2.4.3 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.2.4.3.

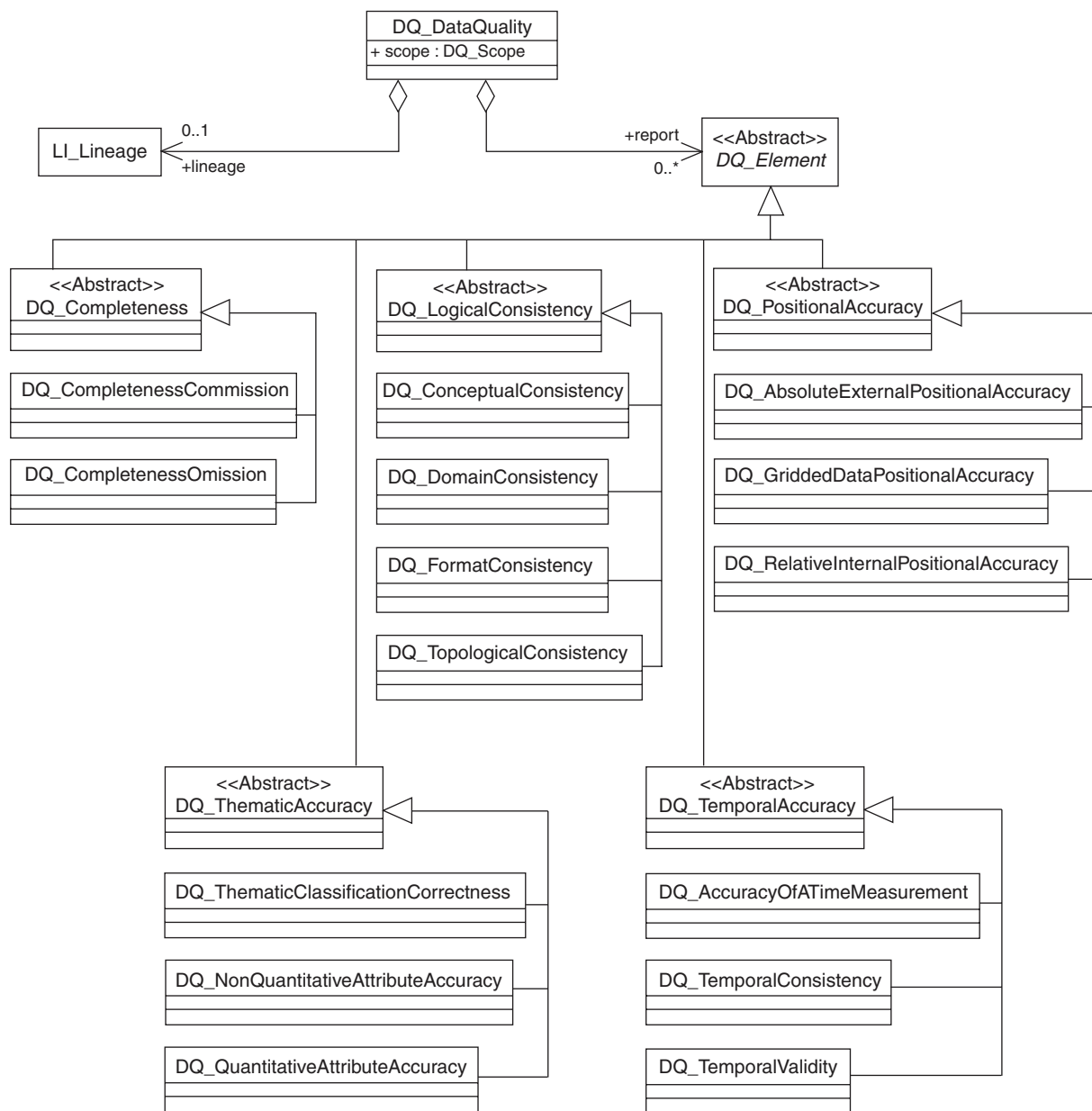


Figure A.6 — Data quality classes and subclasses

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.

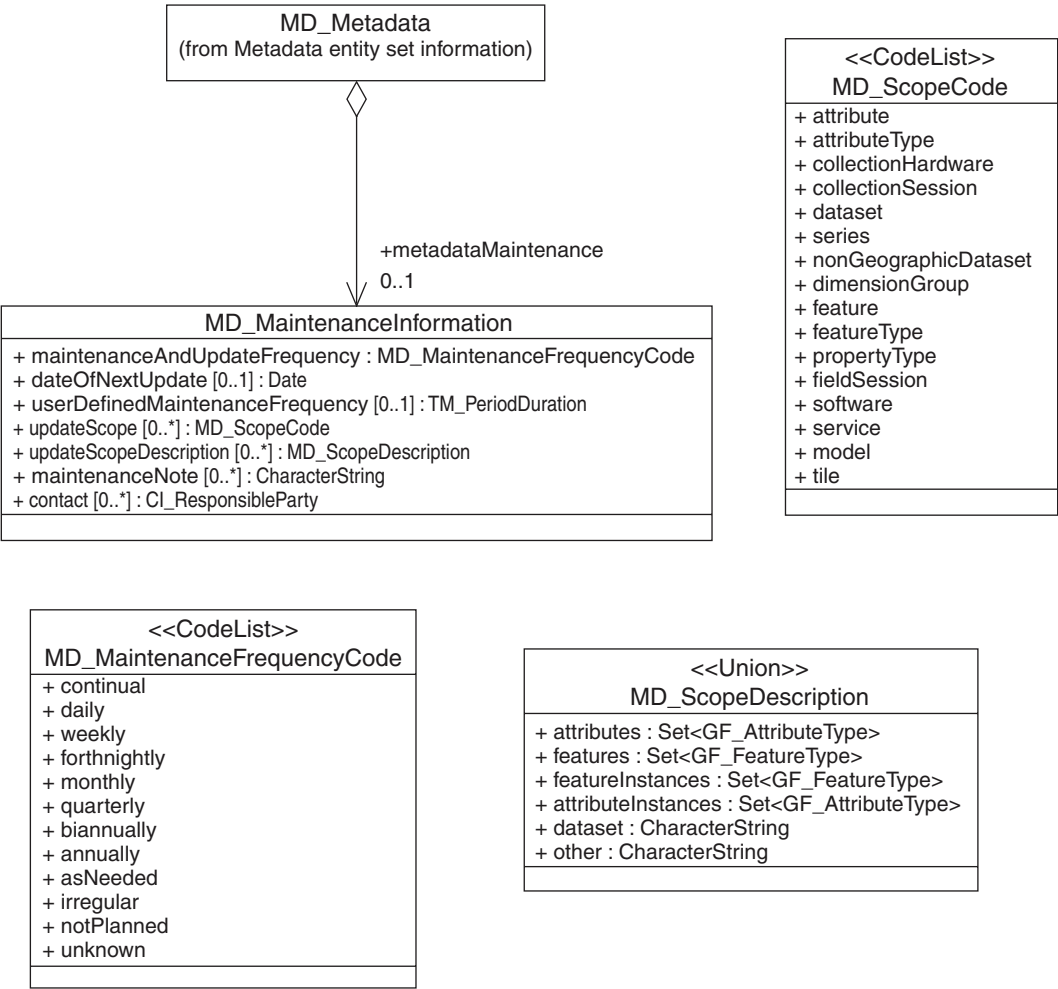


Figure A.7 — Maintenance information

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.

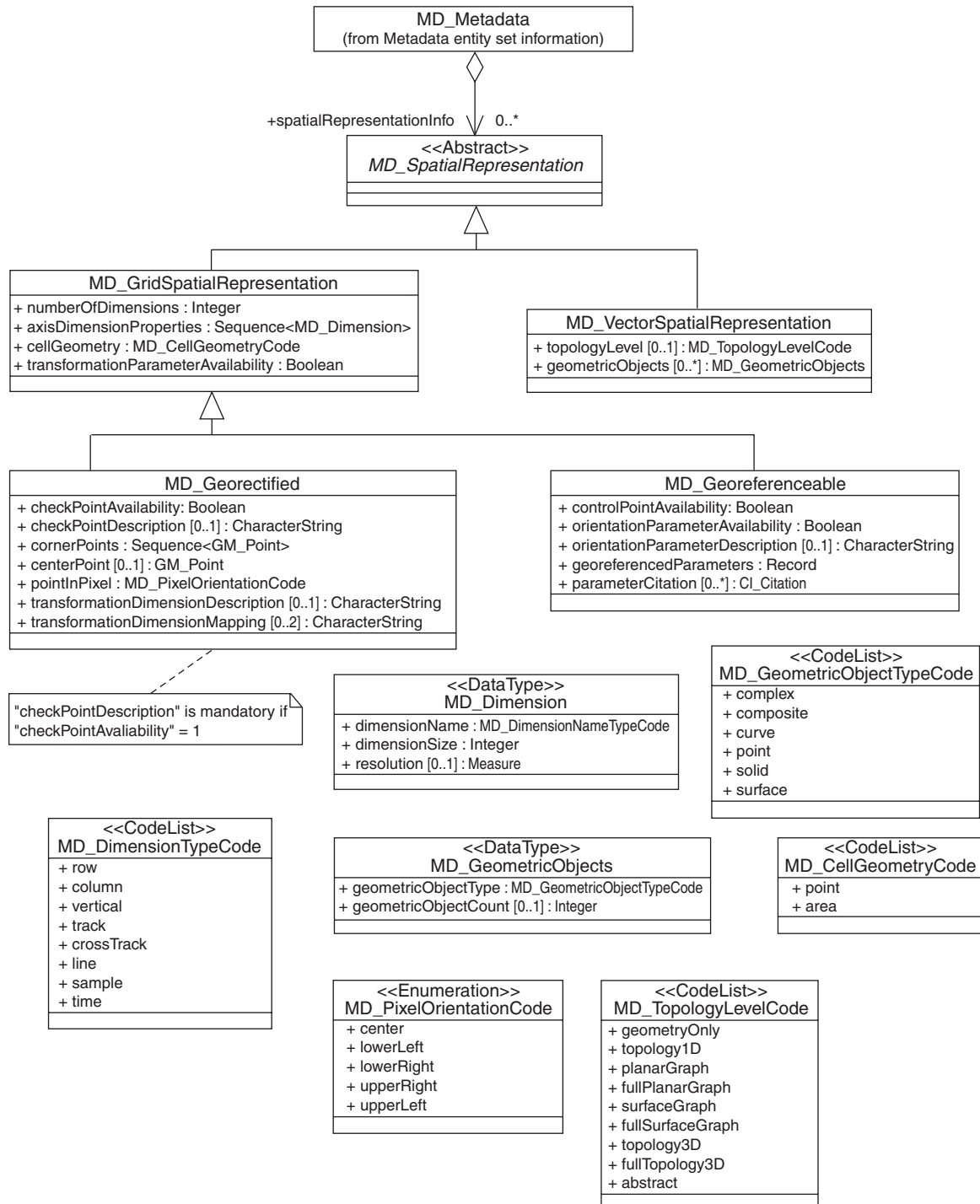


Figure A.8 — Spatial representation information

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.

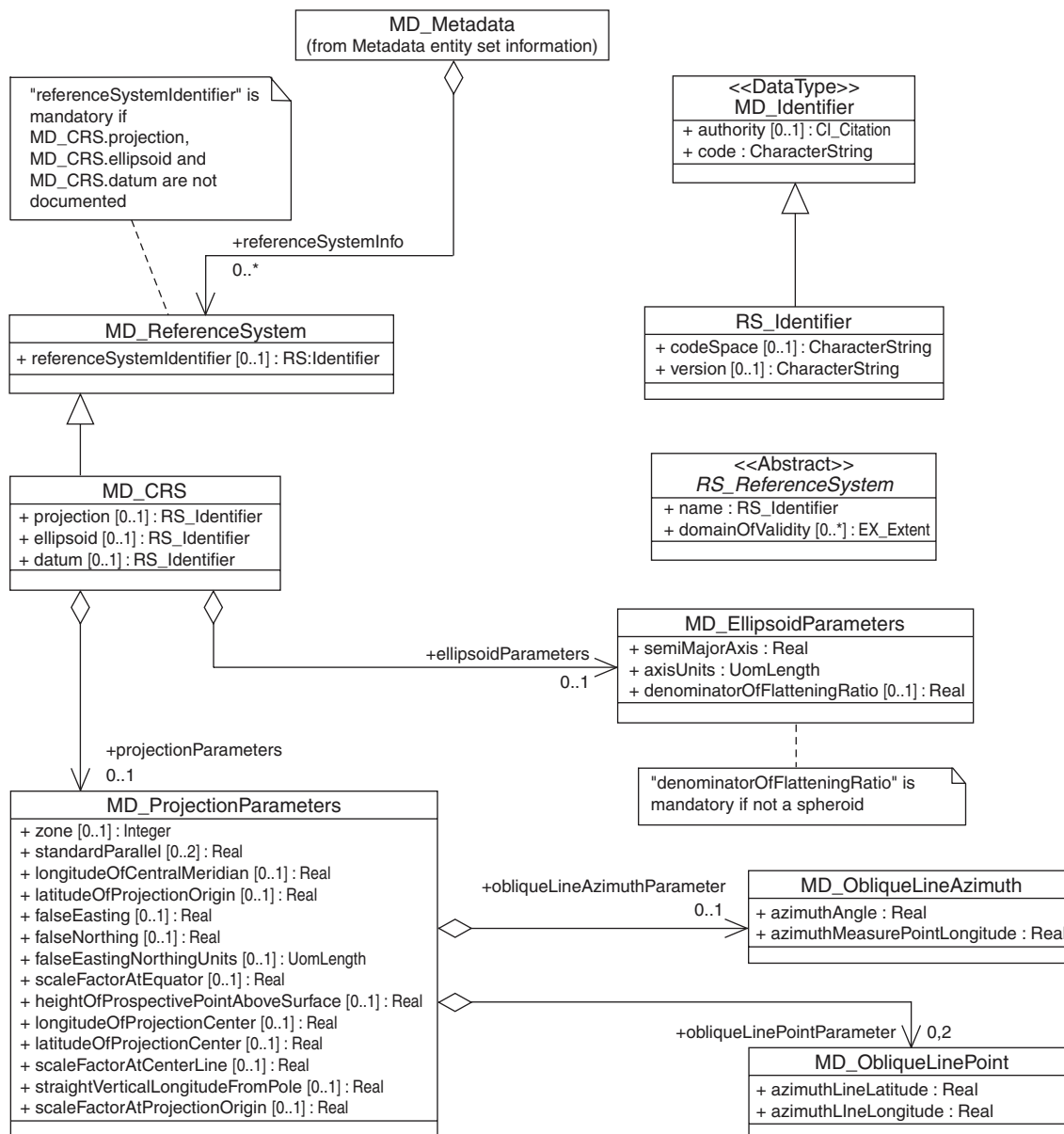


Figure A.9 — Reference system information

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.

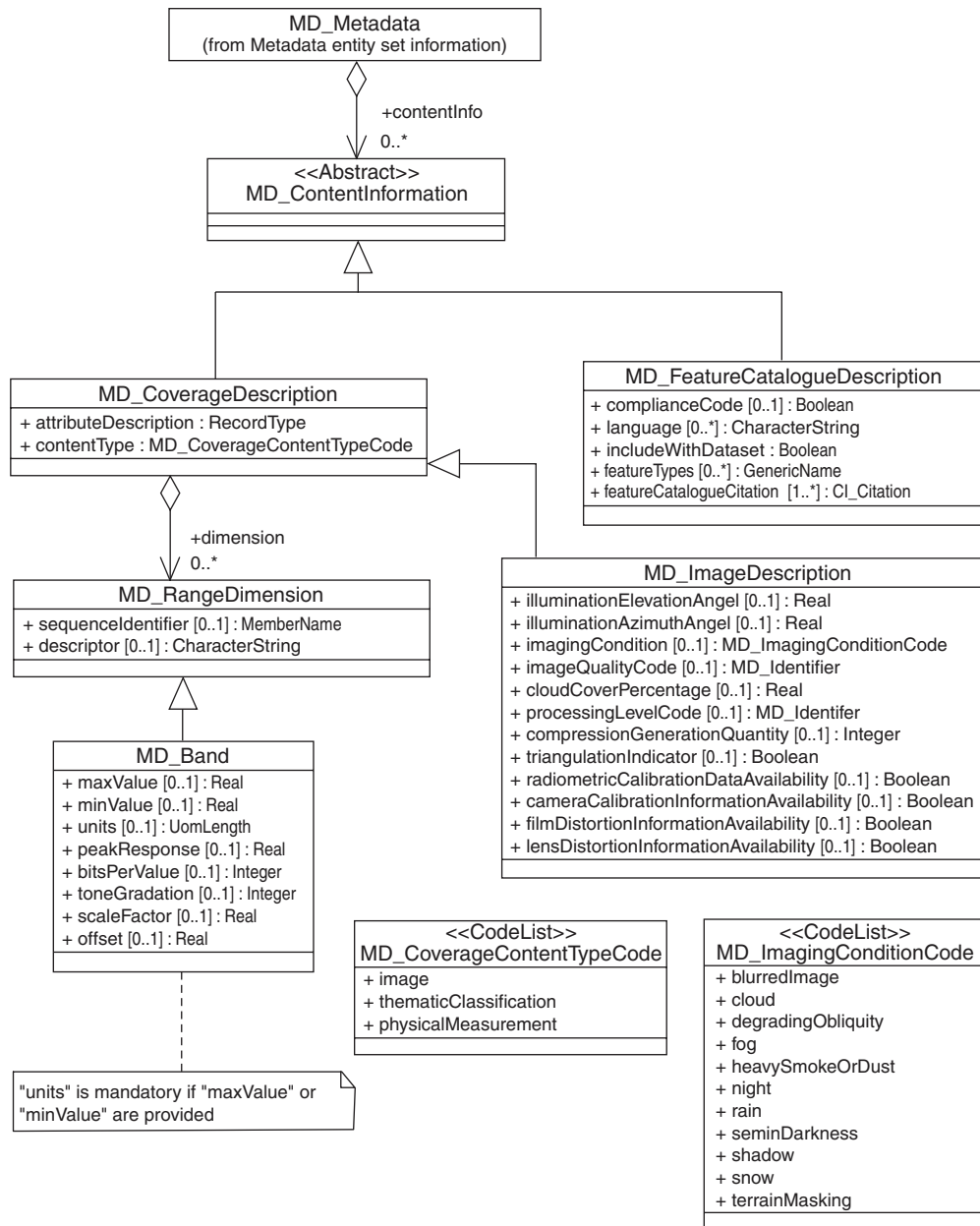


Figure A.10 — Content information

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.

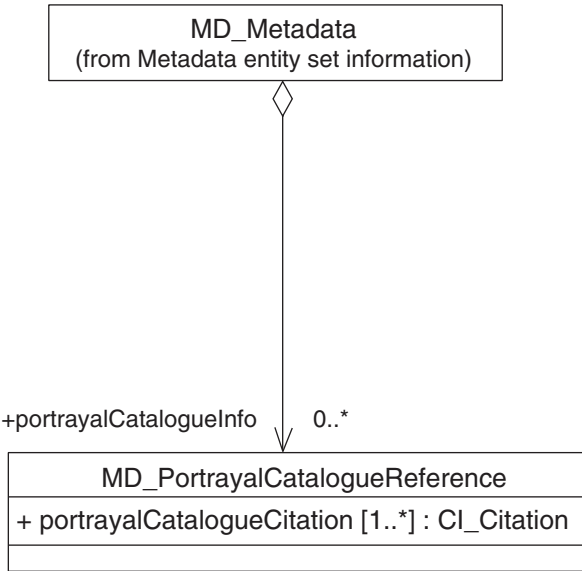


Figure A.11 — Portrayal catalogue information

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.

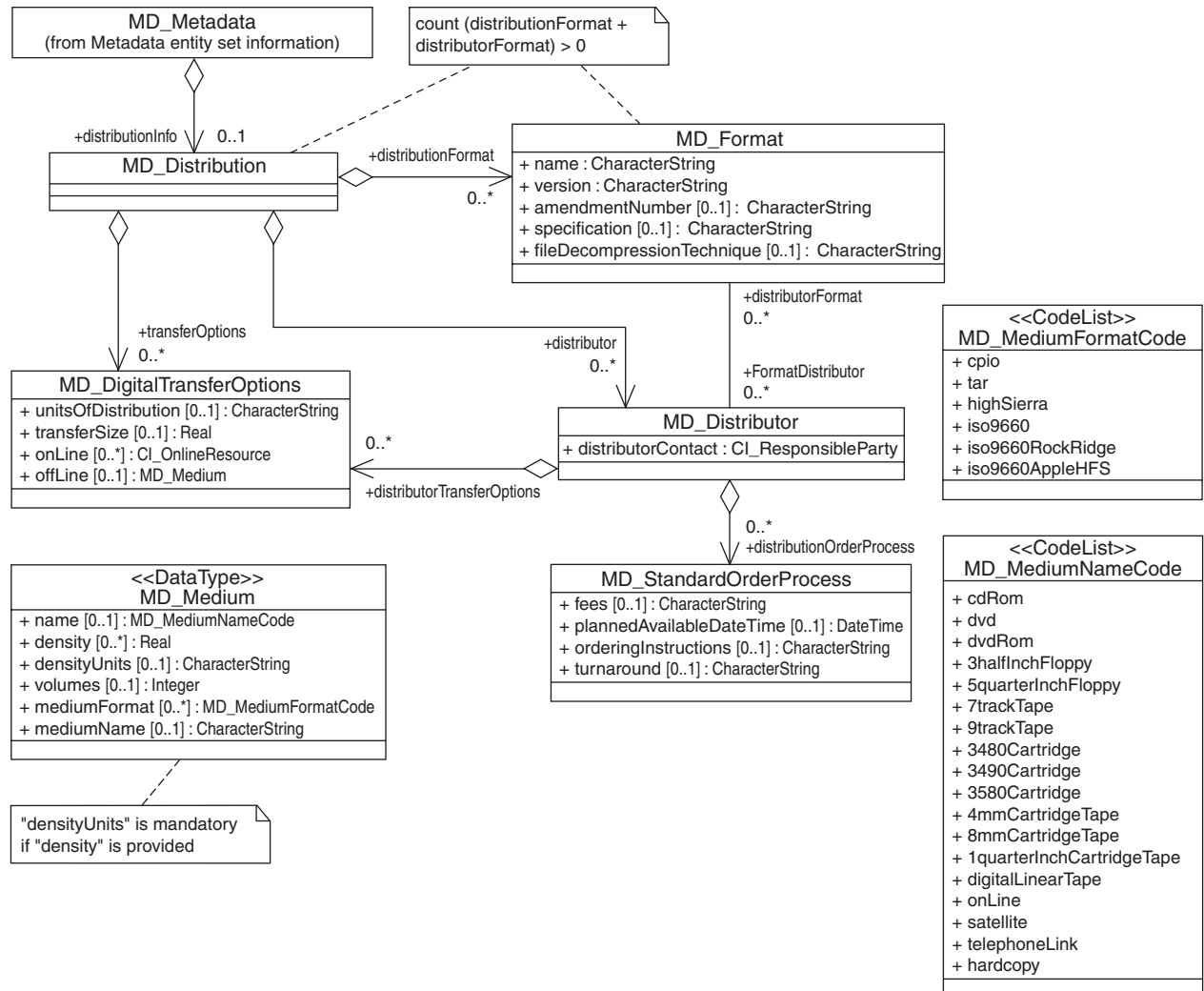


Figure A.12 — Distribution information

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.

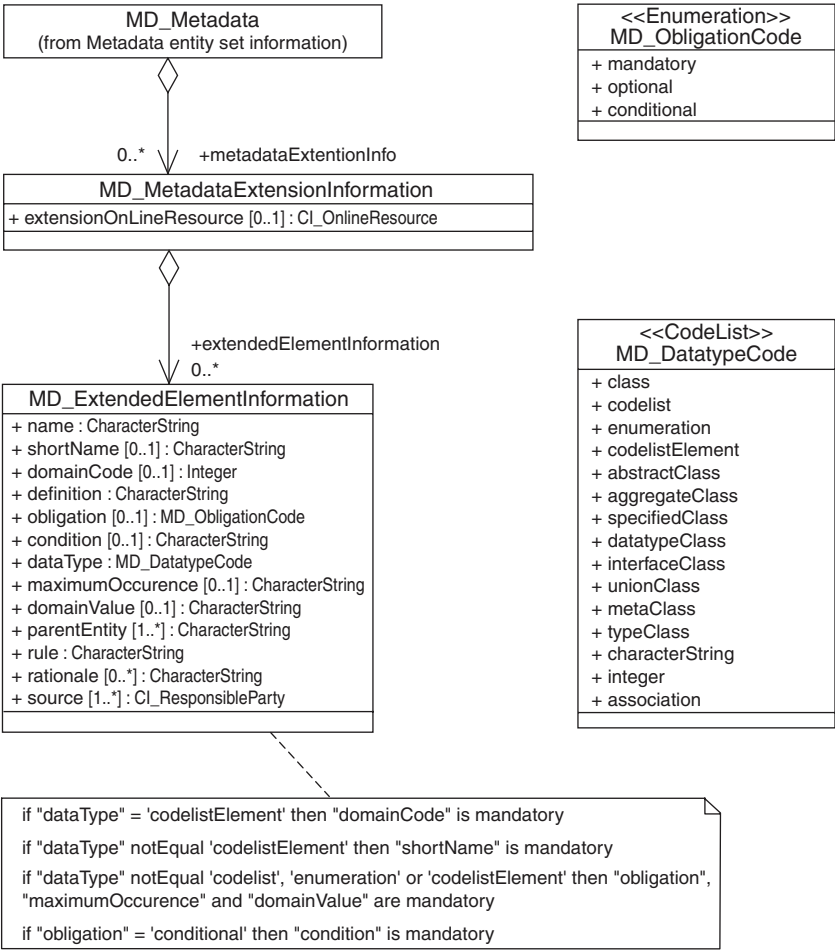


Figure A.13 — Metadata extension information

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.

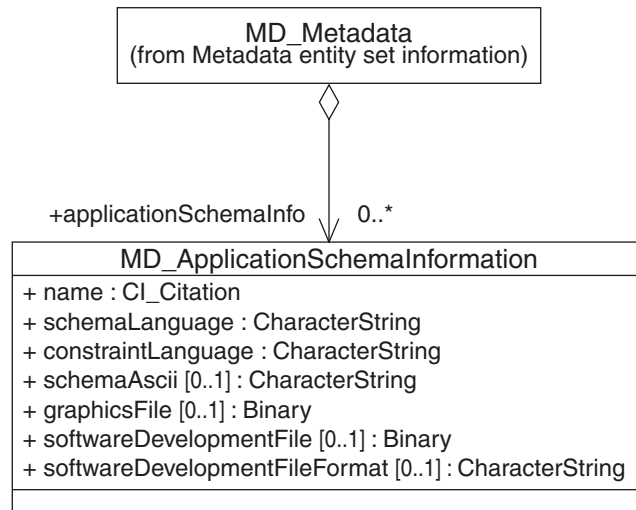


Figure A.14 — Application schema information

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.

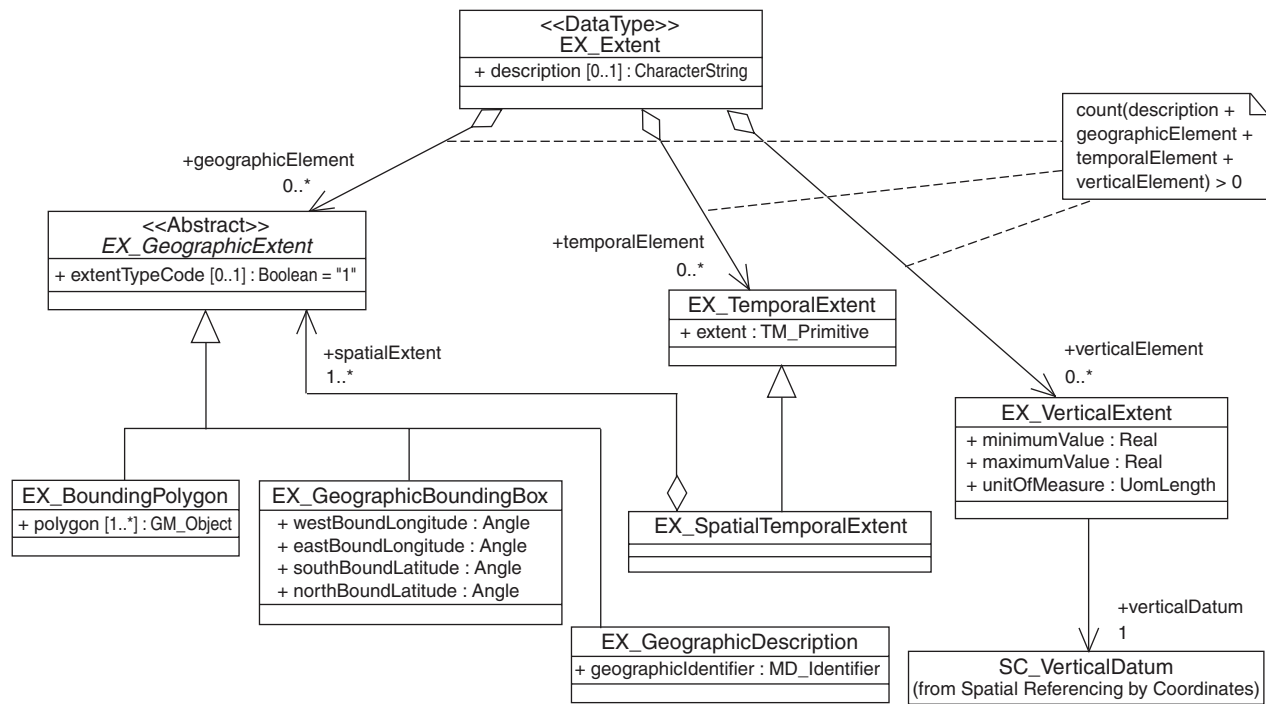


Figure A.15 — Extent information

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.

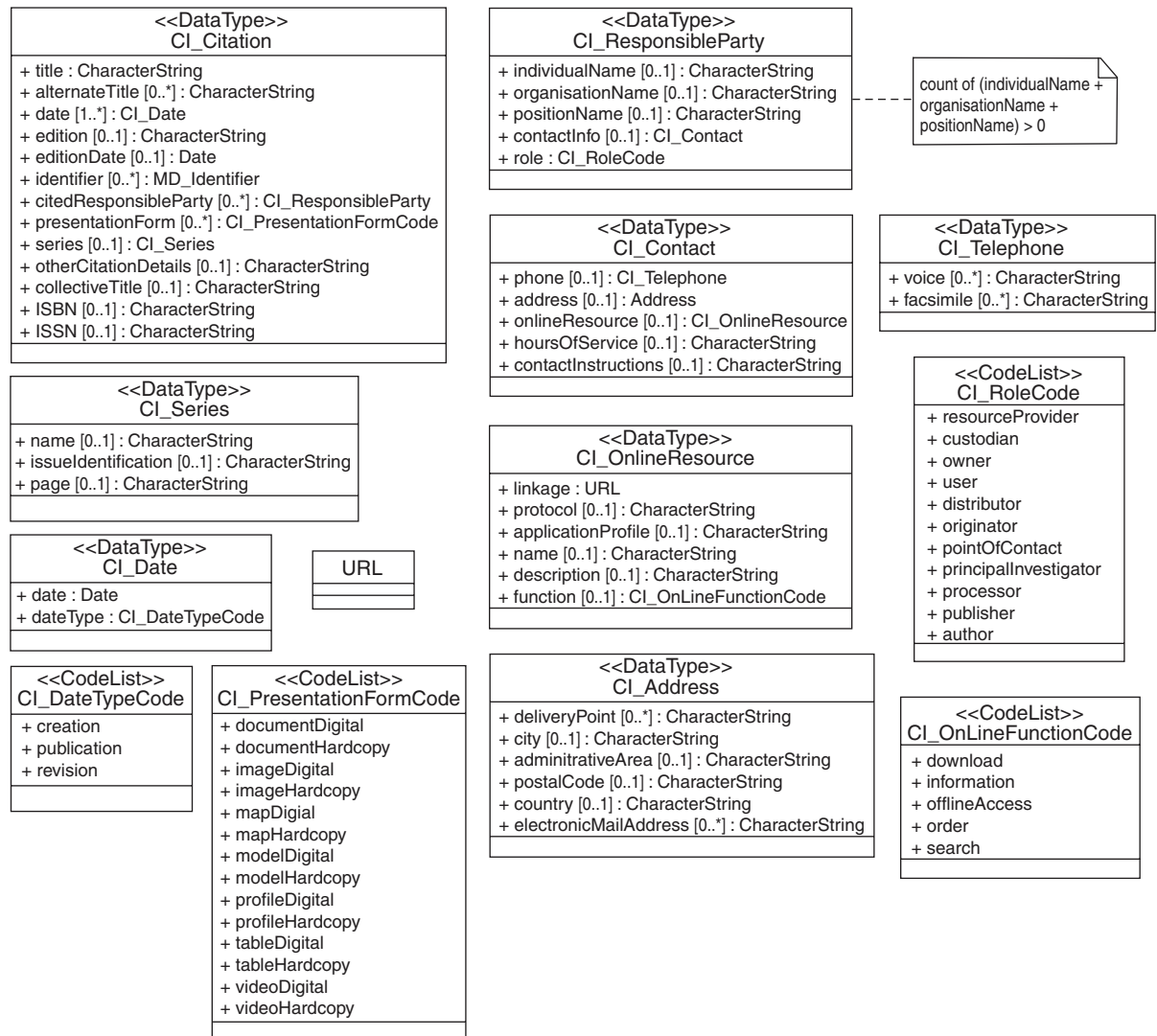


Figure A.16 — Citation and responsible party information

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 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 subword 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.