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Geographic information — Metadata —

Part 1: Fundamentals

Information géographique — Métadonnées —

Partie 1: Principes de base

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics.*

This first edition of ISO 19115-1 cancels and replaces ISO 19115:2003, which has been technically revised. It also incorporates the Technical Corrigendum ISO 19115:2003/Cor 1:2006.

ISO 19115 consists of the following parts, under the general title *Geographic information — Metadata*:

— *Part 1: Fundamentals*

— *Part 2: Extensions for imagery and gridded data*

— *Part 3: XML schema implementation of metadata fundamentals* [Technical Specification][1)]

1) To be published.

Introduction

Recent advancement of computer software and hardware for managing and analysing data, particularly fusing with geographically referenced observations, has resulted in a vast increase in the use of digital information solutions worldwide. The resulting awareness of the importance of geography and how things relate spatially is impacting almost all aspects of society. Increasingly, individuals from a wide range of disciplines outside of geographic information science and information technology are producing, enhancing, and modifying digital geographic information. As the number, complexity, and diversity of geographic information resources grow, a method for providing an understanding of all aspects of these resources increases in importance.

A digital geographic dataset is a representation of some model of the world for use in computer analysis and graphic display of information. The underlying model is an abstraction, requiring approximation, simplification, and omission of some aspects, and is always just one of many possible "views". To ensure that data are not misused, the assumptions and limitations affecting the creation of data must be fully documented. Typically, data are used by many people other than the producer. Metadata allows a producer to describe resources so that users can understand the assumptions and limitations and evaluate the resources' applicability for their intended use. Proper documentation will provide those unfamiliar with the data with a better understanding, and enable them to use it properly. Good quality documentation will also provide data producers with a keener knowledge of their holdings and will allow them to better manage data production, storage, updating, and reuse.

A geographic dataset is typically thought of as structured, tabular data with a location associated with each row in a table or pixel in a grid. For the purposes of the evolving web-based information cloud, the concept of dataset can be usefully extended to include any packaged information product that is intended to be treated as a unit, defined by its scope, authorship, and intended purpose. In this broader view, any document containing geographically located observations or interpretations can be considered a geographic dataset, whether it is structured or unstructured.

The evolving distributed information system enabled by the Internet is fostering the development of service-oriented architectures in which web services are becoming important as sources of information or processing capability, and many of these services provide location-based information or functionality. Description of these services for discovery and utilization has become an important function of metadata.

A significant body of information with geographic reference is contained in resources that are not in digital form. These resources include maps and documents of various sorts, as well as specimens or other artefacts collected to characterize some aspect of the Earth — physical, biological, or cultural. The metadata schema presented in this part of ISO 19115 is also applicable to such resources.

The objective of this part of ISO 19115 is to provide a model for describing information or resources that can have geographic extents. This part of ISO 19115 is intended to be used by information system analysts, program planners, and developers of information systems, as well as others in order to define basic principles and requirements for standardized description of information resources. This part of ISO 19115 defines metadata elements, their properties, and the relationships between elements, and establishes a common set of metadata terminology, definitions, and extension procedures.

Although the primary purpose of this part of ISO 19115 is to describe digital information that has a geographic extent, it can be used to describe all types of resources including textual documents, initiatives, software, non-geographic information, product specifications and repositories, i.e. it can be used to describe information resources that do not have geographic extent. Some domains have their own metadata standards, such as the Dublin Core for libraries. If necessary such standards and this part of ISO 19115 could be profiled to create a Community Schema.

When implemented by a resource provider, this part of ISO 19115 will:

1) Enable information resource providers to effectively and completely characterize their resources.

2) Facilitate the organisation and management of metadata for information resources.

3) Enable appropriate use of information resources through accurate understanding of their characteristics.

4) Facilitate resource discovery, access, retrieval and reuse.

5) Enable users to determine whether an information resource will be of use to them.

This part of ISO 19115 defines general-purpose metadata. More detailed models for some aspects of resource description, including quality, data-structure or imagery, are defined in other ISO geographic information standards. The metadata model described herein enables implementation of domain-specific user extensions based on a common pattern to facilitate implementation of software using those extensions.

This part of ISO 19115 is a revision of ISO 19115:2003 and ISO 19115:2003/Cor 1:2006. This revision was driven by advances in Information Technology and a shift toward the use of the Internet for access, use and management of metadata as well as revisions to reference documents and individual user provided suggestions based on eight years of experience in its use.

This part of ISO 19115 is fully independent from the previous version with a new name and date. Its UML packages, classes, and elements have different identifiers from the previous version. The UML from ISO 19115:2003/Cor 1:2006 will remain available in the ISO/TC 211 Harmonized Model Management Group repository. Backward compatibility is to be provided using a transformation service. Past metadata instances can continue to reference/use the previous version.

The purpose of metadata is to describe resources. This description may remain with the data and does not change. It can be used both to interpret the data and to search for (discover) the data. Large amounts of older data exists compliant with ISO 19115:2003, and newer data exists (which is still being produced) to national or regional profiles of ISO 19115:2003. This data will remain as it is currently defined. New data production to new product specifications will build upon the revision of ISO 19115 making use of the expanded descriptive capabilities. With the introduction of this revision of ISO 19115, a mixed data environment exists. Systems that support data discovery in compliance with the revision of ISO 19115 need to also be able to also recognize and interpret metadata in the ISO 19115:2003 form so that all data in a mixed environment can be discovered. Systems that support data interpretation in compliance with the revision of ISO 19115 need to also be able to also recognize and interpret metadata in the ISO 19115:2003 form so that all data is interpreted. The use of separate identifiers for the revised elements and the manner in which the metadata standard has been revised facilitates this.

To aid in ensuring backward compatibility and ease the transformation of metadata instances to this revised version of ISO 19115:

— No new mandatory elements were created;

— If the definition of a metadata element required changing it was deleted and replaced by a new metadata element; metadata element names were not reused for other concepts;

— Definitions of some metadata elements were broadened;

— Metadata elements were reused when their datatype changed but name and definition remained the same;

— Remaining attributes were kept in the same order as in the replaced standard;

— A list of deleted elements, new elements, and a mapping between old elements and their replacement is provided in Annex G;

— Restructuring of the UML was kept to a minimum.

Summary of major changes:

— The concept of “Core metadata” was removed;

— Metadata for services was added, derived from ISO 19119:2005 and ISO 19119:2005/Amd 1:2008;

— Data quality was moved to ISO 19157;

— Annex F was added to describe metadata for the discovery of service and non-service resources;

— Many codelists were extended;

— The use of “Short name” and “Domain code” was dropped for metadata elements and codes respectively.

A full description of changes is provided in Annex G.

Geographic information — Metadata —

Part 1: Fundamentals

1 Scope

This part of ISO 19115 defines the schema required for describing geographic information and services by means of metadata. It provides information about the identification, the extent, the quality, the spatial and temporal aspects, the content, the spatial reference, the portrayal, distribution, and other properties of digital geographic data and services.

This part of ISO 19115 is applicable to:

— the cataloguing of all types of resources, clearinghouse activities, and the full description of datasets and services;

— geographic services, geographic datasets, dataset series, and individual geographic features and feature properties.

This part of ISO 19115 defines:

— mandatory and conditional metadata sections, metadata entities, and metadata elements;

— the minimum set of metadata required to serve most metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data and services);

— optional metadata elements to allow for a more extensive standard description of resources, if required;

— a method for extending metadata to fit specialized needs.

Though this part of ISO 19115 is applicable to digital data and services, its principles can be extended to many other types of resources such as maps, charts, and textual documents as well as non-geographic data. Certain conditional metadata elements might not apply to these other forms of data.

2 Conformance

2.1 Conformance requirements

Any metadata claiming conformance with this part of ISO 19115 shall pass the requirements described in the abstract test suite presented in Annex A.

Metadata shall be provided as specified in Clause 6 and Annex B.

If a discrepancy exists between the UML models provided in Clause 6 and Annex B, the UML models shall be considered authoritative.

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

Any profile conforming to this part of ISO 19115 shall conform to the rules in C.6.

This part of ISO 19115 defines metadata used to describe data. Datasets defined in accordance with this part of ISO 19115 may coexist with other datasets that conform to earlier versions of this International Standard. Domain specific or regional profiles of this part of ISO 19115 are responsible for establishing

the details of backward compatibility in their domains. Conformance clauses for services that operate using metadata defined in accordance with this part of ISO 19115 or profiles developed based on this part of ISO 19115 need to be defined in those profiles or service specifications in order to permit backward compatibility in their domain.

2.2 Abstract test suite

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

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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), *Codes for the representation of names of languages*

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

ISO 4217:2008, *Codes for the representation of currencies and funds*

ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/TS 19103:2005, *Geographic information — Conceptual schema language*

ISO 19106:2004, *Geographic information — Profiles*

ISO 19107:2003, *Geographic information — Spatial schema*

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

ISO 19109:2005, *Geographic information — Rules for application schema*

ISO 19110:2005, *Geographic information — Methodology for feature cataloguing*

ISO 19111:2007, *Geographic information — Spatial referencing by coordinates*

ISO 19111-2:2009, *Geographic information — Spatial referencing by coordinates — Part 2: Extension for parametric values*

ISO 19112:2003, *Geographic information — Spatial referencing by geographic identifiers*

ISO 19119, *Geographic information — Services*

ISO 19157:2013, *Geographic information — Data Quality*

IETF RFC 3986:2005, *Uniform Resource Identifier (URI): Generic Syntax*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 19103:2005 and the following apply.

4.1
citation
information object containing information that directs a reader's or user's attention from one *resource* (4.17) to another

[SOURCE: ISO 24619:2011, 3.1.16]

4.2
data type
specification of a value domain with *operations* (4.15) allowed on values in this domain

[SOURCE: ISO/TS 19103:2005, 4.1.5]

EXAMPLE Integer, Real, Boolean, String, Date, and GM_Point.

Note 1 to entry: A data type is identified by a term, e.g. Integer.

4.3
dataset
identifiable collection of data

Note 1 to entry: A dataset can 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 can be as small as a single *feature* (4.5) or feature attribute contained within a larger dataset. A hardcopy map or chart can be considered a dataset.

4.4
dataset series
collection of *datasets* (4.3) sharing common characteristics

4.5
feature
abstraction of real world phenomena

[SOURCE: ISO 19101:2002, 4.11]

4.6
free text
textual information that can be expressed in one or many languages

4.7
grid
network composed of two or more sets of curves in which the members of each set intersect the members of the other sets in an algorithmic way

[SOURCE: ISO 19123:2005, 4.1.23]

4.8
interface
named set of *operations* (4.15) that characterize the behaviour of an entity

[SOURCE: ISO 19119:2005, 4.2]

4.9
lineage
provenance, (4.16) source(s) and production process(es) used in producing a *resource* (4.17)

4.10
metadata
information about a *resource* (4.17)

4.11
metadata element
discrete unit of *metadata* (4.10)

Note 1 to entry: Metadata elements are unique within a metadata class.

Note 2 to entry: Equivalent to an attribute and/or an association in UML terminology.

Note 3 to entry: Class attributes and relationships are referred to collectively as metadata elements.

4.12
metadata entity
set *of metadata elements* (4.11) describing the same aspect of data

Note 1 to entry: Can contain one or more metadata entities.

Note 2 to entry: Equivalent to a class in UML terminology.

4.13
metadata section
subset of *metadata* (4.10) which consists of a collection of related *metadata entities* (4.12) and *metadata elements* (4.11)

Note 1 to entry: Equivalent to a package in UML terminology.

4.14
model
abstraction of some aspects of reality

[SOURCE: ISO 19109:2005, 4.14]

4.15
operation
specification of a transformation or query that an object may be called to execute

Note 1 to entry: An operation has a name and a list of parameters.

[SOURCE: ISO 19119:2005, 4.3]

4.16
provenance
organization or individual that created, accumulated, maintained and used records

[SOURCE: ISO 5127:2001, 4.1.1.10]

4.17
resource
identifiable asset or means that fulfils a requirement

EXAMPLE *Dataset* (4.3), *datasetseries* (4.4), *service* (4.18), document, initiative, software, person or organization.

4.18
service
distinct part of the functionality that is provided by an entity through *interfaces* (4.8)

[SOURCE: ISO 19119:2005, 4.1]

5 Symbols and abbreviated terms

5.1 Abbreviated terms

OCL Object Constraint Language

OGC Open Geospatial Consortium

UML Unified Modelling Language

XML Extensible Markup Language

5.2 Abbreviated terms — Package

Two letter abbreviated terms are used to denote the package that contains a class. Those abbreviated terms precede class names, connected by a "_".The International Standard in which those classes are located is indicated in parentheses. A list of those abbreviated terms follows.

CI Citation (ISO 19115-1)

DQ Data Quality (ISO 19157)

DS Dataset (ISO 19115-1)

EX Extent (ISO 19115-1)

FC Feature Catalogue (ISO 19110)

GF General Feature (ISO 19109)

GM Geometry (ISO 19107)

LI Lineage (ISO 19115-1)

LE Lineage extended (ISO 19115-2)

MD Metadata (ISO 19115-1)

PT Polylinguistic Text (ISO/TS 19103)

RS Reference System (ISO 19115-1)

SC Spatial Coordinates (ISO 19111)

SV Metadata for Services (ISO 19115-1)

TM Temporal (ISO 19108)

6 Metadata requirements

6.1 Metadata for resources

This part of ISO 19115 identifies the metadata required to describe all types of resources. Metadata is applicable to: collections of resources and their components, (e.g. series); datasets and their components (e.g. feature and feature property types); software; hardware; services; non-geographic datasets; and other types of resources. Metadata shall be provided for geographic datasets and may, optionally, be provided for other types of resources.

6.2 Metadata application information

Figure 1 is a Unified Modelling Language (UML) class diagram defining the classes of information to which metadata applies. It specifies that a resource (DS_Resource) and aggregations of resources must have one or more related Metadata sets (MD_Metadata). Metadata may optionally relate to a Feature, Feature Attribute, Feature Type, Feature Property Type (Metaclass' instantiated by Feature association role, Feature attribute type, and Feature operation). The method for relating metadata to feature and attribute instances is defined in ISO 19109. A dataset (DS_Dataset), aggregate (DS_Aggregate), and a service (SV_Service) are specializations (subtypes) of a resource (DS_Resource). Resource aggregations may be specified (subclassed) as a general association (DS_OtherAggregate), a dataset series (DS_Series), or a specific activity (DS_Initiative). Aggregate resources which are specified (subtyped) as a series (DS_Series) are related by the fact that they have a common heritage, e.g. they may be datasets that have been derived from the same sensor (DS_Sensor), platform (DS_Platform) or adhere to a common production specification (DS_ProductionSeries). MD_Metadata applies to a wide variety of resources and services which are specified in MD_ScopeCode (B.3.28). The data dictionary for this model is located in Table B.1.

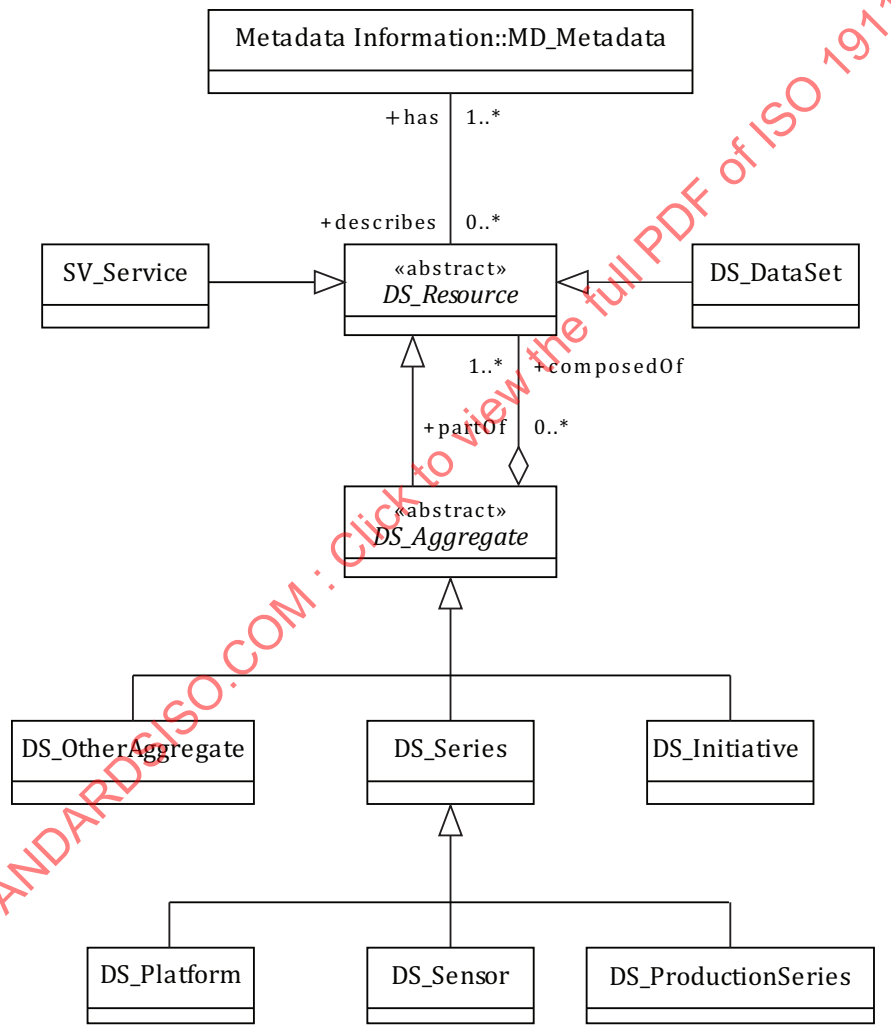

Figure 1 — Metadata application

6.3 Metadata fundamentals package and dependencies

The ISO geographic information series of standards are defined using one or more UML packages and are maintained in a single integrated UML model. This part of ISO 19115 utilizes concepts defined in several of these other standards' packages. Figure 2 illustrates the ISO/TC 211 packages upon which this part of ISO 19115 is dependent. Metadata-Fundamentals are defined and provided by one or

more packages; each package provides a separate component of metadata information. There are 13 packages that are used to define and provide the metadata that is defined in this part of ISO 19115: Metadata information, Identification information, Constraint information, Lineage information, Content information, Distribution information, Reference system information, Spatial representation information, Portrayal catalogue information, Metadata application information, Application Schema information, Metadata extension information, and Service metadata information. There are four packages: Citation information, Responsible party information, Language-characterset localisation information, and Extent information which are used by other packages. Individual packages may be used alone to provide separate components of metadata to meet specific use case requirements but a minimum of the Metadata and Identification information packages must be used when providing a complete metadata set. The additional packages shall be added when providing supplementary metadata.

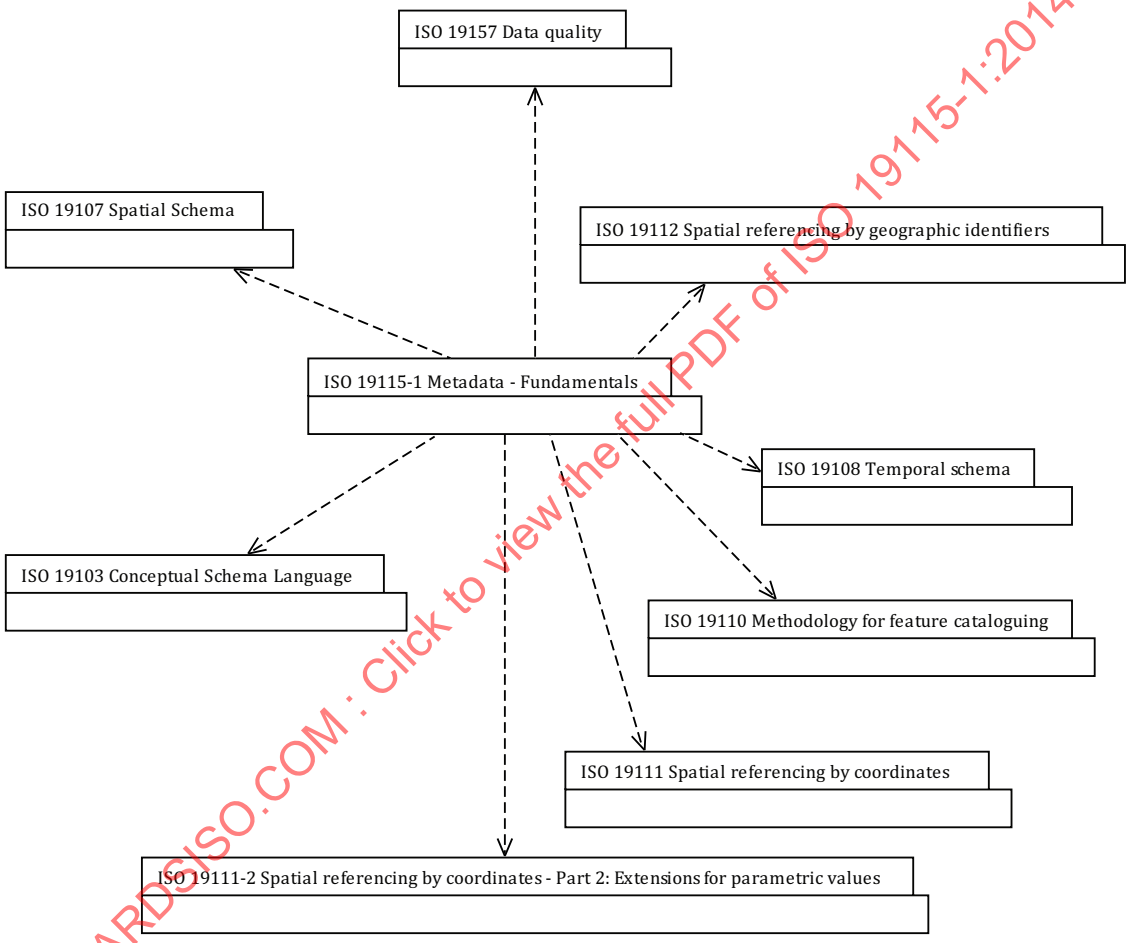

Figure 2 — Metadata fundamentals package and dependencies

6.4 Citation and responsible party, Metadata application information, Language-characterset localisation information, and Extent information package relationships

Four packages: Citation and responsible party information, Language-characterset localisation information, Extent information, and Metadata application information are used by the other packages when providing metadata (see Figure 3).

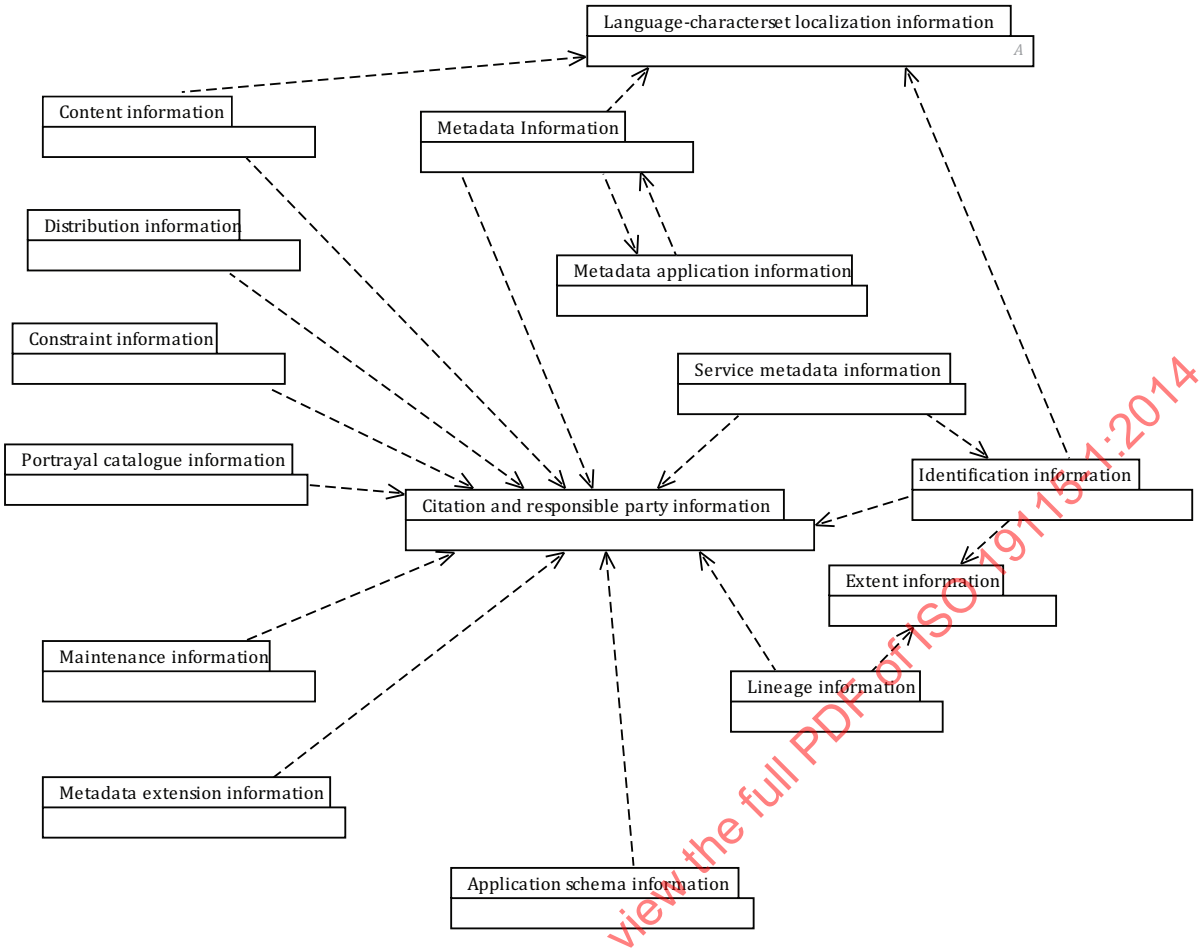

Figure 3 — Citation and responsible party information, Language-characterset localisation information, Metadata application information, and Extent information package relationships

6.5 Resource metadata class diagrams by package

6.5.1 Introduction

Metadata is composed of one or more metadata packages containing one or more metadata classes containing attributes. The relationships between metadata packages and between metadata classes are specified by composition and aggregation relationship symbols. Class attributes and relationships are referred to collectively as metadata elements. The diagrams in 6.5.2 to 6.6.3 provide "views", which are portions of the total abstract model for metadata. Each diagram defines a metadata UML package of related classes, elements, data types, and code lists. Related classes, which are defined in another diagram, are shown with attributes suppressed and the package where they are fully specified identified by the package name proceeding a double colon (::). The metadata is fully specified by the UML model diagrams and an associated data dictionary for each package in Annex B. Abstract classes (which are classes which are defined for schematic organisation purposes, i.e. only their subclasses are implemented) are identified with their names in italic.

NOTE In some cases, optional classes can have mandatory elements; those elements become mandatory only if the optional element is used.

6.5.2 Metadata information (MD_Metadata)

6.5.2.1 General

The MD_Metadata package defines the schema for describing the complete metadata about a resource and metadata about the metadata itself. The data dictionary for this diagram (Figure 4) is located in Table B.2.

6.5.2.2 Metadata schema

Full metadata is provided by MD_Metadata and an aggregate of 12 additional metadata classes as specified in Figure 4. The DQ_DataQuality class is defined in ISO 19157.

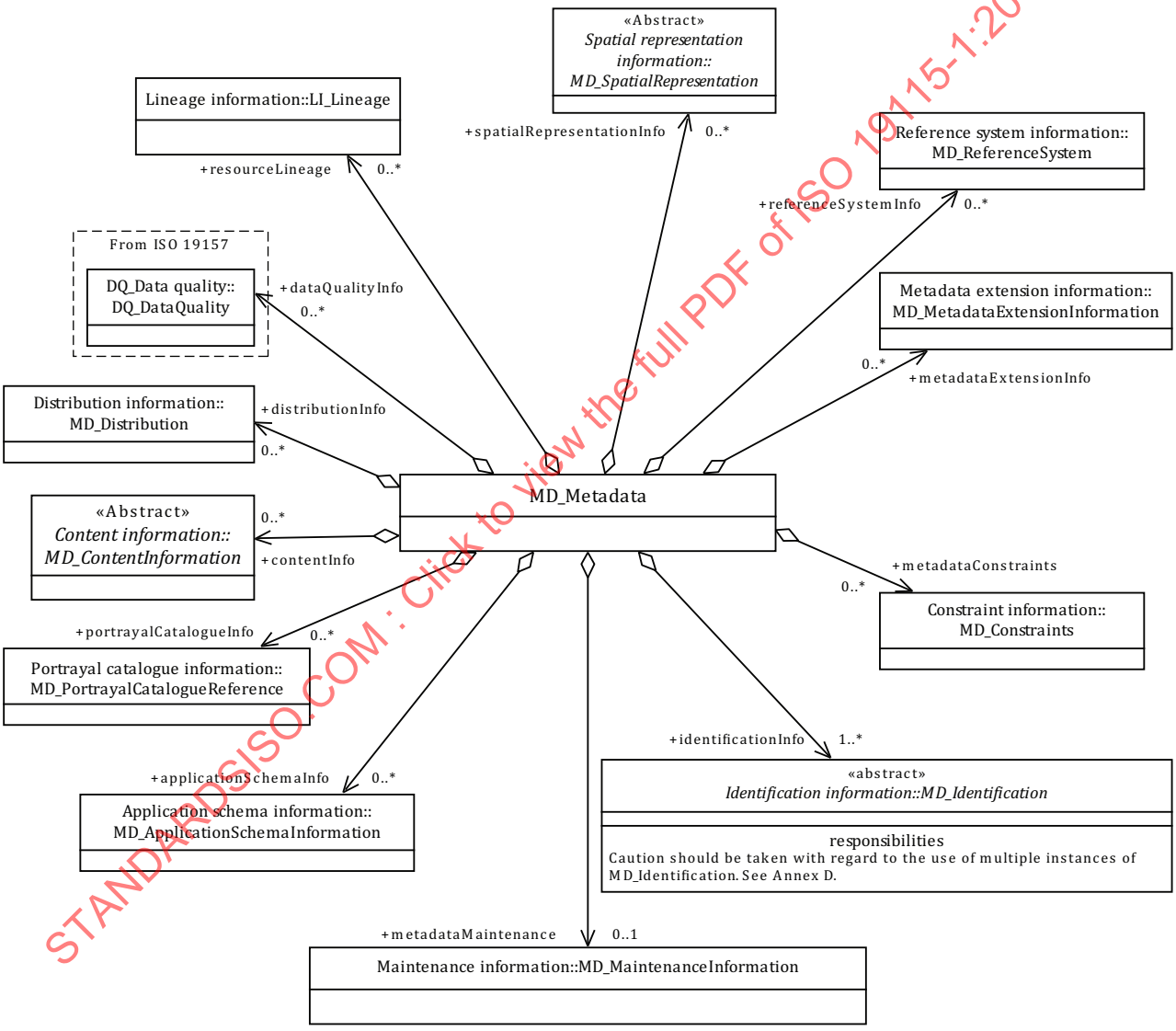

Figure 4 — Metadata schema classes

6.5.2.3 Metadata about metadata

The MD_Metadata class contains attributes providing information about the metadata as specified in Figure 5. The data dictionary for this diagram is located in Table B.2.

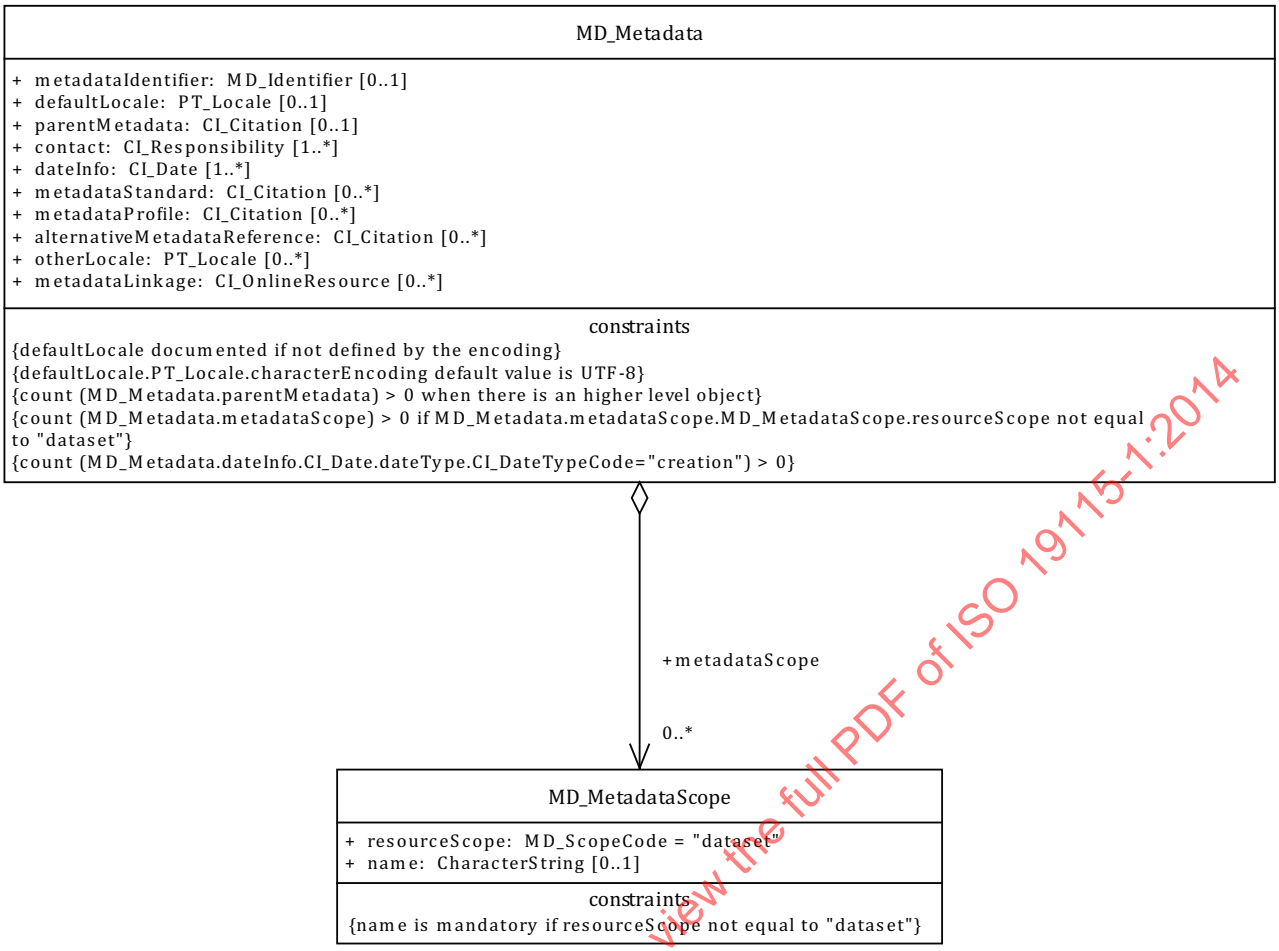

Figure 5 — Metadata on metadata classes

6.5.3 Identification information (MD_Identification)

6.5.3.1 General

Identification information supports the provision of information to uniquely identify a resource. MD_Identification can be specified as MD_DataIdentification or SV_ServiceIdentification and is an aggregate of seven classes of metadata which aid in resource identification. The full package is specified in Figure 6. The data dictionary for this diagram is located in Table B.3.

6.5.3.2 Identification information classes

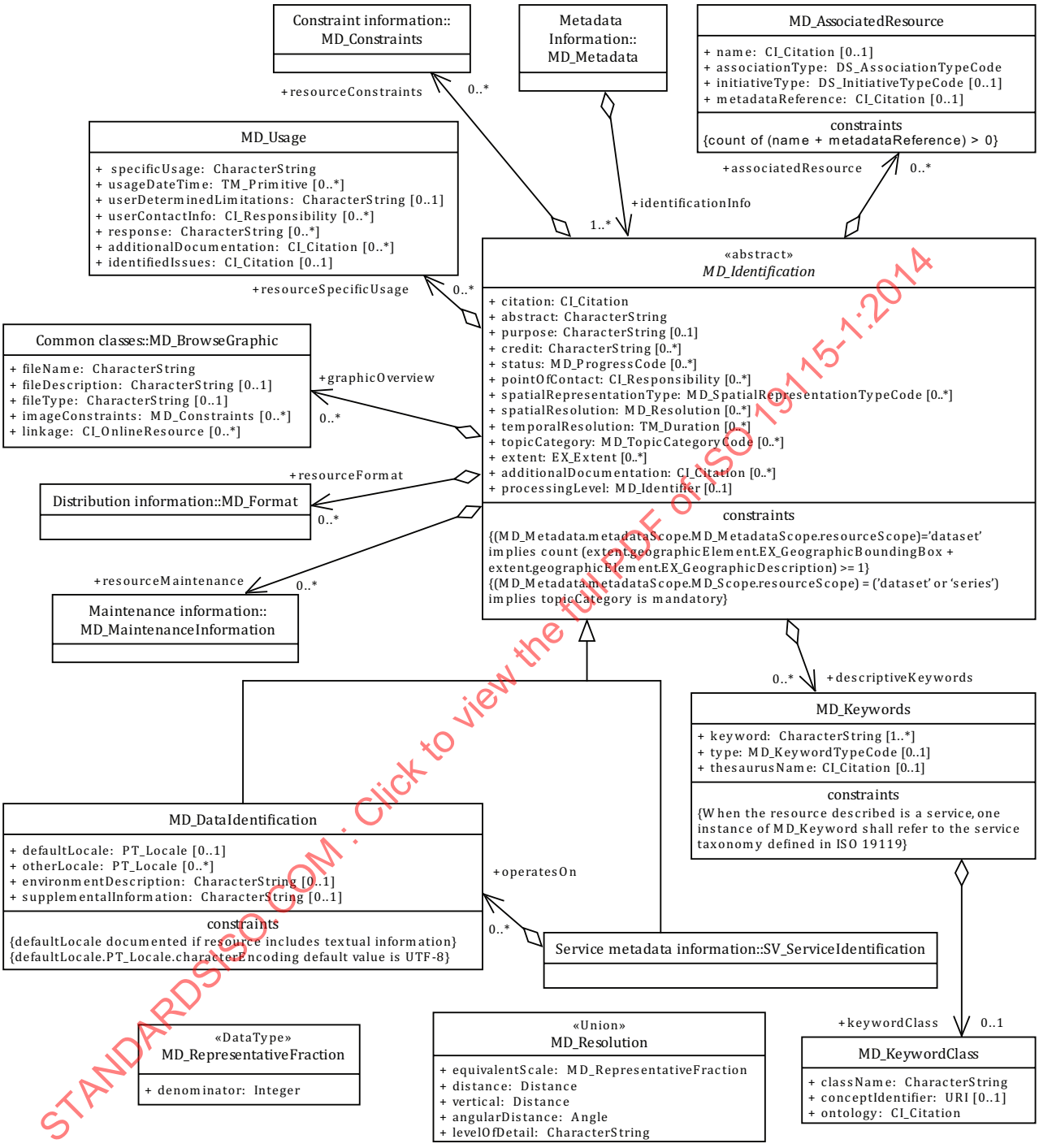

Figure 6 — Identification information classes

6.5.3.3 Identification information codelists

The Identification package uses the codelists specified in Figure 7. The data dictionary for these codelists is located in B.3.

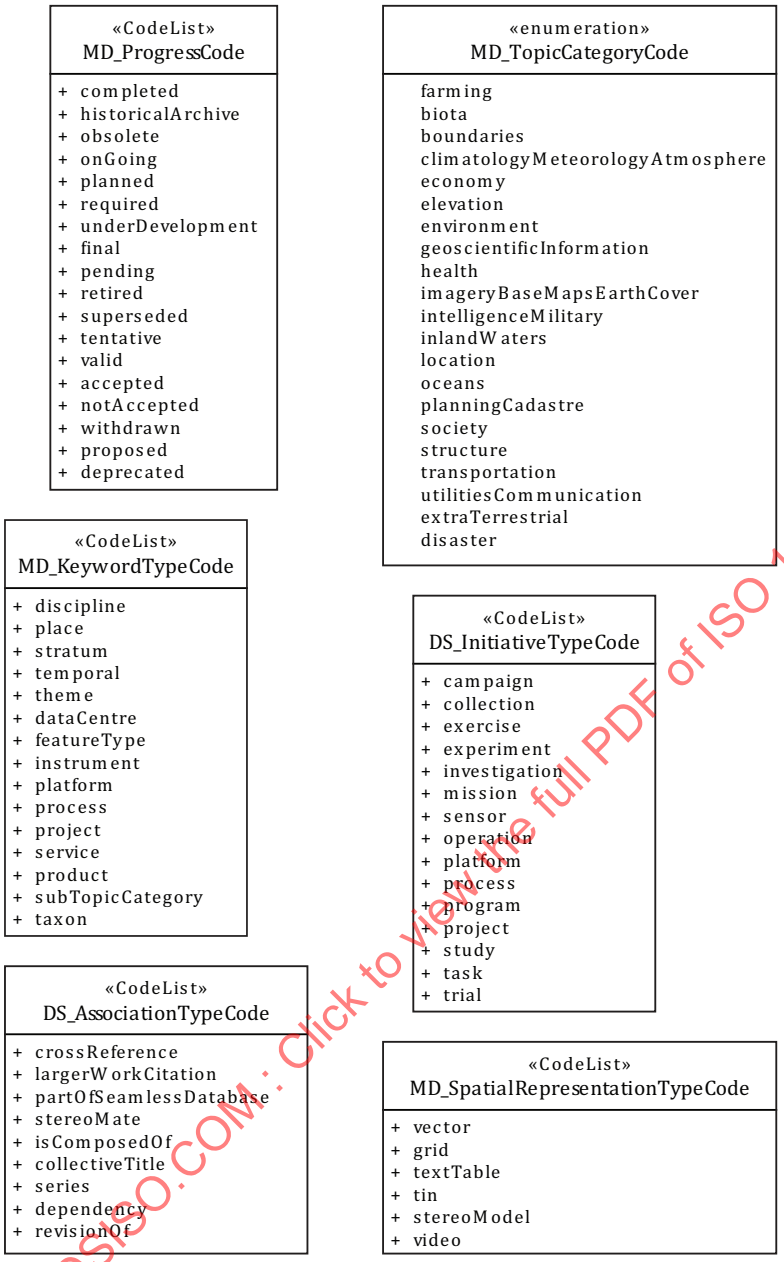

Figure 7 — Identification information codelists

6.5.4 Constraint information (MD_Constraints)

This package supports the provision of metadata concerning the legal and security constraints placed on resources and metadata about resources. It consists of MD_Constraints which can also be specified as MD_LegalConstraints and/or MD_SecurityConstraints. The full package is specified in Figure 8. The data dictionary for this diagram is located in Table B.4.

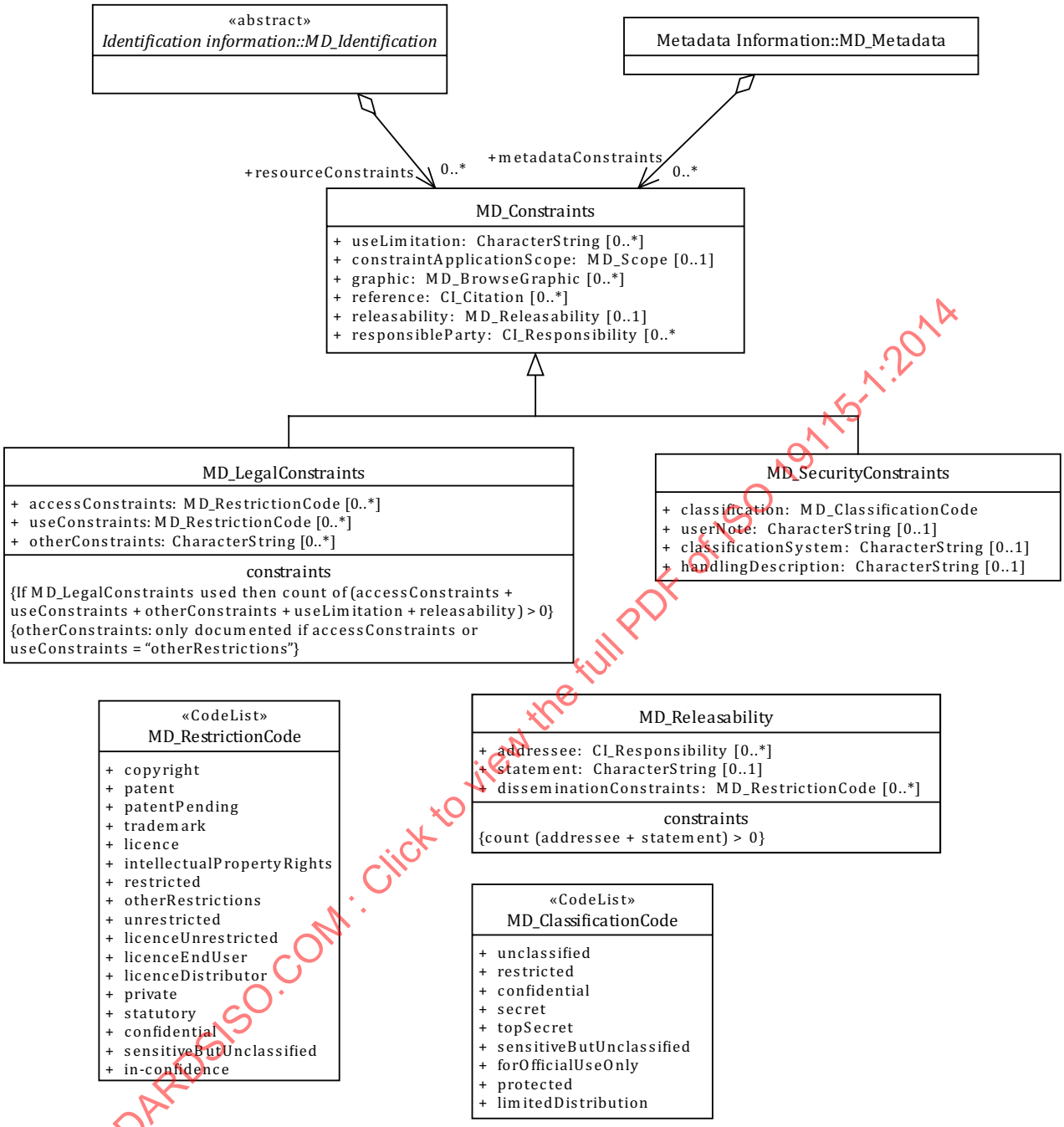

Figure 8 — Constraint information classes

6.5.5 Lineage information (LI_Lineage)

This package supports the provision of metadata concerning the sources and production processes used in producing a resource. LI_Lineage is an aggregate of two classes LI_Source, LI_ProcessStep. The full package is specified in Figure 9. The classes with the suffix "LE" are defined in ISO 19115-2 and are shown here for reference and to provide a complete view of the lineage model. The data dictionary for this diagram is located in Table B.5.

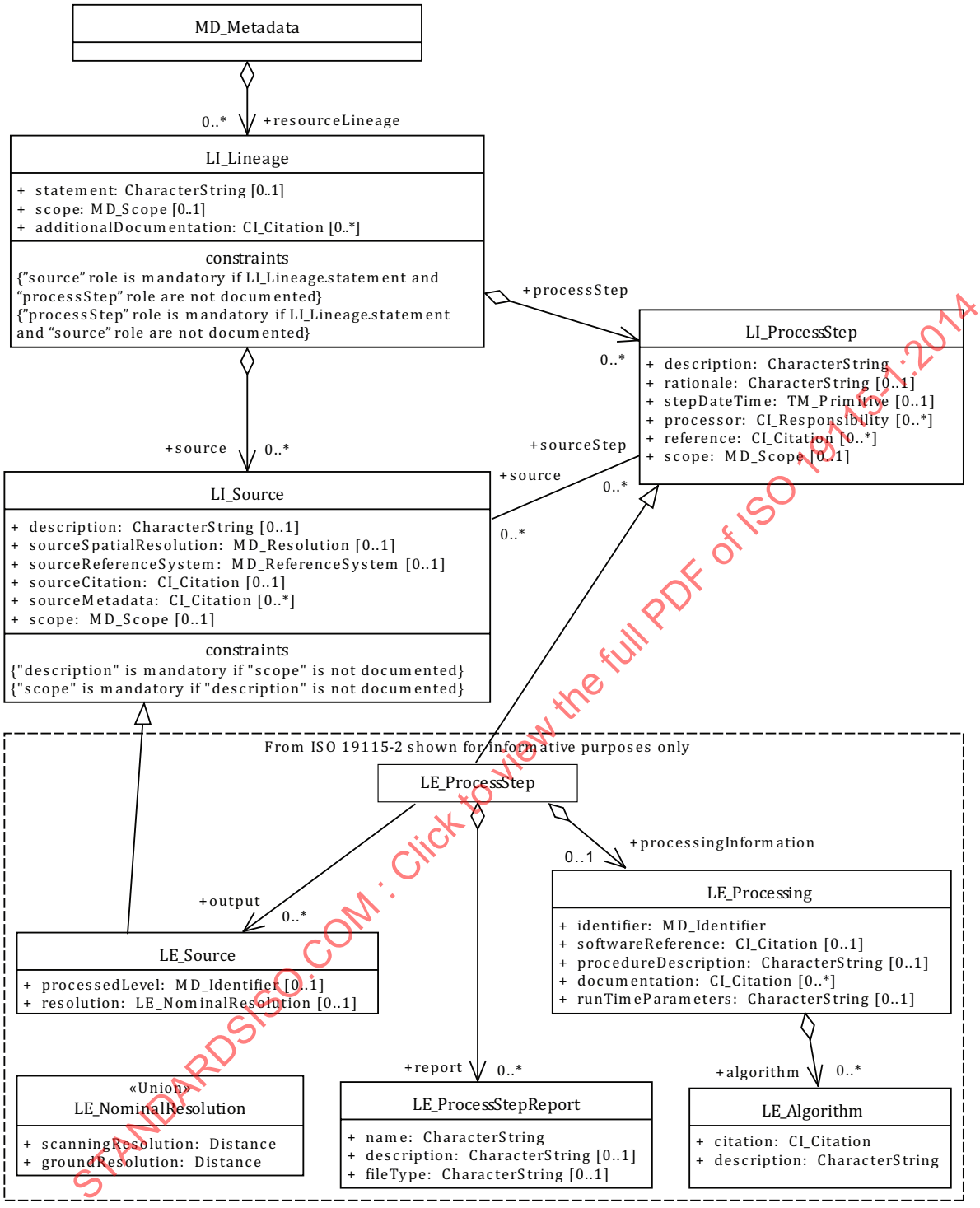

Figure 9 — Lineage information classes

6.5.6 Maintenance information (MD_MaintenanceInformation)

This package supports the provision of metadata related to the scope and frequency of maintenance for a resource or of metadata about a resource in a single class, MD_MaintenanceInformation. The full package is specified in Figure 10. The data dictionary for this diagram is located in Table B.6.

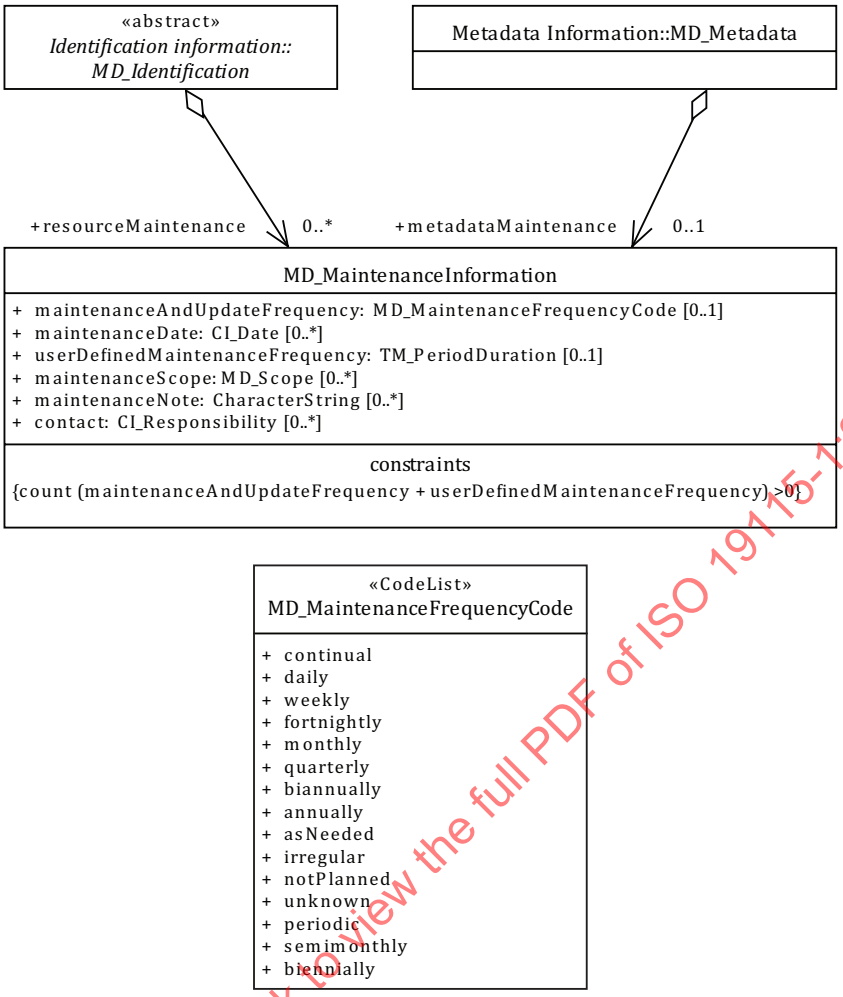

Figure 10 — Maintenance information classes

6.5.7 Spatial representation information (MD_SpatialRepresentation)

This package supports the provision of metadata identifying the spatial primitives used by a resource and the mechanisms used to model real world phenomena in a digital information system. It consists of the MD_SpatialRepresentation which can be specified as either MD_VectorSpatialRepresentation or MD_GridSpatialRepresentation. MD_GridSpatialRepresentation can be further specified as MD_Georectified or MD_Georeferencable. The full package is specified in Figure 11. The data dictionary for this diagram is located in Table B.7.

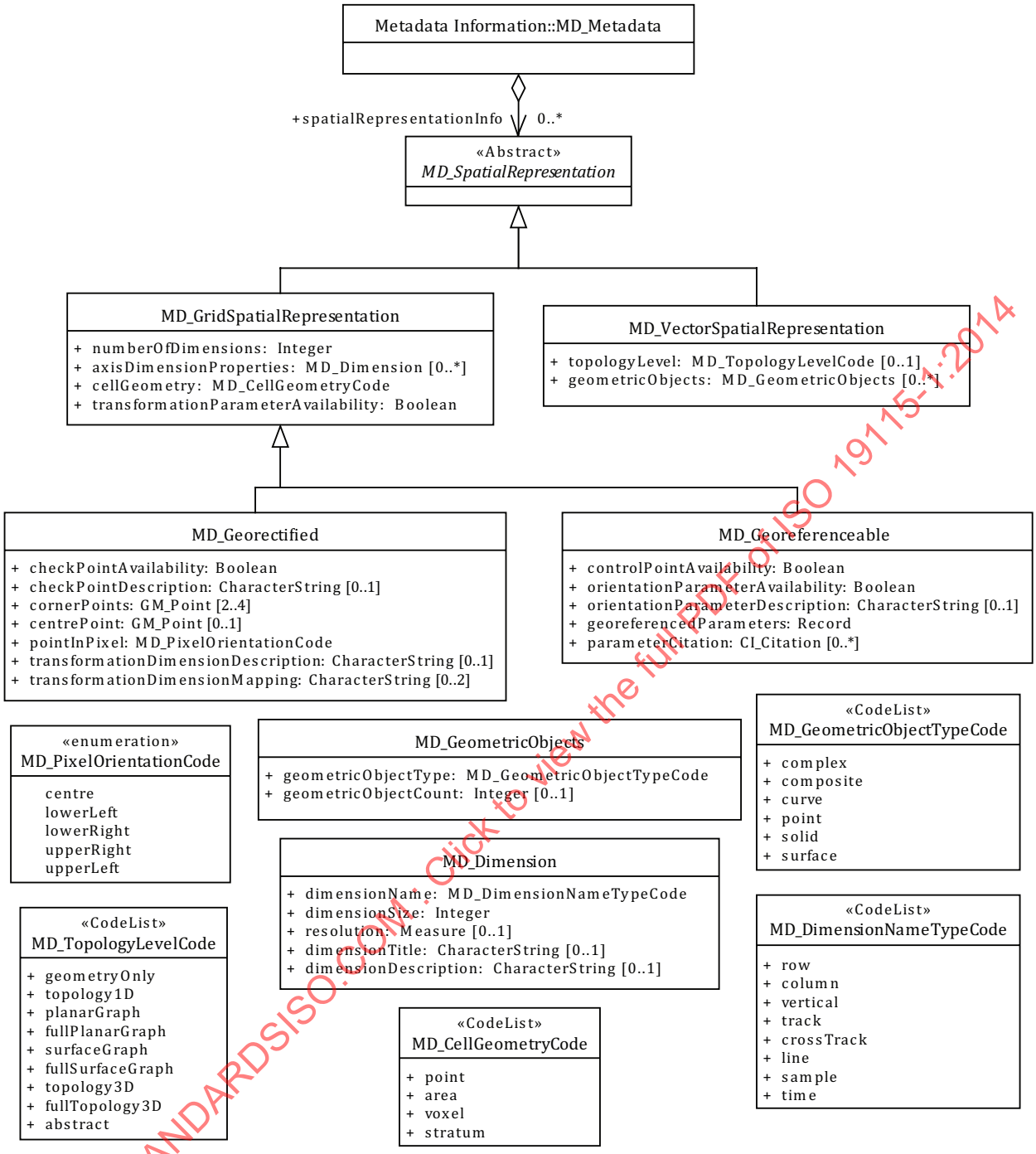

Figure 11 — Spatial representation information classes

6.5.8 Reference system information (MD_ReferenceSystem)

This package supports the metadata identifying the spatial, temporal and parametric reference system(s) used by a resource in one class, MD_ReferenceSystem. The full package is specified in Figure 12. The data dictionary for this diagram is located in Table B.8.

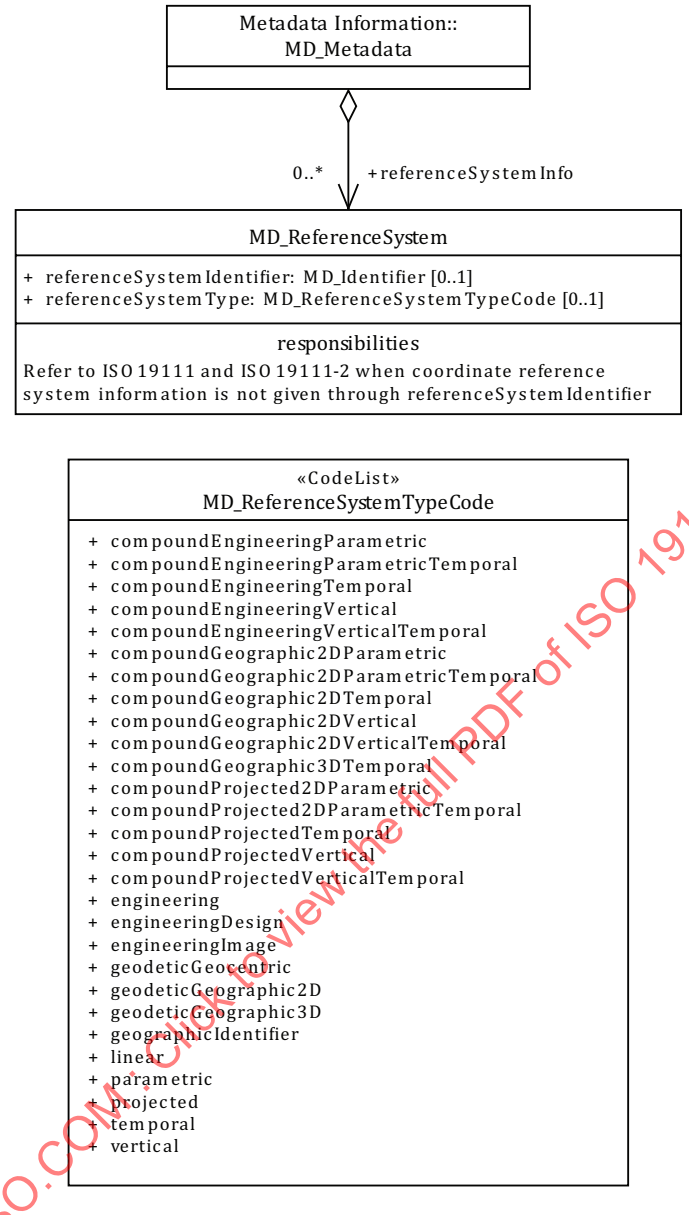

Figure 12 — Reference system information classes

6.5.9 Content information (MD_ContentInformation)

This package supports the provision of metadata identifying the content of a resource by: citing the feature catalogue used to define the content (MD_FeatureCatalogueDescription); incorporating the feature catalogue (MD_FeatureCatalogue – defined in ISO 19110); or describing the content of a coverage resource (MD_CoverageDescription) which also may be specified as MD_ImageDescription. The full package is specified in Figure 13. The data dictionary for this diagram is located in Table B.9.

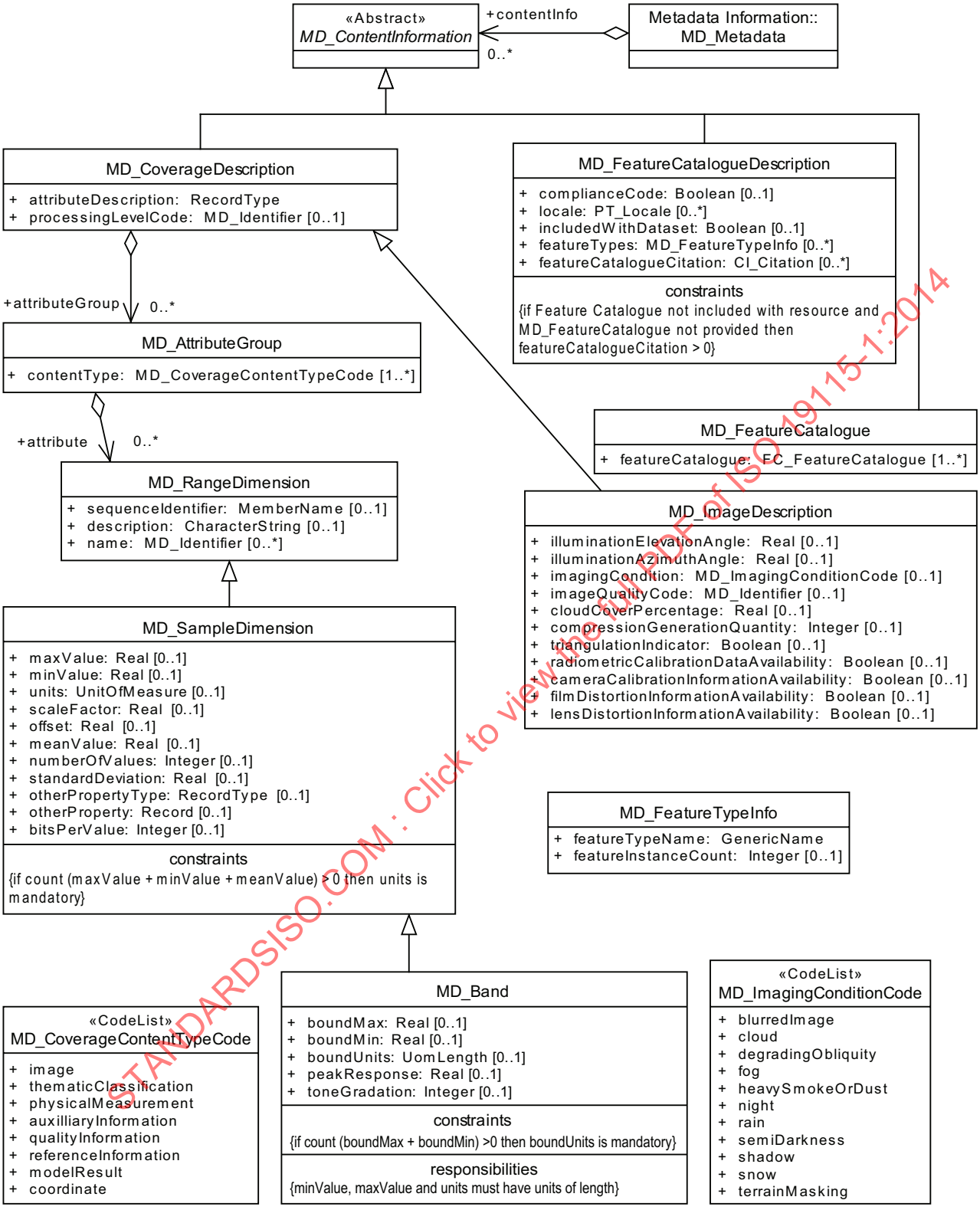

Figure 13 — Content information classes

6.5.10 Portrayal catalogue information (MD_PortrayalCatalogueReference)

This package supports the provision of metadata identifying the portrayal catalogue used. The portrayal catalogue describes how the resource can be rendered for human visualisation. The full package is specified in Figure 14. The data dictionary for this diagram is located in Table B.10.

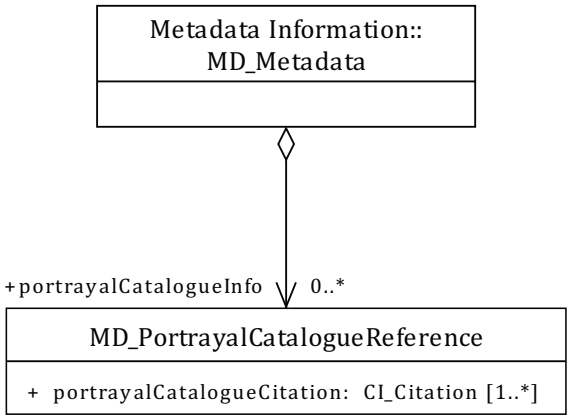

Figure 14 — Portrayal catalogue information classes

6.5.11 Distribution information (MD_Distribution)

This package supports the provision of metadata about the distributor of and options for obtaining a resource. MD_Distribution is an aggregate of three additional classes. The full package is specified in Figure 15. The data dictionary for this diagram is located in Table B.11.

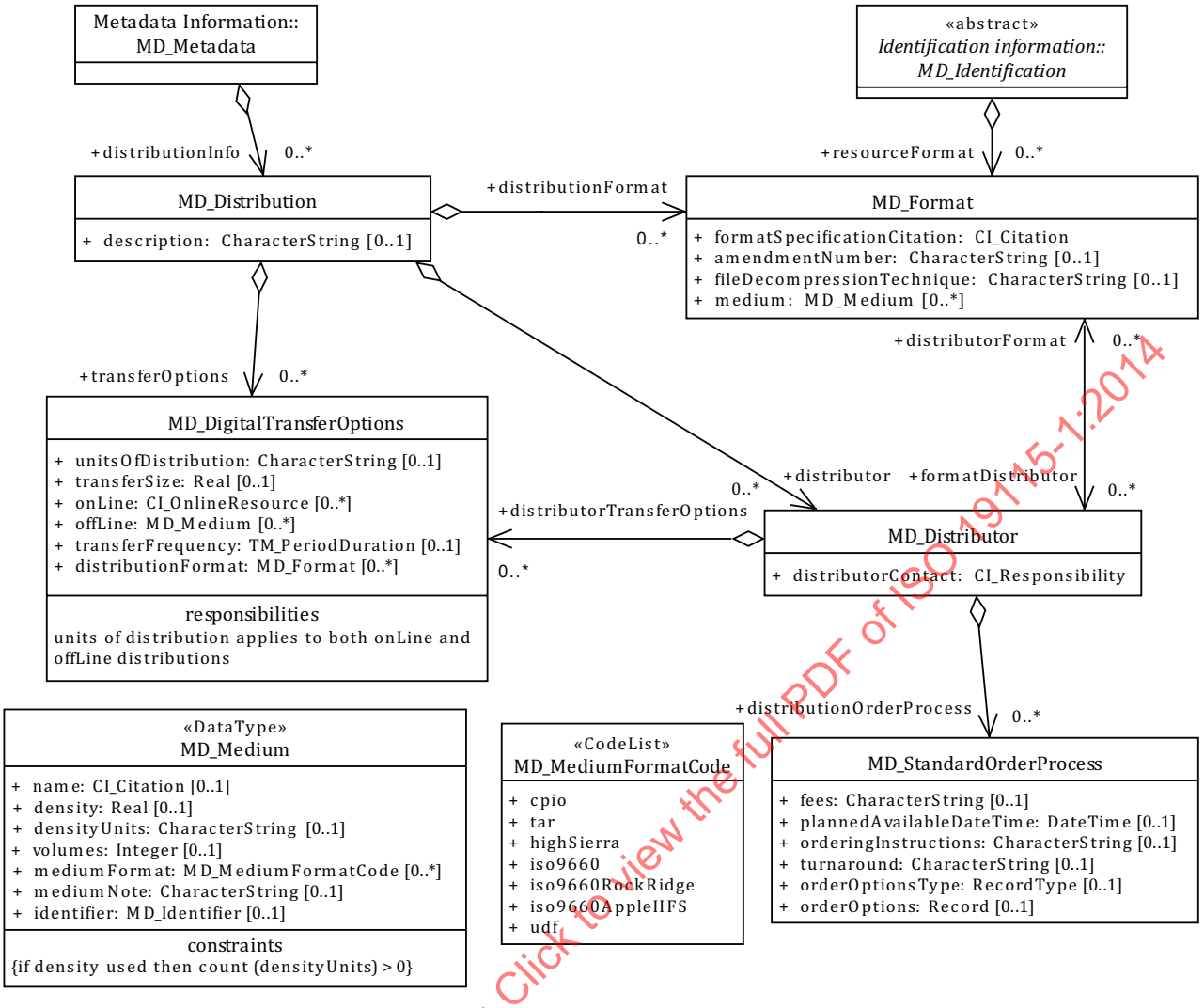

Figure 15 — Distribution information classes

6.5.12 Metadata extension information (MD_MetadataExtensionInformation)

This package supports the provision of information about user specified metadata extensions. MD_MetadataExtensionInformation is an aggregate of one other class. The full package is specified in Figure 16. The data dictionary for this diagram is located in Table B.12.

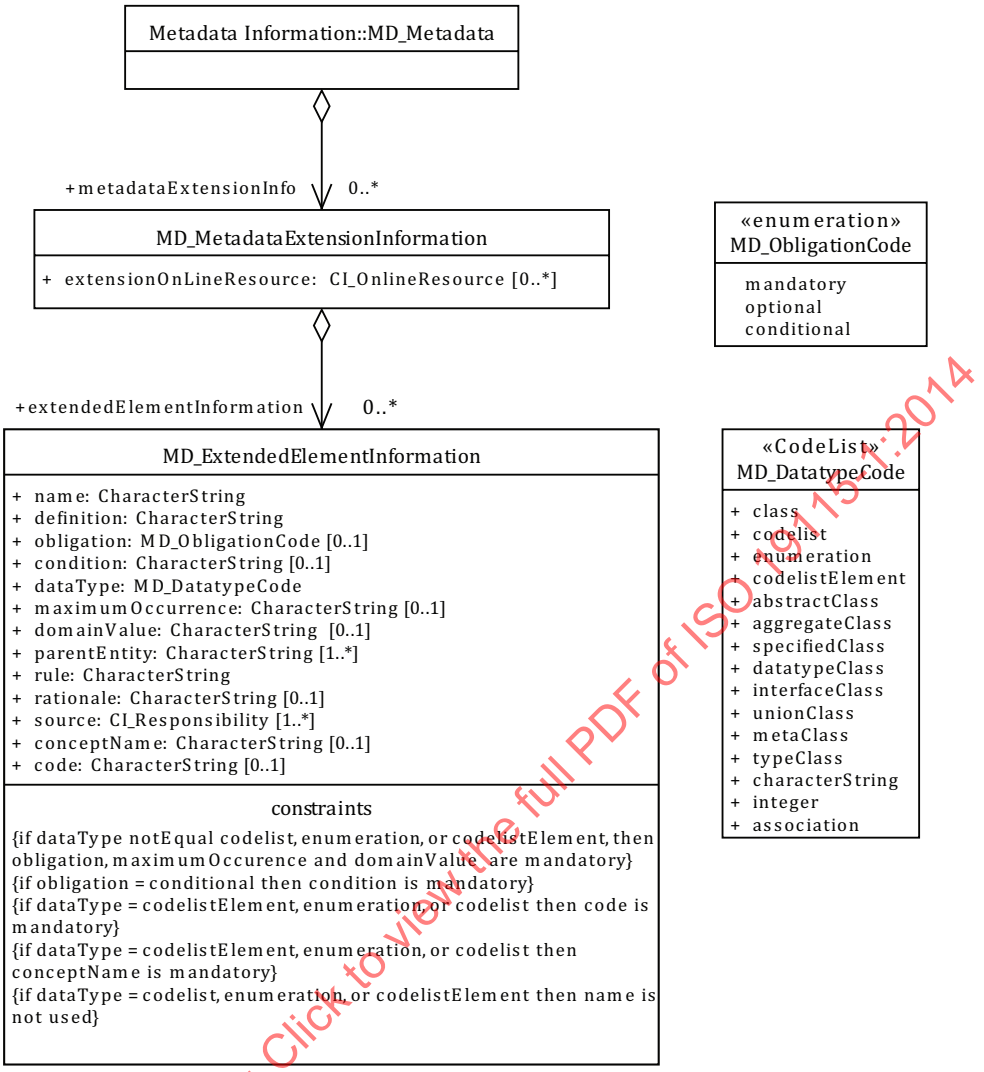

Figure 16 — Metadata extension information classes

6.5.13 Application schema information (MD_ApplicationSchemaInformation)

This package supports the provision of metadata describing the application schema used to define and expose the structure of a resource. The application schema is the model and/or data dictionary that represents the resource. MD_ApplicationSchemaInformation is specified in Figure 17. The data dictionary for this diagram is located in Table B.13.

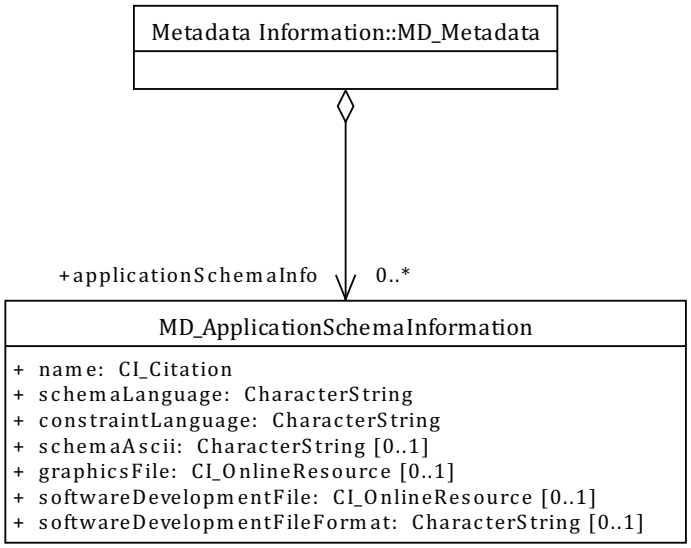

Figure 17 — Application schema information class

6.5.14 Service metadata information

This package supports the provision of metadata about services. The structure of service metadata includes three major classes: a section of basic **service** metadata (SV_ServiceIdentification class) that provides a general description of the functionality provided by the service and two sections that describe the **operations** (SV_OperationMetadata) and **data** (MD_DataIdentification) available from a particular service.

SV_ServiceIdentification has an aggregation relationship with multiple instances of SV_OperationMetadata. While it is known that the service structure may be more complicated than this aggregation, the additional detail of services aggregating services is not needed in a service metadata record.

A service instance may be either tightly coupled with a dataset instance, loosely coupled (i.e. non associated with specific dataset instances), or it may be "mixed coupled."

— In the tightly coupled case, the service metadata shall describe both the service and the geographic dataset. The permitted values for the description of operations shall be constrained by the values defined by the datasets associated with the service.

— Loosely coupled services may have an association with data types through the service type definition (SV_ServiceIdentification.serviceType). Dataset metadata need not be provided in the service metadata for the loosely coupled case (i.e. operatedDataset:CI_Citation or operatesOn:MD_DataIdentification optional).

— A single service instance may be associated to both kinds of data associated, loosely and tightly coupled. This is the case of "mixed coupled" instance. The coupling type is specified from the SV_CouplingType codelist, which includes {tight, loose, mixed}.

The class SV_CoupledResource enables the description of the link between an operation, and the data on which it is based. This class requires that a given operation, resource and scopedName shall refer respectively to an existing operation (instance of SV_OperationMetadata), a resource metadata (instance of MD_DataIdentification or a CI_Citation), and a scopedName providing the name of the data in the context of the operation. The full service metadata package is specified in Figure 18. The data dictionary for this diagram is located in Table B.14.

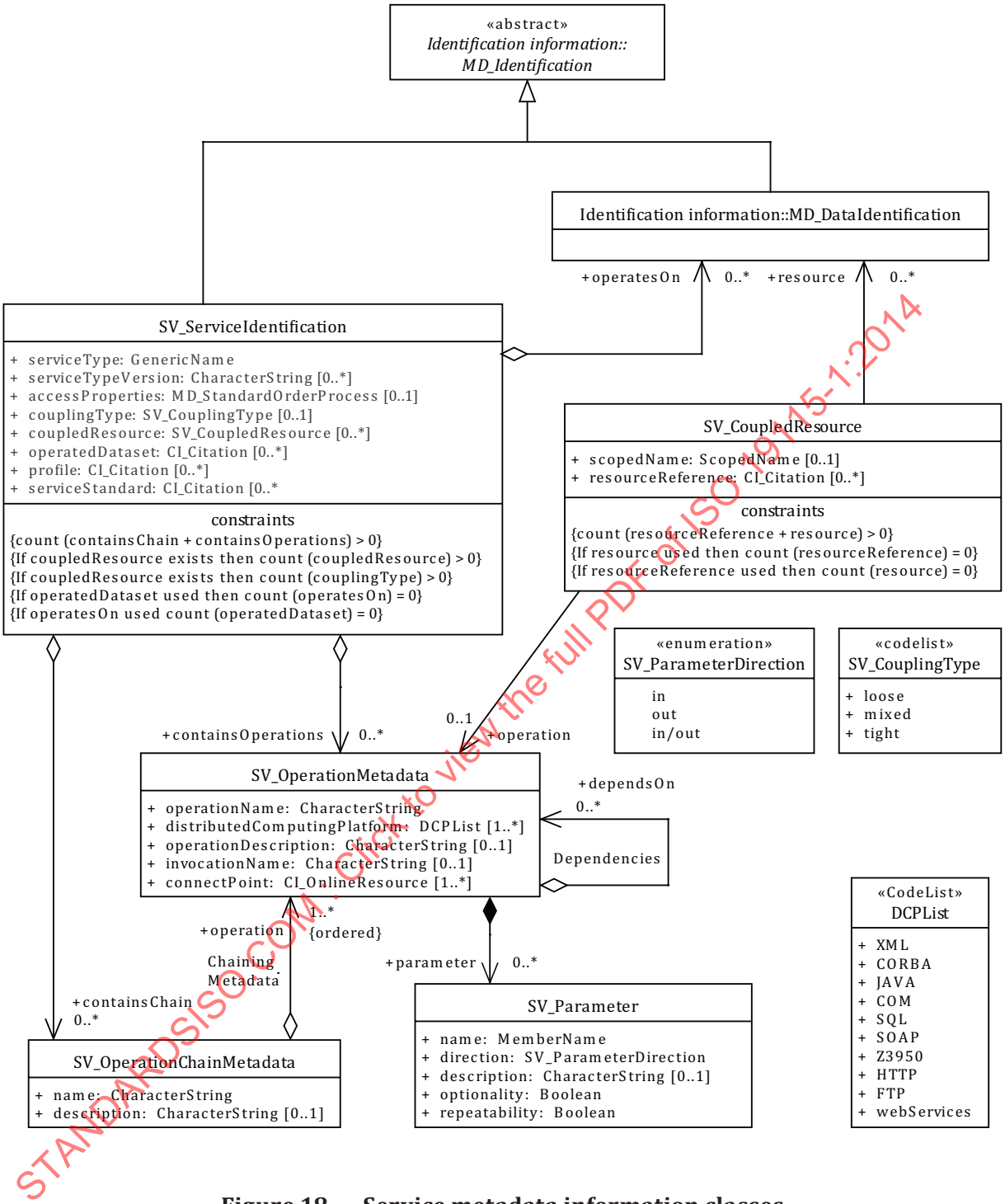

Figure 18 — Service metadata information classes

6.6 Extent, Citation and Common information packages

6.6.1 Extent information (EX_Extent)

The datatype in this package is an aggregate of the metadata elements that describe the spatial and temporal extent of resources, objects, events, or phenomena. The EX_Extent class contains information about the geographic (EX_GeographicExtent), temporal (EX_TemporalExtent) and the vertical (EX_VerticalExtent) extent of something. 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 full package is specified in Figure 19.

The EX_Extent class has three optional roles named “geographicElement”, “temporalElement”, and “verticalElement” and an element called “description”. At least one of the four shall be used. The data dictionary for this diagram is located in Table B.15.

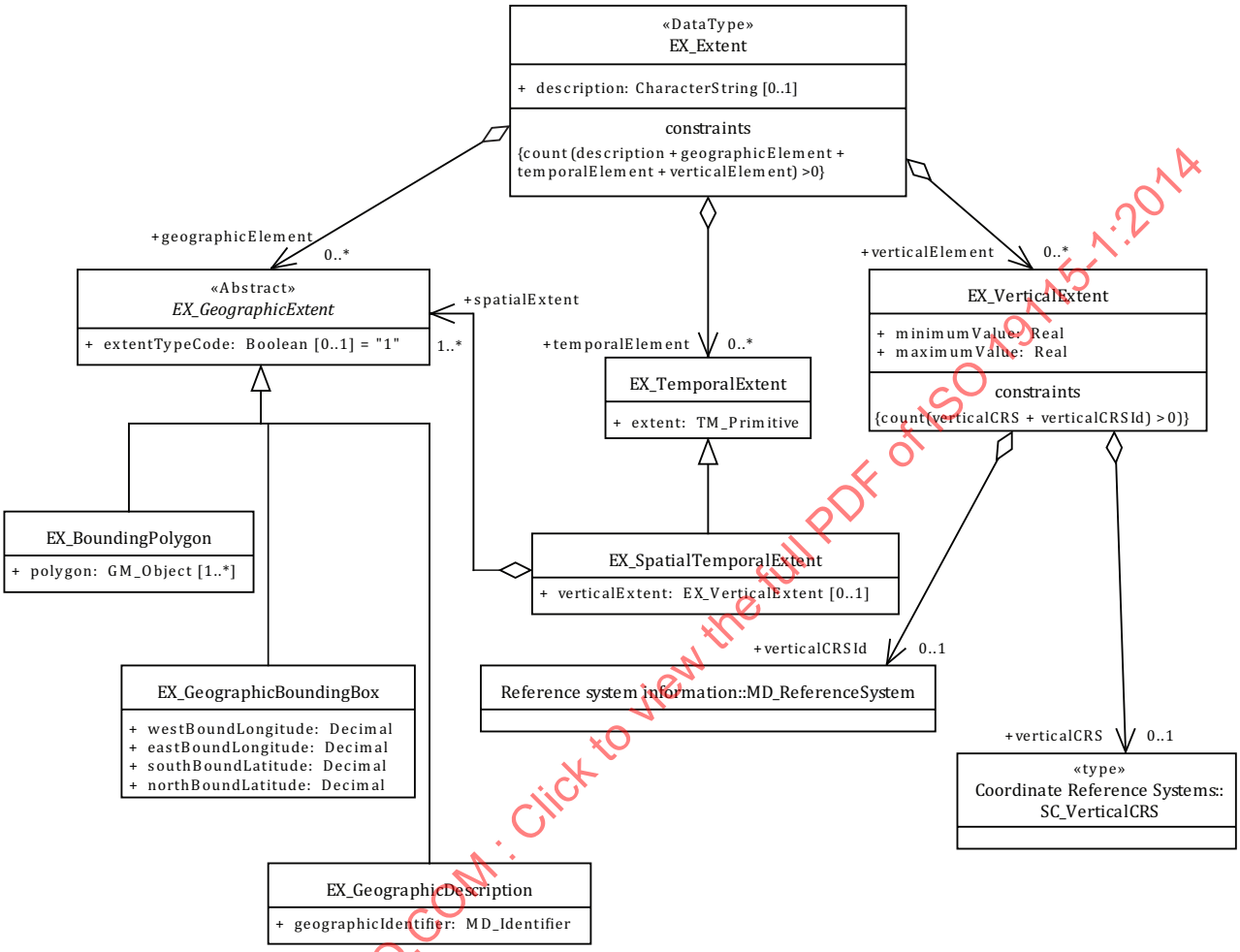

Figure 19 — Extent information classes

6.6.2 Citation, responsibility and party information (CI_Citation, CI_Responsibility, and CI_Party) classes

This package provides a standardized method for citing a resource, as well as information about the party responsible for a resource. Citations use CI_Citation and cite the party responsible using CI_Responsibility. CI_Responsibility may be used without CI_Citation. CI_Responsibility is an aggregate of one or more parties (CI_Party). CI_Party may be specified as CI_Individual and/or CI_Organisation. The full package is specified in Figure 20. The data dictionary for this diagram is located in Table B.16.

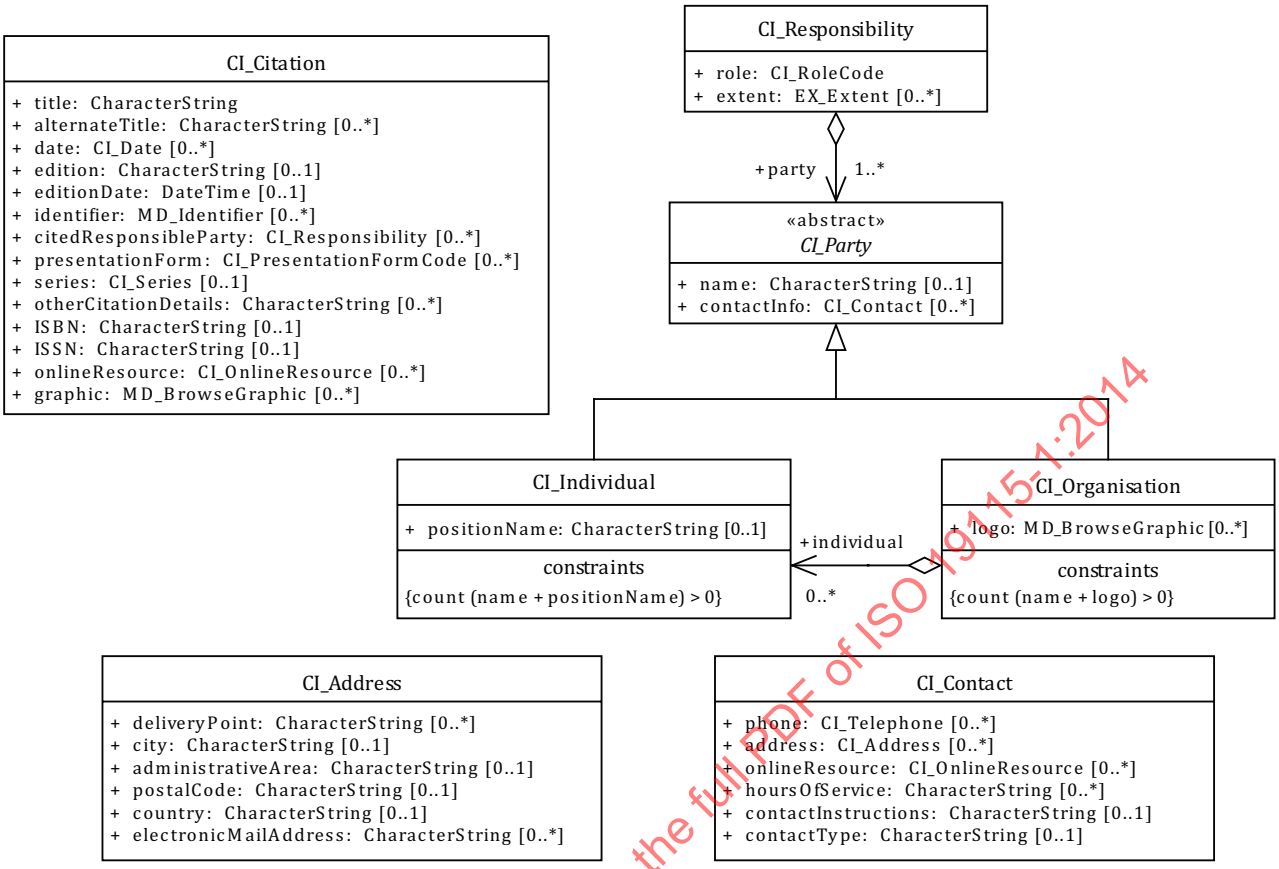

Figure 20 — Citation and responsible party information classes

6.6.3 Citation, responsibility and party information (CI_Citation, CI_Responsibility, and CI_Party) and codelists

The classes and codelists used by Citation and responsible party information are specified in Figure 21. The data dictionary for this diagram is located in Table B.16.

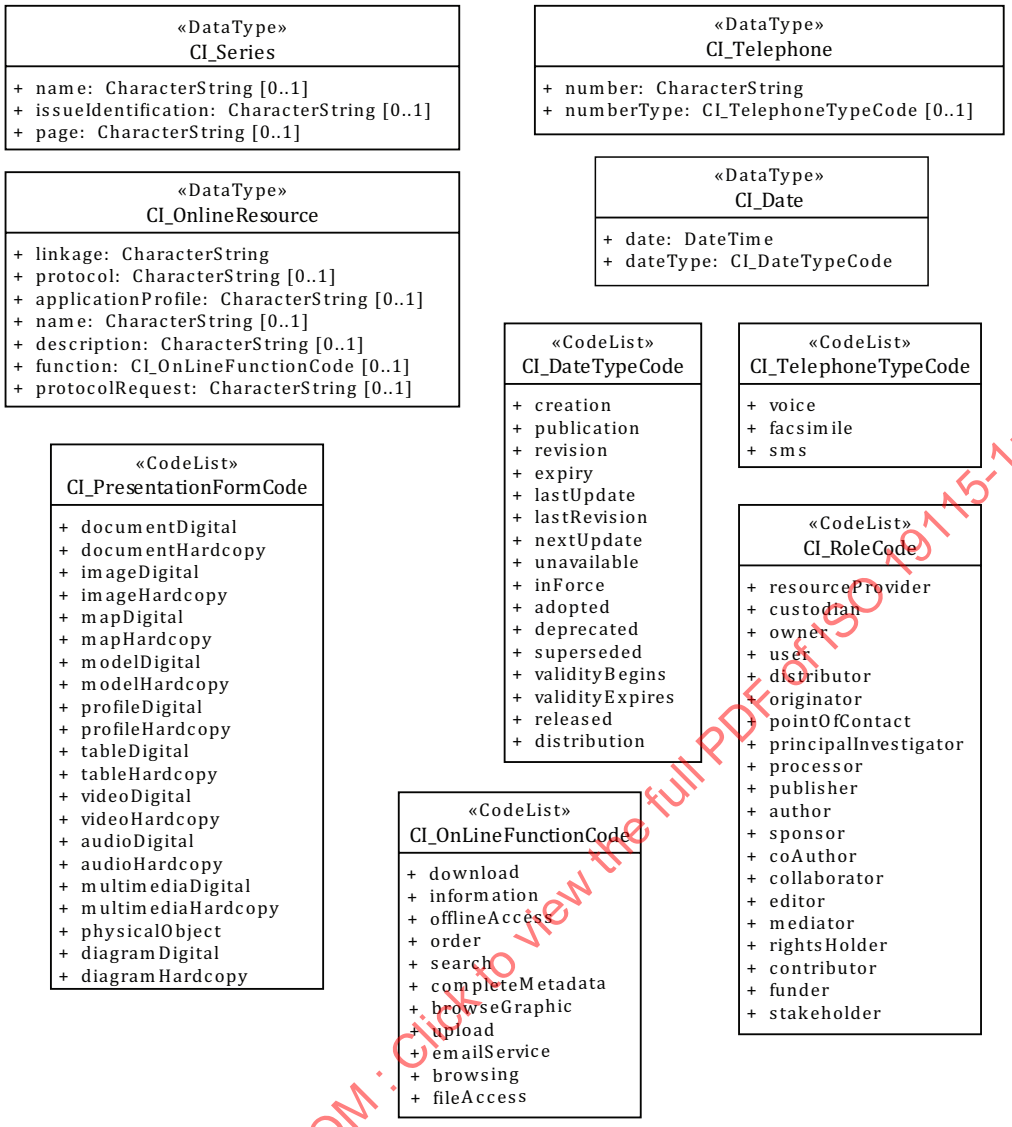

Figure 21 — Citation and responsible party information codelists

6.6.4 Commonly used classes

This package contains classes that are commonly used by the other packages in all parts of ISO 19115. It provides the MD_Identifier, URI, MD_Scope, MD_BrowseGraphic and related classes. The package is specified in Figure 22. The data dictionary for this diagram is located in Table B.17.

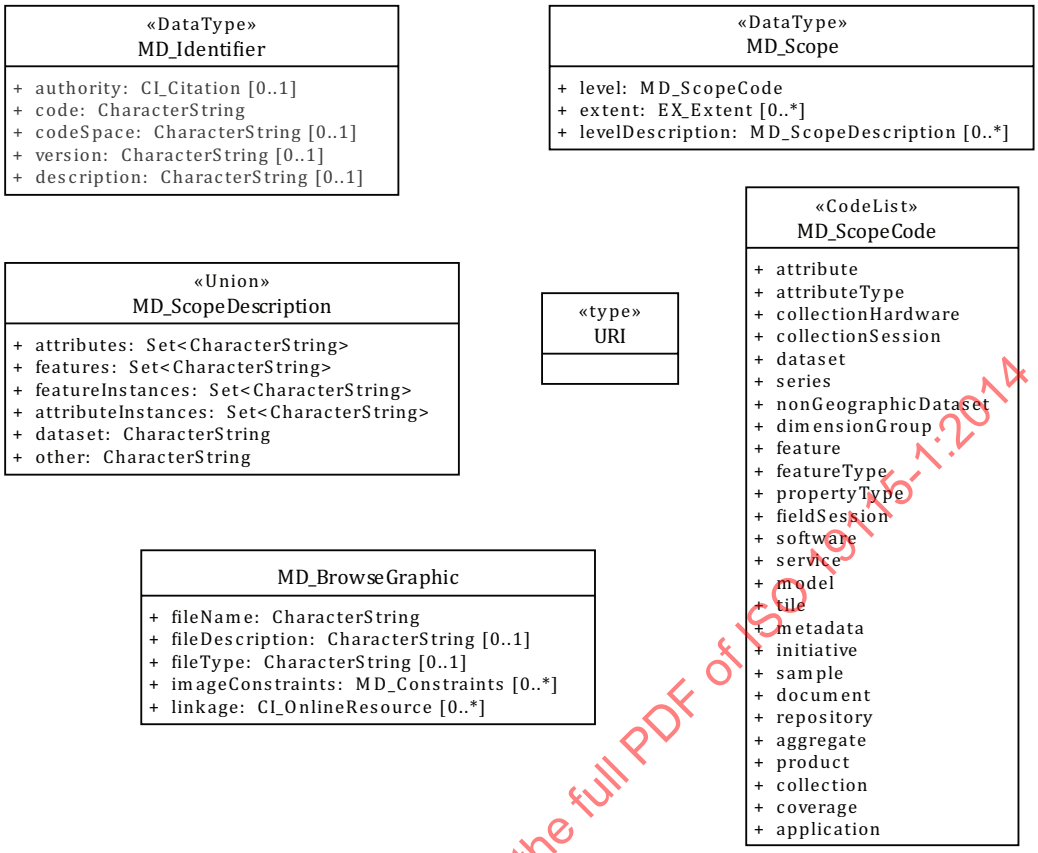

Figure 22 — Commonly used classes

6.7 Multilingual support for free text fields

6.7.1 Free text metadata elements

In this part of ISO 19115 a free text element can 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. Optionally, everywhere in this part of ISO 19115 where "free text" is specified as the domain the class PT_FreeText can be used. A locale (identified as PT_Locale) is a combination of language, potentially a country, and a character encoding (i.e., character set) in which localised character strings are expressed. LocalisedCharacterString is a subtype of CharacterString whose value is expressed in a single locale. An instance of a Free Text consequently is a CharacterString (with its value expressed in a default language and character set that could be defined in an instance of MD_Metadata). Annex D provides a multi-lingual example. The PT_Locale schema is specified in Figure 23. The data dictionary for this diagram is located in Table B.18.2.

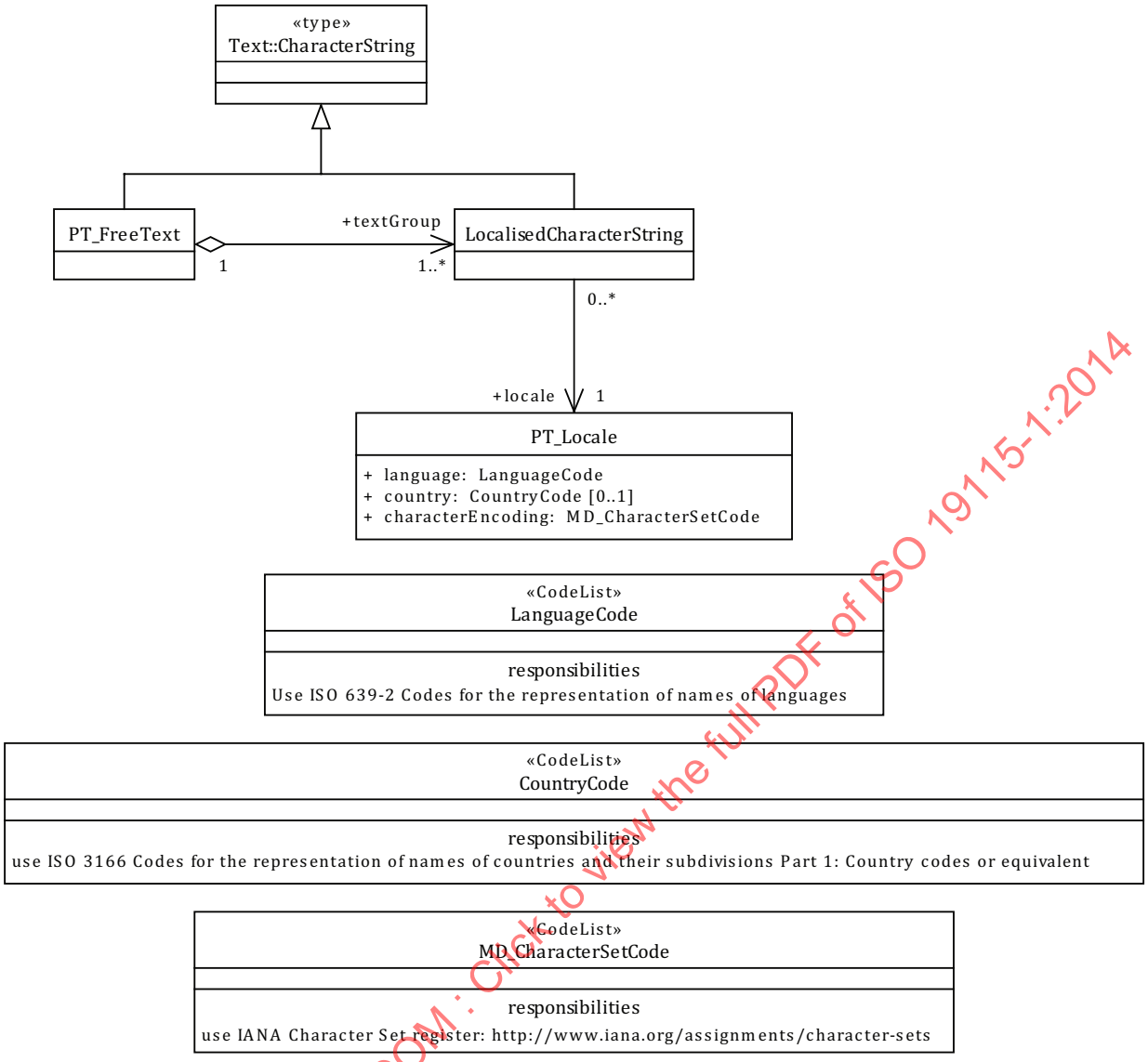

Figure 23 — PT_Locale schema

6.7.2 Management of localised strings

An instance of freetext is composed of default character strings and their translations in different locales through the use of localised strings. This construct implies a distribution of localised strings throughout any given multilingual metadata set. However a more common way of managing multilingual sets of information consists of grouping the localised strings per their locales. In order to ease the management of localised strings, this part of ISO 19115 describes the concept of locale container (identified as PT_LocaleContainer). A locale container aggregates a set of localised strings related to a given locale (locale attribute of PT_LocaleContainer). There is no direct relationship between a locale container and a metadata set except that a locale container may aggregate localised strings of a metadata set.

This translation container concept is particularly useful in terms of the XML Implementation of this and other parts of ISO 19115, but it is applicable to any other implementation. Indeed, an XML file can only support data expressed in a single character set, which is generally declared in the XML File Header.

Having all the localised strings stored in a single XML File would limit the use of a single character set such as UTF-8. In order to avoid this:

— The LocalisedCharacterString class is implemented specifically to allow a by reference containment of the PT_FreeText.textGroup property.

— The PT_LocaleContainer is the recommended root element to be instantiated in a dedicated XML File.

The localised string related to a given locale can be stored in a corresponding locale container (i.e., XML File) and referenced from the PT_FreeText.textGroup property instances. The Translation container is specified in Figure 24. The data dictionary for this diagram is located in B.2.

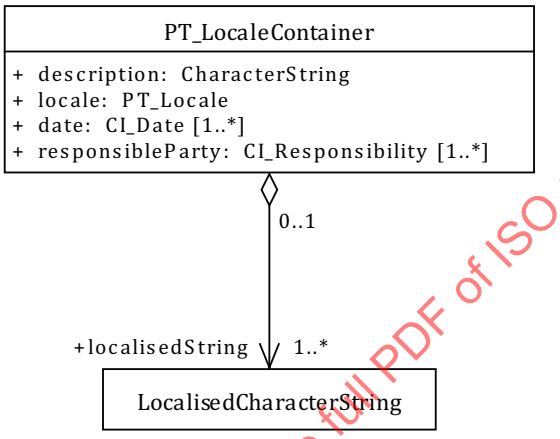

Figure 24 — Translation containerMetadata extensions and profiles

Annex C provides guidance on extending metadata and rules for creating profiles to better serve special user needs.

6.8 Implementation examples

Annex D provides an example of the use of this part of ISO 19115 for a geographic dataset. An example of extended metadata elements, as may be developed by a specific information community, is provided.

6.9 Metadata implementation

Annex E 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.

6.10 Discovery metadata

Annex F provides a list of metadata elements that facilitate the discovery of geospatial resources.

6.11 Revisions

Annex G provides a list of revisions to this part of ISO 19115.

Annex A
(normative)

Abstract test suite

A.1 Abstract test suite

Metadata provided as specified in Clause 6 and Annex B shall meet the requirements specified in this abstract test suite. This abstract test suite applies to any profile derived from this part of ISO 19115. User-defined metadata shall be defined and provided as specified in Annex C and shall satisfy the requirements as stated in A.3.

A.2 Metadata test suite

A.2.1 Test case identifier: Completeness test

a) Test Purpose: to determine conformance by the inclusion of all metadata packages, metadata classes, and metadata elements that are specified with an obligation of "mandatory" or mandatory under the conditions specified.

NOTE 1 Many elements designated as mandatory are contained within optional classes. These elements become mandatory only when their containing class is used.

b) Test Method: a comparison between this part of ISO 19115 and a subject metadata set to be tested shall be performed to determine if all metadata defined as mandatory in Clause 6 and Annex B are present. A comparison test shall also be performed to determine if all metadata elements defined as conditional in Clause 6 and Annex B are present if the conditions set out in this part of ISO 19115 apply.

c) Reference: Clause 6 and Annex B.

d) Test Type: Basic.

NOTE 2 The test cases in A.2.2 to A.2.5, A.3 and A.4 apply at all levels of obligation – mandatory, conditional, and optional.

A.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 part of ISO 19115.

b) Test Method: examine a subject metadata set for the number of occurrences of each metadata package, metadata class, and metadata element provided. The number of occurrences for each shall be compared with its "Maximum Occurrences" attribute specified in Clause 6 and Annex B.

c) Reference: Clause 6 and Annex B.

d) Test Type: Basic.

A.2.3 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: Clause 6 and Annex B.

d) Test Type: Basic.

A.2.4 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: Clause 6 and Annex B.

d) Test Type: Basic.

A.2.5 Test case identifier: Schema test

a) Test Purpose: to determine if a subject metadata set follows the schema specified in this part of ISO 19115.

b) Test Method: test each metadata element and ensure it is contained within the specified metadata class.

c) Reference: Clause 6 and Annex B.

d) Test Type: Basic.

A.3 User-defined extension metadata test suite

A.3.1 Test case identifier: Exclusiveness test

a) Test Purpose: to verify that each user-defined metadata package, metadata class, and metadata element is unique and not already defined in this part of ISO 19115.

b) Test Method: each user-defined metadata class and metadata element is tested to ensure it is unique and not previously used.

c) Reference: Clause 6 and Annex B.

d) Test Type: Basic.

A.3.2 Test case identifier: Definition test

a) Test Purpose: to verify that user-defined metadata classes and metadata elements have been defined as specified in this part of ISO 19115.

b) Test Method: each user-defined metadata class and metadata element is tested to ensure that all attributes have been defined.

c) Reference: C.3.

d) Test Type: Basic.

A.3.3 Test case identifier: Standard metadata test

a) Test Purpose: to verify that user-defined metadata within a metadata set fulfils the same test requirements as the metadata of this part of ISO 19115.

b) Test Method: all user-defined metadata in a subject metadata set is tested in accordance with A.2 of this part of ISO 19115.

c) Reference: 2.3.

d) Test Type: Basic.

A.4 Metadata profiles — Test case identifier: Metadata profiles

a) Test Purpose: to verify that a profile follows the rules specified in this part of ISO 19115.

b) Test Method: apply tests defined in A.2 and A.3 of this part of ISO 19115.

c) Reference: 2.2.

d) Test Type: Basic.

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 6.2 to 6.7. The dictionary is specified in a hierarchy to establish relationships and an organisation for the information. The dictionary is categorised into sections equivalent to the UML model package diagrams. The table titles have been expanded to reflect class specification within the respective diagram. Each model diagram from 6.2, 6.5, 6.6 and 6.7 has a set of tables within the data dictionary. Each UML model class along with its sub-class equates to a table in this data dictionary. The classes and metadata elements within the data dictionary are defined by six attributes (those attributes are in B.1.2 to B.1.7).

B.1.2 Name/role name

A label assigned to a metadata class or to a metadata element. Metadata class names start with an upper case letter. Spaces do not appear in a metadata class name. Instead, multiple words are concatenated, with each new subword starting with a capital letter (example: XnnnYmmm). Metadata class names are unique within the entire data dictionary of this part of ISO 19115. Metadata element names are unique within a metadata class, not the entire data dictionary of this part of ISO 19115. Metadata element names are made unique, within an application, by the combination of the metadata class 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.

B.1.3 Definition

The metadata class/element description.

B.1.4 Obligation/Condition

B.1.4.1 General

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

B.1.4.2 Mandatory (M):

The metadata class or metadata element shall be documented.

B.1.4.3 Conditional (C):

Specifies a condition that can be processed by a machine under which at least one metadata class 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 class 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 (e.g. Table B.2, row 17 "C / not defined by encoding and UFT-8 not used?"). If the answer to the condition is true, then the metadata class or the metadata element shall be mandatory.

B.1.4.4 Optional (O):

The metadata class or the metadata element may or may not be documented. Optional metadata classes 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 information users and producers world-wide.) If an optional class is not used, the elements contained within that class (including mandatory elements) will also not be used.

NOTE Optional classes can have mandatory elements; those elements only become mandatory if the optional class is used.

B.1.5 Maximum occurrence

Specifies the maximum number of instances the metadata class or the metadata element may have. Single occurrences are shown by "1"; repeating, unbounding, 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.1.6 Data type

Specifies a set of distinct values for representing the metadata elements; for example, integer, real, string, DateTime, and Boolean.

B.1.7 Domain

For a class, the domain indicates the line numbers covered by that class.

For a metadata element, the domain specifies the values allowed. The use of free text indicating unrestricted textual information in one or many languages are used for the content of the field, or "unspecified domain" which may be any alpha- numeric set of characters.

Table B.1 — Metadata application information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
1.	***DS_Resource***	**an identifiable asset or means that fulfils a requirement**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Class <<Abstract>>**	**Lines 2-3**
2.	*Role name:* has	resource has related metadata	M	N	Association	MD_Metadata (Table B.2)
3.	*Role name:* partOf	resource is a component of an aggregate resource	O	N	Association	*DS_Aggregate* (Table B.1)
4.	**DS_DataSet**	**identifiable collection of data**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Resource)**	**Lines 2-3**
5.	**SV_Service**	**capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Resource)**	**Lines 2-3**
6.	***DS_Aggregate***	**collection of resources**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Resource) <<Abstract>>**	**Lines 2-3**
7.	*Role name:*composedOf	aggregate is composed of multiple resources	M	N	Association	*DS_Resource* (Table B.1)
8.	**DS_OtherAggregate**	**collection of resource associated through unspecified means**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Aggregate)**	**Lines 2-3 and 7**
9.	**DS_StereoMate**	**collection of image datasets covering the same subject from different perspectives providing a stereo view**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_OtherAggregate)**	**Lines 2-3 and 7**
10.	**DS_Initiative**	**collection of associated resources related by their participation in a common initiative**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Aggregate)**	**Lines 2-3 and 7**
11.	**DS_Series**	**collection of resource related by a common heritage adhering to a common specification**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (DS_Aggregate)**	**Lines 2-3 and 7**
NOTE: The UML model for this table is shown in Figure 1.						

Table B.1 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
12.	DS_Platform	collection of associated resources produced from the same sensor platform	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DS_Series)	Lines 2-3 and 7
13.	DS_Sensor	collection of associated resources produced by the same sensor	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DS_Series)	Lines 2-3 and 7
14.	DS_ProductionSeries	collection of associated resources produced to the same production specification	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (DS_Series)	Lines 2-3 and 7
NOTE: The UML model for this table is shown in Figure 1.						

Table B.2 — Metadata information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
15.	**MD_Metadata**	**root entity which defines metadata about a resource or resources**	**M**	**Use maximum occurrence from referencing object if referenced from DS_Resource**	**Class**	**Lines 16-38**
16.	metadataIdentifier	unique Identifier for this metadata record	O	1	Class	MD_Identifier (Table B.17.2)
17.	defaultLocale	language and character set used for documenting metadata	C / not defined by encoding and UTF-8 not used?	1	Class	PT_Locale (Table B.18.2)
18.	parentMetadata	identification of the parent metadata record	C / If there is an upper level object	1	Class	CI_Citation (Table B.16)
19.	contact	party responsible for the metadata information	M	N	Class	CI_Responsibility (Table B.16.1)
20.	dateInfo	date(s) associated with the metadata NOTE Creation" date must be provided, others can also be provided.	M	N	Class	CI_Date (Table B.16.5)
21.	metadataStandard	citation for the standard to which the metadata conforms NOTE Metadata standard citations should include an identifier.	O	N	Class	CI_Citation (Table B.16)
22.	metadataProfile	citation for the profile(s) of the metadata standard to which the metadata conforms NOTE Metadata profile citations should include an identifier.	O	N	Class	CI_Citation (Table B.16)
23.	alternativeMetadataReference	reference to alternative metadata, e.g Dublin Core, FGDC, or metadata in a non-ISO standard for the same resource	O	N	Class	CI_Citation (Table B.16)
24.	otherLocale	provides information about alternatively used localised character strings	O	N	Class	PT_Locale (Table B.18.2)
25.	metadataLinkage	online location where the metadata is available	O	N	Class	CI_OnlineResource (Table B.16.6)
26.	*Role name*:spatialRepresentationInfo	digital representation of spatial information in the resource	O	N	Association	MD_SpatialRepresentation <<Abstract>> (Table B.7)
27.	*Role name:*referenceSystemInfo	description of the spatial and temporal reference systems used in the resource	O	N	Association	MD_ReferenceSystem (Table B.8)
NOTE: The UML model for this table is shown in Figures 4 and 5.						

Table B.2 *(continued)*

28.	*Role name*:metadataExtensionInfo	information describing metadata extensions	0	N	Association	MD_MetadataExtension Information (Table B.12)
29.	*Role name*:identificationInfo	basic information about the resource(s) to which the metadata applies	M	N	Association	*MD_Identification (*Table B.3*)* <<Abstract>> NOTE Caution should be taken regarding the use of multiple instances of MD_Identification. See Annex E.
30.	*Role name*:contentInfo	information about feature and coverage characteristics	0	N	Association	MD_ContentInformation <<Abstract>> (Table B.9)
31.	*Role name*:distributionInfo	information about the distributor of and options for obtaining the resource(s)	0	N	Association	MD_Distribution (Table B.11)
32.	*Role name*:dataQualityInfo	overall assessment of quality of a resource(s)	0	N	Association	DQ_DataQuality (ISO 19157)
33.	*Role name*:portrayalCatalogueInfo	information about the catalogue of rules defined for the portrayal of a resource(s)	0	N	Association	MD_PortrayalCatalogue Reference (Table B.10)
34.	*Role name:*metadataConstraints	restrictions on the access and use of metadata	0	N	Association	MD_Constraints (Table B.4)
35.	*Role name:*applicationSchemaInfo	information about the conceptual schema of a resource	0	N	Association	MD_ApplicationSchema Information (Table B.13)
36.	*Role name:*metadataMaintenance	information about the frequency of metadata updates, and the scope of those updates	0	1	Association	MD_MaintenanceInformation (Table B.6)
37.	*Role name:*resourceLineage	information about the provenance, source(s), and/or the production process(es) applied to the resource	0	N	Association	LI_Lineage (Table B.5)
38.	*Role name:*metadataScope	the scope/type of resource for which metadata is provided	C / Metadata is about a resource other than a dataset?	N	Association	MD_MetadataScope (Table B.2.1)
NOTE: The UML model for this table is shown in Figures 4 and 5.						

Table B.2.1 — Metadata scope information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
39.	**MD_MetadataScope**	**information about the scope of the resource**	**Use obligation from referencing object**	**Use maximum occurrence from referenc-ing object**	**Class**	**Lines 40-41**
40.	resourceScope	code for the scope	M Default = “dataset”	1	Class	MD_ScopeCode <<CodeList>>(B.3.28)
41.	name	description of the scope	O	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figures 4 and 5.						

Table B.3 — Identification information (includes data and service identification)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
42.	***MD_Identification***	**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 43-62** **NOTE Caution regarding the use of multiple instances of this class. See Annex E.**
43.	citation	citation for the resource	M	1	Class	CI_Citation (Table B.16)
44.	abstract	brief narrative summary of the resource	M	1	CharacterString	Free text
45.	purpose	summary of the intentions with which the resource was developed	O	1	CharacterString	Free text
46.	credit	recognition of those who contributed to the resource	O	N	CharacterString	Free text
47.	status	status of the resource	O	N	Class	MD_ProgressCode <<CodeList>> (B.3.25)
48.	pointOfContact	identification of, and means of communication with, person(s) and organisation(s) associated with the resource	O	N	Class	CI_Responsibility (Table B.16.1)
49.	spatialRepresentationType	method used to spatially represent geographic information	O	N	Class	MD_SpatialRepresentationTypeCode <<CodeList>> (B.3.29)
50.	spatialResolution	factor which provides a general understanding of the density of spatial data in the resource or describes the range of resolutions in which a digital resource may be used NOTE This element should be repeated when describing upper and lower range.	O	N	Class	MD_Resolution <<Union>> (Table B.3.4)
51.	temporalResolution	smallest resolvable temporal period in a resource	O	N	Class	TM_Duration (B.2.4)
52.	topicCategory	main theme(s) of the resource	C / is metadataScope/ resourceScope equal "dataset" or "series"?	N	Class	MD_TopicCategoryCode <<Enumeration>> (B.3.30)

NOTE 1: The UML model for this table is shown in Figure 6.

NOTE 2: SV_ServiceIdentification is introduced in Table B.14.

Table B.3 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
53.	extent	spatial and temporal extent of the resource	C / is metadataScope/ resourceScope equal "dataset"? if yes, either extent.geographic Element.EX_ GeographicBoundingBox or extent.geographic Element.EX_ Geographic Description is required	N	Class	EX_Extent (Table B.15)
54.	additionalDocumentation	other documentation associated with the resource EXAMPLE Related articles, publications, user guides, data dictionaries.	O	N	Class	CI_Citation (Table B.16)
55.	processingLevel	code that identifies the level of processing in the producers coding system of a resource EXAMPLE NOAA level 1B.	O	1	Class	MD_Identifier <<DataType>> (Table B.17.2)
56.	*Role name:*resourceMaintenance	information about the frequency of resource updates, and the scope of those updates	O	N	Association	MD_MaintenanceInformation (Table B.6)
57.	*Role name:*graphicOverview	graphic that illustrates the resource (should include a legend for the graphic)	O	N	Association	MD_BrowseGraphic (Table B.17.3)
58.	*Role name:*resourceFormat	description of the format of the resource	O	N	Association	MD_Format (Table B.11.3)
59.	*Role name:*descriptiveKeywords	category keywords, their type, and reference source	O	N	Association	MD_Keywords (Table B.3.1)
60.	*Role name:*resourceSpecificUsage	basic information about specific application(s) for which the resource has been or is being used by different users	O	N	Association	MD_Usage (Table B.3.5)
61.	*Role name:*resourceConstraints	information about constraints which apply to the resource	O	N	Association	MD_Constraints (Table B.4)
62.	*Role name:*associatedResource	associated resource information	O	N	Association	MD_AssociatedResource (Table B.3.6)
63.	**MD_DataIdentification**	**information required to identify a resource**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_ Identification)**	**Lines 43-62 and 64-67**

NOTE 1: The UML model for this table is shown in Figure 6.

NOTE 2: SV_ServiceIdentification is introduced in Table B.14.

Table B.3 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
64.	defaultLocale	language and character set used within the resource	C / language used in resource?	1	Class	PT_Locale (Table B.18.2)
65.	otherLocale	alternate localised language(s) and character set (s) used within the resource	O	N	Class	PT_Locale (Table B.18.2)
66.	environmentDescription	description of the resource in the producer's processing environment, including items such as the software, the computer operating system, file name and size	O	1	CharacterString	Free text
67.	supplementalInformation	any other descriptive information about the resource	O	1	CharacterString	Free text
NOTE 1: The UML model for this table is shown in Figure 6. NOTE 2: SV_ServiceIdentification is introduced in Table B.14.						

Table B.3.1 — Keyword information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
68.	**MD_Keywords**	**keywords, their type and reference source** NOTE When the resource described is a service, one instance of MD_Keyword should refer to the service taxonomy defined in ISO 19119).	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Identification)**	**Lines 69-72**
69.	keyword	commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject	M	N	CharacterString	Free text
70.	type	subject matter used to group similar keywords	O	1	Class	MD_KeywordTypeCode <<CodeList>> (B.3.20)
71.	thesaurusName	name of the formally registered thesaurus or a similar authoritative source of keywords	O	1	Class	CI_Citation (Table B.16)
72.	*Role name:*keywordClass	association of a MD_Keywords instance with a MD_KeywordClass to provide user-defined categorization of groups of keywords that extend or are orthogonal to the standardized KeywordTypeCodes and are associated with an ontology that allows additional semantic query processing NOTE The thesaurus citation specifies a collection of instances from some ontology, but is not an ontology. It might be a list of places that include rivers, mountains, counties and cities. There might be a Laconte county, the city of Laconte, the Laconte River, and Mt. Laconte; when searching it is useful for the user to be able to restrict the search to only rivers.	O	1	Class	MD_KeywordClass (Table B.3.2)
NOTE: The UML model for this table is shown in Figure 6.						

Table B.3.2 — Keyword class

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
73.	**MD_KeywordClass**	**specification of a class to categorize keywords in a domain-specific vocabulary that has a binding to a formal ontology**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Keywords)**	**Lines 74-76**
74.	className	character string to label the keyword category in natural language	M	1	CharacterString	Free text
75.	conceptIdentifier	URI of concept in the ontology specified by the next element (ontology) and labelled by the previous element (className)	O	1	Class	URI (B.2.9)
76.	ontology	reference that binds the keyword class to a formal conceptualization of a knowledge domain for use in semantic processing NOTE Keywords in the associated MD_Keywords keyword list must be within the scope of this ontology.	M	1	Class	CI_Citation (Table B.16)
NOTE: The UML model for this table is shown in Figure 6.						

Table B.3.3 — Representative fraction information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
77.	**MD_RepresentativeFraction**	**derived from** ISO/TS 19103 **Scale where MD_Representative Fraction. denominator = 1 / Scale. measure And Scale.targetUnits = Scale.sourceUnits**	**Use obligation from referencing object**	**Use maximum occurrence from referenc-ing object**	**Class <<DataType>>**	**Line 78**
78.	denominator	the number below the line in a vulgar fraction	M	1	Integer	Integer > 0
NOTE: The UML model for this table is shown in Figure 6.						

Table B.3.4 — Resolution information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
79.	**MD_Resolution**	**level of detail expressed as a scale factor, a distance or an angle**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Class <<Union>>**	**Lines 80-84**
80.	equivalentScale	level of detail expressed as the scale of a comparable hardcopy map or chart	C / distance, vertical, angularDistance, or levelOfDetail not documented?	1	Class	MD_RepresentativeFraction <<DataType>> (Table B.3.3)
81.	distance	horizontal ground sample distance	C / equivalentScale, vertical, angularDistance, or levelOfDetail not documented?	1	Class	Distance (B.2.3)
82.	vertical	vertical sampling distance	C / distance, equivalentScale or angularDistance, or levelOfDetail not documented?	1	Class	Distance (B.2.3)
83.	angularDistance	angular sampling measure	C / distance, equivalentScale, vertical, or levelOfDetail not documented?	1	Class	Angle (B.2.3)
84.	levelOfDetail	brief textual description of the spatial resolution of the resource	C / distance, equivalentScale, vertical or angularDistance not documented?	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 6.						

Table B.3.5 — Usage information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
85.	**MD_Usage**	**brief description of ways in which the resource(s) is/are currently or has been used**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Identification)**	**Lines 86-92**
86	specificUsage	brief description of the resource and/or resource series usage	M	1	CharacterString	Free text
87.	usageDateTime	date and time of the first use or range of uses of the resource and/or resource series	O	N	Class	TM_Primitive (B.2.4)
88.	userDeterminedLimitations	applications, determined by the user for which the resource and/or resource series is not suitable	O	1	CharacterString	Free text
89.	userContactInfo	identification of and means of communicating with person(s) and organisation(s) using the resource(s)	O	N	Class	CI_Responsibility (Table B.16.1)
90.	response	response to the user-determined limitations EXAMPLE "This has been fixed in version x."	O	N	CharacterString	Free text
91.	additionalDocumentation	publications that describe usage of data	O	N	Class	CI_Citation (Table B.16)
92.	identifiedIssues	citation of a description of known issues associated with the resource along with proposed solutions if available	O	N	Class	CI_Citation (Table B.16)
NOTE: The UML model for this table is shown in Figure 6.						

Table B.3.6 — Association information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
93.	**MD_AssociatedResource**	**associated resource information**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Identification)**	**Lines 94-97**
94.	name	citation information about the associated resource	C / if metadataReference not documented?	1	Class	CI_Citation (Table B.16)
95.	associationType	type of relation between the resources	M	1	Class	DS_AssociationTypeCode <<CodeList>> (B.3.8)
96.	initiativeType	type of initiative under which the associated resource was produced	O	1	Class	DS_InitiativeTypeCode <<CodeList>> (B.3.10)
97.	metadataReference	reference to the metadata of the associated resource	C / if name not documented?	1	Class	CI_Citation (Table B.16)

Table B.4 — Constraint information (includes legal and security)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
98.	**MD_Constraints**	**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)**	**Lines 99-104**
99.	useLimitation	limitation affecting the fitness for use of the resource or metadata EXAMPLE Not to be used for navigation."	O	N	CharacterString	Free text
100.	constraintApplicationScope	spatial and/or temporal extent and or level of the application of the constraint restrictions	O	1	Class	MD_Scope (Table B.17)
101.	graphic	graphic /symbol indicating the constraint EXAMPLE 	O	N	Class	MD_BrowseGraphic (Table B.17.3)
102.	reference	citation for the limitation or constraint EXAMPLE Copyright statement, licence agreement, etc.	O	N	Class	CI_Citation (Table B.16)
103.	releasability	information concerning the parties to whom the resource can or cannot be released	O	1	Class	MD_Releasability (Table B.4.1)
104.	responsibleParty	party responsible for the resource constraints	O	N	Class	CI_Responsibility (Table B.16.1)
105.	**MD_LegalConstraints**	**restrictions and legal prerequisites for accessing and using the resource or metadata**	**Use obligation from referencing object**	**N**	**Specified Class (MD_Constraints)**	**Lines 99-104 and 106-108**
106.	accessConstraints	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata	C / useConstraints or otherConstraints, or useLimitation or releasability not exist?	N	Class	MD_RestrictionCode <<CodeList>> (B.3.27)
107.	useConstraints	constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata	C / accessConstraints or otherConstraints or useLimitation or releasability not exist?	N	Class	MD_RestrictionCode <<CodeList>> (B.3.27)
NOTE: The UML model for this table is shown in Figure 8.						

Table B.4 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
108.	otherConstraints	other restrictions and legal prerequisites for accessing and using the resource or metadata	C / accessConstraints or useConstraints or useLimitation or releasability not exist and accessConstraints or useConstraints = "otherRestrictions"?	N	CharacterString	Free text
109.	**MD_SecurityConstraints**	**handling restrictions imposed on the resource or metadata for national security or similar security concerns**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Constraints)**	**Lines 99-104 and 110-113**
110.	classification	name of the handling restrictions on the resource or metadata	M	1	Class	MD_ClassificationCode <<CodeList>> (B.3.13)
111.	userNote	explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the resource or metadata	O	1	CharacterString	Free text
112.	classificationSystem	name of the classification system	O	1	CharacterString	Free text
113.	handlingDescription	additional information about the restrictions on handling the resource or metadata	O	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 8.						

Table B.4.1 — Releasability information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
114.	**MD_Releasability**	**information about resource release constraints**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 115-117**
115.	addressee	party to which the release statement applies	C / statement not exist?	N	Class	CI_Responsibility (Table B.16.1)
116.	statement	release statement	C / addressee not exist?	1	CharacterString	free text
117.	disseminationConstraints	component in determining releasability	O	N	Class	MD_RestrictionCode <<CodeList>> (B.3.27)
NOTE: The UML model for this table is shown in Figure 8.						

Table B.5 — Lineage information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
118.	**LI_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 (MD_Metadata)**	**Lines 119-123**
119.	statement	general explanation of the data producer's knowledge about the lineage of a resource	O	1	CharacterString	Free text
120.	scope	type of resource and/or extent to which the lineage information applies	O	1	Class	MD_Scope (Table B.17)
121.	additionalDocumentation	resource EXAMPLE A publication that describes the whole process to generate this resource (e.g. a dataset).	O	N	Class	CI_Citation (Table B.16)
122.	*Role name:*processStep	information about events in the life of a resource specified by the scope	C / LI_Lineage.statement and source role not documented?	N	Association	LI_ProcessStep (Table B.5.1)
123.	*Role name:*source	information about the source data used in creating the data specified by the scope	C / LI_Lineage.statement and processStep role are documented?	N	Association	LI_Source (Table B.5.2)
NOTE: The UML model for this table is shown in Figure 9.						

Table B.5.1 — Process step information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
124.	**LI_ProcessStep**	**information about an event or transformation in the life of a resource including the process used to maintain the resource**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (LI_Lineage and LI_Source)**	**Lines 125-131**
125.	description	description of the event, including related parameters or tolerances	M	1	CharacterString	Free Text
126.	rationale	requirement or purpose for the process step	O	1	CharacterString	Free Text
127.	stepDateTime	date, time, range or period of process step	O	1	Class	TM_Primitive (B.2.4)
128.	processor	identification of, and means of communication with, person(s) and organisation(s) associated with the process step	O	N	Class	CI_Responsibility (Table B.16.1)
129.	reference	process step documentation	O	N	Class	CI_Citation (Table B.16)
130.	scope	type of resource and/or extent to which the process step applies	O	1	Class	MD_Scope (Table B.17)
131.	*Role name:*source	information about the source data used in creating the data specified by the scope	O	N	Association	LI_Source (Table B.5.2)
NOTE: The UML model for this table is shown in Figure 9.						

Table B.5.2 — Source information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
132.	**LI_Source**	**information about the resource used in creating the resource specified by the scope**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (LI_Lineage and LI_ProcessStep)**	**Lines 133-139**
133.	description	detailed description of the source	C / scope not provided?	1	CharacterString	Free Text
134.	sourceSpatialResolution	spatial resolution expressed as a scale factor, a distance, an angle or a level of detail	O	1	Class	MD_Resolution (Table B.3.4)
135.	sourceReferenceSystem	spatial reference system used by the source	O	1	Class	MD_ReferenceSystem (Table B.8)
136.	sourceCitation	recommended reference to be used for the source	O	1	Class	CI_Citation (Table B.16)
137.	sourceMetadata	reference to metadata for the source	O	N	Class	CI_Citation (Table B.16)
138.	scope	type and/or extent of the source	C / description not provided?	1	Class	MD_Scope (Table B.17)
139.	*Role name:*sourceStep	information about a process step in which this source was used	O	N	Association	LI_ProcessStep (Table B.5.1)
NOTE: The UML model for this table is shown in Figure 9.						

Table B.6 — Maintenance information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
140.	**MD_MaintenanceInformation**	**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 141-146**
141.	maintenanceAndUpdateFrequency	frequency with which changes and additions are made to the resource after the initial resource is completed	C / userDefinedMaintenanceFrequency not provided?	1	Class	MD_MaintenanceFrequencyCode <<CodeList>> (B.3.21)
142.	maintenanceDate	date information associated with maintenance of resource	O	N	Class	CI_Date (Table B.16.5)
143.	userDefinedMaintenanceFrequency	maintenance period other than those defined	C / maintenanceAndUpdateFrequency not provided?	1	Class	TM_PeriodDuration (B.2.4)
144.	maintenanceScope	type of resource and/or extent to which the maintenance information applies	O	N	Class	MD_Scope (Table B.17)
145.	maintenanceNote	information regarding specific requirements for maintaining the resource	O	N	CharacterString	Free text
146.	contact	identification of, and means of communicating with, person(s) and organisation(s) with responsibility for maintaining the resource	O	N	Class	CI_Responsibility (Table B.16.1)
NOTE: The UML model for this table is shown in Figure 10.						

Table B.7 — Spatial representation information (includes grid and vector representation)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
147.	***MD_SpatialRepresentation***	**digital mechanism used to represent spatial information**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata) <<Abstract>>**	
148.	**MD_GridSpatial Representation**	**information about grid spatial objects in the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Spatial Representation)**	**Lines 149-152**
149.	numberOfDimensions	number of independent spatial-temporal axes	M	1	Integer	Integer
150.	axisDimensionProperties	information about spatial-temporal axis properties	M	N	Sequence (B.2.6)	MD_Dimension <<DataType>> (Table B.7.1)
151.	cellGeometry	identification of grid data as point or cell	M	1	Class	MD_CellGeometryCode <<CodeList>> (B.3.12)
152.	transformationParameter Availability	indication of whether or not parameters for transformation between image coordinates and geographic or map coordinates exist (are available)	M	1	Boolean	0 = no 1 = yes
153.	**MD_Georectified**	**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_GridSpatial Representation)**	**Lines 149-152 and 154-160**
154.	checkPointAvailability	indication of whether or not geographic position points are available to test the accuracy of the georeferenced grid data	M	1	Boolean	0 = no 1 = yes
155.	checkPointDescription	description of geographic position points used to test the accuracy of the georeferenced grid data	C / checkPointAvailability = "yes"?	1	CharacterString	Free text
156.	cornerPoints	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 NOTE There are four corner points in a georectified grid; at least two corner points along one diagonal are required. The first corner point corresponds to the origin of the grid.	O	2 - 4	Sequence (B.2.6)	GM_Point <<Type>> (B.2.5)

NOTE: The UML model for this table is shown in Figure 11.

Table B.7 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
157.	centrePoint	earth location in the coordinate system defined by the Spatial Reference System and the grid coordinate of the cell half-way between opposite ends of the grid in the spatial dimensions	O	1	Class	GM_Point <<Type>> (B.2.5)
158.	pointInPixel	point in a pixel corresponding to the Earth location of the pixel	M	1	Class	MD_PixelOrientationCode <<Enumeration>> (B.3.24)
159.	transformationDimension Description	general description of the transformation	O	1	CharacterString	Free text
160.	transformationDimension Mapping	information about which grid axes are the spatial (map) axes	O	2	CharacterString	Free text
161.	**MD_Georeferenceable**	**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_GridSpatial Representation)**	**Lines 149-152 and 162-166**
162.	controlPointAvailability	indication of whether or not control point(s) exists	M	1	Boolean	0 = no 1 = yes
163.	orientationParameterAvailability	indication of whether or not orientation parameters are available	M	1	Boolean	0 = no 1 = yes
164.	orientationParameterDescription	description of parameters used to describe sensor orientation	O	1	CharacterString	Free text
165.	georeferencedParameters	terms which support grid data georeferencing	M	1	Class	Record (B.2.3)
166.	parameterCitation	reference providing description of the parameters	O	N	Class	CI_Citation (Table B.16)
167.	**MD_VectorSpatial Representation**	**information about the vector spatial objects in the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Spatial Representation)**	**Lines 168-169**
168.	topologyLevel	code which identifies the degree of complexity of the spatial relationships	O	1	Class	MD_TopologyLevelCode <<CodeList>> (B.3.31)
169.	geometricObjects	information about the geometric objects used in the resource	O	N	Class	MD_GeometricObjects <<DataType>> (Table B.7.2)
NOTE: The UML model for this table is shown in Figure 11.						

Table B.7.1 — Dimension information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
170.	**MD_Dimension**	**axis properties**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class <<DataType>>**	**Lines 171-175**
171.	dimensionName	name of the axis	M	1	Class	MD_DimensionNameType Code <<CodeList>> (B.3.17)
172.	dimensionSize	number of elements along the axis	M	1	Integer	Integer
173.	resolution	degree of detail in the grid dataset	O	1	Class	Measure (B.2.3)
174.	dimensionTitle	enhancement/modifier of the dimension name EXAMPLE dimensionName = "column" dimensionTitle = "Longitude"	O	1	CharacterString	Free text
175.	dimensionDescription	description of the axis	O	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 11.						

Table B.7.2 — Geometric object information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
176.	**MD_GeometricObjects**	**number of objects, listed by geometric object type, used in the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class <<DataType>>**	**Lines 177-178**
177.	geometricObjectType	name of point or vector objects used to locate zero-, one-, two-, or three-dimensional spatial locations in the resource	M	1	Class	MD_GeometricObjectType Code <<CodeList>> (B.3.18)
178.	geometricObjectCount	total number of the point or vector object type occurring in the dataset	O	1	Integer	> 0
NOTE: The UML model for this table is shown in Figure 11.						

Table B.8 — Reference system information (includes identifier and type)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
179.	**MD_ReferenceSystem**	**information about the reference system**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata)**	**Line 180-181**
180.	referenceSystemIdentifier	identifier and codespace for reference system NOTE Refer to SC_CRS in ISO 19111 and ISO 19111-2 when coordinate reference system information is not given through reference system identifier. EXAMPLE EPSG::4326	0	1	Class	MD_Identifier (Table B.17.2)
181.	referenceSystemType	type of reference system used EXAMPLE compoundGeographic2DParametric	0	1	Class	MD_ReferenceSystemTypeCode <<CodeList>> (B.3.26)
NOTE: The UML model for this table is shown in Figure 12.						

Table B.9 — Content information (includes Feature catalogue and Coverage descriptions)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
182.	**MD_ContentInformation**	**description of the content of a resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata) <<Abstract>>**	
183.	**MD_FeatureCatalogue Description**	**information identifying the feature catalogue or the conceptual schema**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_ContentInformation)**	**Lines 184-188**
184.	complianceCode	indication of whether or not the cited feature catalogue complies with ISO 19110	O	1	Boolean	0 = no 1 = yes
185.	locale	language(s) and character set(s) used within the catalogue	O	N	Class	PT_Locale (Table B.18.2)
186.	includedWithDataset	indication of whether or not the feature catalogue is included with the resource	O	1	Boolean	0 = no 1 = yes
187.	featureTypes	subset of feature types from cited feature catalogue occurring in resource and count of feature instances	O	N	Class	MD_FeatureTypeInfo (Table B.9.3)
188.	featureCatalogueCitation	complete bibliographic reference to one or more external feature catalogues	C / Feature Catalogue not included with resource and MD_FeatureCatalogue not provided?	N	Class	CI_Citation (Table B.16)
189.	**MD_FeatureCatalogue**	**a catalogue of feature types**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_ContentInformation)**	**Line 190**
190.	featureCatalogue	the catalogue of feature types, attribution, operations, and relationships used by the resource	M	N	Class	FC_FeatureCatalogue (ISO 19110)
191.	**MD_CoverageDescription**	**details about the content of a resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Content Information)**	**Lines 192-194**
192.	attributeDescription	description of the attribute described by the measurement value	M	1	Class	RecordType (B.2.3)
193.	processingLevelCode	identifier for the level of processing that has been applied to the resource	O	1	Class	MD_Identifier (Table B.17.2)
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
194.	*Role name:*attributeGroup	information on groups(s) of related attributes of the resource with the same type	O	N	Class	MD_AttributeGroup (Table B.9.1)
195.	**MD_ImageDescription**	**information about an image's suitability for use**	**Use obligation/ condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Coverage Description)**	**Lines 192-194 and 196-206**
196.	illuminationElevationAngle	illumination elevation measured in degrees clockwise from the target plane at intersection of the optical line of sight with the Earth's surface NOTE For images from a scanning device, refer to the centre pixel of the image.	O	1	Real	-90 – 90
197.	illuminationAzimuthAngle	illumination azimuth measured in degrees clockwise from true north at the time the image is taken NOTE For images from a scanning device, refer to the centre pixel of the image.	O	1	Real	0,00 – 360
198.	imagingCondition	conditions affected the image	O	1	Class	MD_ImagingConditionCode <<CodeList>> (B.3.19)
199.	imageQualityCode	code in producer's codespace that specifies the image quality	O	1	Class	MD_Identifier <<DataType>> (Table B.17.2)
200.	cloudCoverPercentage	area covered by the resource obscured by clouds, expressed as a percentage of the spatial extent	O	1	Real	0,0 – 100,0
201.	compressionGenerationQuantity	count of the number of lossy compression cycles performed on the image	O	1	Integer	Integer
202.	triangulationIndicator	indication of whether or not triangulation has been performed upon the image	O	1	Boolean	0 = no 1 = yes
203.	radiometricCalibrationData Availability	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
204.	cameraCalibrationInformation Availability	indication of whether or not constants are available which allow for camera calibration corrections	O	1	Boolean	0 = no 1 = yes
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
205.	filmDistortionInformation Availability	indication of whether or not Calibration Research information is available	O	1	Boolean	0 = no 1 = yes
206.	lensDistortionInformation Availability	indication of whether or not lens aberration correction information is available	O	1	Boolean	0 = no 1 = yes
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9.1 — Attribute group information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
207.	**MD_AttributeGroup**	**Information about contentType for groups of attributes for a specific MD_RangeDimension**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Coverage Description)**	**Lines 208-209**
208.	contentType	type of information represented by the value(s)	M	N	Class	MD_CoverageContentType Code <<CodeList>> (B.3.15)
209.	*Role name:*attribute	information on an attribute of the resource	O	N	Class	MD_RangeDimension (Table B.9.2)
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9.2 — Range dimension information (includes Band information)

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
210.	**MD_RangeDimension**	**information on the range of attribute values**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Coverage Description)**	**Lines 211-213**
211.	sequenceIdentifier	unique name or number that identifies attributes included in the coverage	O	1	Class	MemberName (B.2.7)
212.	description	description of the attribute	O	1	CharacterString	Free text
213.	name	identifiers for each attribute included in the resource NOTE These identifiers can be used to provide names for the attribute from a standard set of names.	O	N	Class	MD_Identifier (Table B.17.2)
214.	**MD_SampleDimension**	**the characteristics of each dimension (layer) included in the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_RangeDimension)**	**Lines 211-213 and 215-225**
215.	maxValue	maximum value of data values in each dimension included in the resource NOTE Restricted to UomLength in the MD_Band class.	O	1	Real	real number
216.	minValue	minimum value of data values in each dimension included in the resource NOTE Restricted to UomLength in the MD_Band class.	O	1	Real	real number
217.	units	units of data in each dimension included in the resource NOTE The type of this is UnitsOfMeasure and that it is restricted to UomLength in the MD_Band class.	C / minValue, maxValue or meanValue provided?	1	Class	UnitsOfMeasure (B.2.3) restricted to UomLength in the MD_Band class
218.	scaleFactor	scale factor which has been applied to the cell value	O	1	Real	real number
219.	offset	the physical value corresponding to a cell value of zero	O	1	Real	real number
220.	meanValue	mean value of data values in each dimension included in the resource	O	1	Real	real number
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9.2 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
221.	numberOfValues	the number of values used in a thematic-Classification resource EXAMPLE The number of classes in a Land Cover Type coverage or the number of cells with data in other types of coverages.	O	1	Integer	Number
222.	standardDeviation	standard deviation of data values in each dimension included in the resource	O	1	Real	real number
223.	otherPropertyType	type of other attribute description (i.e. netcdf/variable in gml.xsd)	O	1	Class	RecordType (B.2.3)
224.	otherProperty	instance of otherAttributeType that defines attributes not explicitly included in MD_CoverageType	O	1	Class	Record (B.2.3)
225.	bitsPerValue	maximum number of significant bits in the uncompressed representation for the value in each band of each pixel	O	1	Integer	number
226.	**MD_Band**	**range of wavelengths in the electro-magnetic spectrum**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_SampleDimension)**	**Lines 211-213, 215-225 and 227-231**
227.	boundMax	longest wavelength that the sensor is capable of collecting within a designated band	O	1	Real	real number
228.	boundMin	shortest wavelength that the sensor is capable of collecting within a designated band	O	1	Real	real number
229.	boundUnit	units in which sensor wavelengths are expressed	C / boundMax or boundMin provided?	1	Class	UomLength (B.2.3)
230.	peakResponse	wavelength at which the response is the highest	O	1	Real	real number
231.	toneGradation	number of discrete numerical values in the data	O	1	Integer	number
NOTE: The UML model for this table is shown in Figure 13.						

Table B.9.3 — Feature type information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
232.	**MD_FeatureTypeInfo**	**Information about the occurring feature type**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_FeatureCatalogueDescription)**	**Lines 233-234**
233.	featureTypeName	name of the feature type	M	1	Class	GenericName (B.2.7)
234.	featureInstanceCount	number of occurrence of feature instances for this feature type	O	1	Integer	>0
NOTE: The UML model for this table is shown in Figure 13.						

Table B.10 — Portrayal catalogue information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
235.	**MD_PortrayalCatalogue Reference**	**information identifying the portrayal catalogue used**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata)**	**Line 236**
236.	portrayalCatalogueCitation	bibliographic reference to the portrayal catalogue cited	M	N	Class	CI_Citation (Table B.16)
NOTE: The UML model for this table is shown in Figure 11.						

Table B.11 — Distribution information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
237.	**MD_Distribution**	**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 238-241**
238.	description	brief description of a set of distribution options	O	1	CharacterString	Free text
239.	*Role name:*distributionFormat	provides a description of the format of the data to be distributed	O	N	Class	MD_Format (Table B.11.3)
240.	*Role name:*distributor	provides information about the distributor	O	N	Class	MD_Distributor (Table B.11.2)
241.	*Role name:*transferOptions	provides information about technical means and media by which a resource is obtained from the distributor	O	N	Class	MD_DigitalTransferOptions (Table B.11.1)
NOTE: The UML model for this table is shown in Figure 15.						

Table B.11.1 — Digital transfer options information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
242.	**MD_DigitalTransferOptions**	**technical means and media by which a resource is obtained from the distributor**	**Use obligation/condition from referencing object** **(If this class is used at least one attribute must be provided)**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Distribution and MD_Distributor)**	**Lines 243-248**
243.	unitsOfDistribution	tiles, layers, geographic areas, etc., in which data are available NOTE unitsOfDistribution" applies to both onLine and offLine distributions	O	1	CharacterString	Free text
244.	transferSize	estimated size of a unit in the specified transfer format, expressed in megabytes NOTE The transfer size is > 0,0	O	1	Real	> 0,0
245.	onLine	information about online sources from which the resource can be obtained	O	N	Class	CI_OnlineResource (Table B.16.6)
246.	offLine	information about offline media on which the resource can be obtained	O	N	Class	MD_Medium (Table B.11.4) <<DataType>>
247.	transferFrequency	rate of occurrence of distribution	O	1	Class	TM_PeriodDuration (B.2.4)
248.	distributionFormat	format of distribution	O	N	Class	MD_Format (Table B.11.3)
NOTE: The UML model for this table is shown in Figure 15.						

Table B.11.2 — Distributor information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
249.	**MD_Distributor**	**information about the distributor**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Distribution and MD_Format)**	**Lines 250-253**
250.	distributorContact	party from whom the resource may be obtained. This list need not be exhaustive	M	1	Class	CI_Responsibility (Table B.16.1)
251.	*Role name:*distributionOrderProcess	provides information about how the resource may be obtained and related instructions and fee information	O	N	Class	MD_StandardOrderProcess (Table B.11.5)
252.	*Role name:*distributorFormat	provides information about the format used by the distributor	O	N	Class	MD_Format (Table B.11.3)
253.	*Role name:*distributorTransferOptions	provides information about the technical means and media used by the distributor	O	N	Class	MD_DigitalTransferOptions (Table B.11.1)
NOTE: The UML model for this table is shown in Figure 15.						

Table B.11.3 — Format information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
254.	**MD_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, MD_Identification, and MD_Distributor)**	**Lines 255-259**
255.	formatSpecificationCitation	citation/URL of the specification for the format	M	1	Class	CI_Citation (Table B.16)
256.	amendmentNumber	amendment number of the format version	O	1	CharacterString	Free text
257.	fileDecompressionTechnique	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
258.	medium	medium used by the format	O	N	Class	MD_Medium (Table B.11.4)
259.	*Role name:*formatDistributor	provides information about the distributor of the format	O	N	Class	MD_Distributor (Table B.11.2)
NOTE: The UML model for this table is shown in Figure 15.						

Table B.11.4 — Medium information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
260.	**MD_Medium**	**information about the media on which the resource can be stored (resourceFormat) or distributed**	**Use obligation/condition from referencing object** **(If this class is used at least one attribute must be provided)**	**Use maximum occurrence from referencing object**	**Class <<DataType>>**	**Lines 261-267**
261.	name	name of the medium on which the resource can be stored (resourceFormat) or distributed	O	1	Class	CI_Citation (Table B.16)
262.	density	density at which the data are recorded	O	1	Real	> 0,0
263.	densityUnits	units of measure for the recording density	O	1	CharacterString	Free text
264.	volumes	number of items in the media identified	O	1	Integer	> 0
265.	mediumFormat	method used to write to the medium	O	N	Class	MD_MediumFormatCode <<CodeList>> (B.3.22)
266.	mediumNote	description of other limitations or requirements for using the medium	O	1	CharacterString	Free text
267.	identifier	unique identifier for an instance of the MD_Medium	O	1	Class	MD_Identifier (Table B.17.2)

NOTE: The UML model for this table is shown in Figure 15.

Table B.11.5 — Standard order process information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
268.	**MD_StandardOrderProcess**	**common ways in which the resource may be obtained or received, and related instructions and fee information**	**Use obligation/condition from referencing object** **(If this class is used at least one attribute must be provided)**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Distributor)**	**Lines 269-274**
269.	fees	fees and terms for retrieving the resource. Include monetary units (as specified in ISO 4217)	O	1	CharacterString	Free text
270.	plannedAvailableDateTime	date and time when the resource will be available	O	1	Class	DateTime (B.2.2)
271.	orderingInstructions	general instructions, terms and services provided by the distributor	O	1	CharacterString	Free text
272.	turnaround	typical turnaround time for the filling of an order	O	1	CharacterString	Free text
273.	orderOptionsType	description of the order options record	O	1	Class	RecordType (B.2.3)
274.	orderOptions	request/purchase choices	O	1	Class	Record (B.2.3)
NOTE: The UML model for this table is shown in Figure 15.						

Table B.12 — Metadata extension information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
275.	**MD_MetadataExtension Information**	**information describing metadata extensions**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata)**	**Lines 276-277**
276.	extensionOnLineResource	information about on-line sources containing the community profile name, the extended metadata elements and information for all new metadata elements information about on-line sources containing the community profile name, the extended metadata elements and information for all new metadata elements	O	N	Class	CI_OnlineResource (Table B.16.6)
277.	*Role name:*extendedElementInformation	provides information about a new metadata element, not found in ISO 19115, which is required to describe the resource	O	N	Class	MD_ExtendedElement Information (Table B.12.1)
NOTE: The UML model for this table is shown in Figure 16.						

Table B.12.1 — Extended element information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
278.	**MD_ExtendedElementInformation**	**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_Metadata ExtensionInformation)**	**Lines 279-291**
279.	name	name of the extended metadata element	C / dataType not "codelist", "enumeration" or "codelistElement"?	1	CharacterString	Free text
280.	definition	definition of the extended element	M	1	CharacterString	Free text
281.	obligation	obligation of the extended element	C / dataType not "codelist", "enumeration" or "codelistElement"?	1	Class	MD_ObligationCode <<Enumeration>> (B.3.23)
282.	condition	condition under which the extended element is mandatory	C / obligation = "Conditional"?	1	CharacterString	Free text
283.	dataType	code which identifies the kind of value provided in the extended element	M	1	Class	MD_DatatypeCode <<CodeList>> (B.3.16)
284.	maximumOccurrence	maximum occurrence of the extended element	C / dataType not "codelist", "enumeration" or "codelistElement"?	1	CharacterString	N or any integer
285.	domainValue	valid values that can be assigned to the extended element	C / dataType not "codelist ", "enumeration" or "codelistElement"?	1	CharacterString	Free text
286.	parentEntity	name of the metadata entity(s) under which this extended metadata element may appear NOTE The name(s) may be standard metadata element(s) or other extended metadata element(s).	M	N	CharacterString	Free text
287.	rule	specifies how the extended element relates to other existing elements and entities	M	1	CharacterString	Free text
288.	rationale	reason for creating the extended element	O	1	CharacterString	Free text
289.	source	name of the person or organisation creating the extended element	M	N	Class	CI_Responsibility (Table B.16.1)
290.	conceptName	the name of the item	C / datatype equal codelist ", "enumeration" or "codelistElement"?	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 16.						

Table B.12.1 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
291.	code	language neutral identifier	C / datatype equal codelist “, “enumeration” or “codelistElement”?	1	CharacterString	Unspecified domain
NOTE: The UML model for this table is shown in Figure 16.						

Table B.13 — Application schema information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
292.	**MD_ApplicationSchema Information**	**application schema used to define and expose the structure of a resource, i.e. the model and/or data dictionary that represents the resource.**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Metadata)**	**Lines 293-299**
293.	name	name of the application schema used	M	1	Class	CI_Citation (Table B.16)
294.	schemaLanguage	identification of the schema language used	M	1	CharacterString	Free text
295.	constraintLanguage	formal language used in Application Schema	M	1	CharacterString	Free text
296.	schemaAscii	full application schema given as an ASCII file	O	1	CharacterString	Free text
297.	graphicsFile	full application schema given as a graphics file	O	1	Class	CI_OnlineResource (Table B.16.6)
298.	softwareDevelopmentFile	full application schema given as a software development file	O	1	Class	CI_OnlineResource (Table B.16.6)
299.	softwareDevelopmentFile Format	software dependent format used for the application schema software dependent file	O	1	CharacterString	Free text

NOTE: The UML model for this table is shown in Figure 17.

Table B.14 — Service metadata information — Service Identification information

	Name/ Role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
300.	**SV_ServiceIdentification**	**identification of capabilities which a service provider makes available to a service user through a set of interfaces that define a behaviour** NOTE See ISO 19119 for further information.	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (MD_Identification)**	**Lines 43-62 and 301-311**
301.	serviceType	a service type name EXAMPLE 'discovery', 'view', 'download', 'transformation', or 'invoke'	M	1	Class	GenericName (B.2.7)
302.	serviceTypeVersion	the version of the service, supports searching based on the version of serviceType EXAMPLE We might only be interested in OGC Catalogue V1.1 services. If version is maintained as a separate attribute, users can easily search for all services of a type regardless of the version.	O	N	CharacterString	No specified domain
303.	accessProperties	information about the availability of the service, including, — fees — planned available date and time — ordering instructions — turnaround	O	1	Class	MD_StandardOrderProcess (Table B.11.5)
304.	couplingType	type of coupling between service and associated data (if exists)	C / coupled resource exists?	1	Class	SV_CouplingType <<CodeList>> (B.3.32)
305.	coupledResource	further description of the data coupling in the case of tightly coupled services	C / coupled resource exists?	N	Class	SV_CoupledResource (Table B.14.4)
306.	operatedDataset	provides a reference to the resource on which the service operates NOTE For one resource either operatedDataset or operatesOn may be used (not both for the same resource).	O	N	Class	CI_Citation (Table B.16)
307.	profile	profile to which the service adheres	O	N	Class	CI_Citation (Table B.16)
308.	serviceStandard	standard to which the service adheres	O	N	Class	CI_Citation (Table B.16)
NOTE: The UML model for this table is shown in Figure 18.						

Table B.14 *(continued)*

	Name/ Role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
309.	*Role name:*containsOperations	provides information about the operations that comprise the service	O	N	Association	SV_OperationMetadata (Table B.14.1)
310.	*Role name:*operatesOn	provides information on the resources that the service operates on NOTE Either operatedDataset or operatesOn may be used (not both for the same resource).	O	N	Association	MD_DataIdentification (Table B.3)
311.	*Role name:*containsChain	provide information about the chain applied by the service	O	N	Association	SV_OperationChainMetadata (Table B.14.2)
NOTE: The UML model for this table is shown in Figure 18.						

Table B.14.1 — Operation information

	Name/ Role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
312.	**SV_OperationMetadata**	**describes the signature of one and only one method provided by the service**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Service Identification)**	**Lines 313-319**
313.	operationName	a unique identifier for this interface	M	1	CharacterString	No specified domain
314.	distributedComputingPlatform	distributed computing platforms on which the operation has been implemented	M	N	Class	DCPlist <<CodeList>> (B.3.9)
315.	operationDescription	free text description of the intent of the operation and the results of the operation	O	1	CharacterString	Free text
316.	invocationName	the name used to invoke this interface within the context of the DCP. The name is identical for all DCPs.	O	1	CharacterString	Free text
317.	connectPoint	handle for accessing the service interface	M	N	Class	CI_OnlineResource (Table B.16.6)
318.	*Role name:*parameters	the parameters that are required for this interface in sequence	O	N	Association	SV_Parameter (Table B.14.3)
319.	*role name:*dependsOn	list of operations that must be completed immediately before current operation is invoked, structured as a list for capturing alternate predecessor paths and sets for capturing parallel predecessor paths	O	N	Association	SV_OperationMetadata (Table B.14.1)
NOTE: The UML model for this table is shown in Figure 18.						

Table B.14.2 — Operation chain information

	Name/ Role name	Definition	Obligation/ Condition[a]	Maximum occurrence[b]	Data type	Domain
320.	**SV_OperationChainMetadata**	**Operation Chain Information**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (SV_Service Identification)**	**Lines 321-323**
321.	name	the name, as used by the service for this chain	M	1	CharacterString	Free text
322.	description	a narrative explanation of the services in the chain and resulting output	O	1	CharacterString	Free text
323.	*Role name:*operation	(ordered) information about the operations applied by the chain	M	N	Class	SV_OperationMetadata (Table B.14.1)
NOTE: The UML model for this table is shown in Figure 18.						

Table B.14.3 — Parameter information

	Name/ Role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
324.	**SV_Parameter**	**parameter information**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (SV_ Service Identification)**	**Lines 325-329**
325.	name	the name, as used by the service for this parameter	M	1	Class	MemberName (B.2.7)
326.	direction	indication if the parameter is an input to the service, an output or both	M	1	Class	SV_ParameterDirection <<Enumeration>> (B.3.33)
327.	description	a narrative explanation of the role of the parameter	O	1	CharacterString	Free text
328.	optionality	indication if the parameter is required	M	1	Boolean	0 = no 1 = yes
329.	repeatability	indication if more than one value of the parameter may be provided	M	1	Boolean	0 = no 1 = yes
NOTE: The UML model for this table is shown in Figure 18.						

Table B.14.4 — Coupled resource information

	Name/ Role name	Definition	Obligation/ Condition	Maximum occurrence	Data type	Domain
330.	**SV_CoupledResource**	**links a given operationName (mandatory attribute of SV_OperationMetadata) with a resource identified by an "identifier"**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (SV_ Service Identification)**	**Lines 331-334**
331.	scopedName	scoped identifier of the resource in the context of the given service instance NOTE Name of the resources (i.e. dataset) as it is used by a service instance EXAMPLE layer name or featureTypeName.	O	1	Class	ScopedName (B.2.7)
332.	resourceReference	reference to the resource on which the service operates NOTE For one resource either resource or resourceReference should be used (not both for the same resource).	O	N	Class	CI_Citation (Table B.16)
333.	*Role name*:resource	the tightly coupled resource NOTE 1 This attribute should be implemented by reference. NOTE 2 For one resource either resource or resourceReference should be used (not both for the same resource).	O	N	Class	MD_DataIdentification (Table B.3)
334.	*Role name*:operation	the service operation NOTE This attribute should be implemented by reference.	O	1	Class	SV_OperationMetadata (Table B.14.1)
NOTE: The UML model for this table is shown in Figure 18.						

Table B.15 — Extent information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
335.	**EX_Extent**	**extent of the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**<<DataType>> Class**	**Lines 336-339**
336.	description	extent of the referring object	C / geographicElement and temporalElement and verticalElement not documented?	1	CharacterString	Free text
337.	*Role name:*geographicElement	provides spatial component of the extent of the referring object	C / description and temporalElement and verticalElement not documented?	N	Association	EX_GeographicExtent <<Abstract>> (Table B.15.1)
338.	*Role name:*temporalElement	provides temporal component of the extent of the referring object	C / description and geographicElement and verticalElement not documented?	N	Association	EX_TemporalExtent (Table B.15.2)
339.	*Role name:*verticalElement	provides vertical component of the extent of the referring object	C / description and geographicElement and temporalElement not documented?	N	Association	EX_VerticalExtent (Table B.15.3)
NOTE: The UML model for this table is shown in Figure 19.						

Table B.15.1 — Geographic extent information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
340.	***EX_GeographicExtent***	**spatial area of the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (EX_Extent and EX_SpatialTemporal Extent) <<Abstract>>**	**Line 341**
341.	extentTypeCode	indication of whether the geographic element encompasses an area covered by the data or an area where data are not present	0 Default = 1	1	Boolean	0 = exclusion 1 = inclusion
342.	**EX_BoundingPolygon**	**enclosing geometric object which locates the resource, expressed as a set of (x,y) coordinate (s)** **NOTE 1 If a polygon is used it should be closed (last point replicates first point).** **NOTE 2 This type can be used to represent geometries other than polygons, e.g. points, lines.**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (EX_GeographicExtent)**	**Line 341 and 343**
343.	polygon	sets of points defining the bounding polygon or any other GM_Object geometry (point, line or polygon)	M	N	Class	GM_Object (B.2.5)
344.	**EX_GeographicBoundingBox**	**geographic position of the resource** **NOTE This is only an approximate reference so specifying the coordinate reference system is unnecessary and need only be provided with a precision of up to two decimal places.**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (EX_GeographicExtent)**	**Lines 341 and 345-348**
345.	westBoundLongitude	western-most coordinate of the limit of the resource extent, expressed in longitude in decimal degrees (positive east)	M	1	Decimal	-180,0 <= West Bounding Longitude Value <= 180,0
346.	eastBoundLongitude	eastern-most coordinate of the limit of the resource extent, expressed in longitude in decimal degrees (positive east)	M	1	Decimal	-180,0 <= East Bounding Longitude Value <= 180,0
347.	southBoundLatitude	southern-most coordinate of the limit of the resource extent, expressed in latitude in decimal degrees (positive north)	M	1	Decimal	-90,0 <= South Bounding Latitude Value <= 90,0; South Bounding Latitude Value <= North bounding Latitude Value
NOTE: The UML model for this table is shown in Figure 19.						

Table B.15.1 *(continued)*

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
348.	northBoundLatitude	northern-most coordinate of the limit of the resource extent expressed in latitude in decimal degrees (positive north)	M	1	Decimal	-90,0 <= North Bounding Latitude Value <= 90,0; North Bounding Latitude Value >= South Bounding Latitude Value
349.	**EX_GeographicDescription**	**description of the geographic area using identifiers**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (EX_GeographicExtent)**	**Line 341 and 350**
350.	geographicIdentifier	identifier used to represent a geographic area NOTE A geographic identifier as described in ISO 19112.	M	1	Class	MD_Identifier (Table B.17.2)
NOTE: The UML model for this table is shown in Figure 19.						

Table B.15.2 — Temporal extent information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
351.	**EX_TemporalExtent**	**time period covered by the content of the resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (EX_Extent)**	**Line 352**
352.	extent	period for the content of the resource	M	1	Class	TM_Primitive (B.2.4)
353.	**EX_SpatialTemporalExtent**	**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 352 and 354-355**
354.	verticalExtent	vertical extent component	O	1	Class	EX_VerticalExtent (Table B.15.3)
355.	*Role name:*spatialExtent	spatial extent component of composite spatial and temporal extent	M	N	Association	EX_GeographicExtent <<Abstract>> (Table B.15.1)
NOTE: The UML model for this table is shown in Figure 19.						

Table B.15.3 — Vertical extent information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
356.	**EX_VerticalExtent**	**vertical domain of resource**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (EX_Extent)**	**Lines 357-360**
357.	minimumValue	lowest vertical value contained in the resource	M	1	Real	Real
358.	maximumValue	highest vertical value contained in the resource	M	1	Real	Real
359.	*Role name:* verticalCRS	provides information about the vertical coordinate reference system to which the maximum and minimum elevation values are measured NOTE The CRS information includes unit of measure.	C / verticalCRSId not documented?	1	Class	*SC_VerticalCRS* <<Abstract>> (B.2.8)
360.	verticalCRSId	identifies the vertical coordinate reference system used for the minimum and maximum values	C / verticalCRS not documented?	1	Class	MD_ReferenceSystem (Table B.8)
NOTE: The UML model for this table is shown in Figure 19.						

Table B.16 — Citation and responsible party information — Citation information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
361.	**CI_Citation**	**standardized resource reference**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 362-375**
362.	title	name by which the cited resource is known	M	1	CharacterString	Free text
363.	alternateTitle	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
364.	date	reference date for the cited resource	O	N	Class	CI_Date (Table B.16.5)
365.	edition	version of the cited resource	O	1	CharacterString	Free text
366.	editionDate	date of the edition	O	1	Class	DateTime (B.2.2)
367.	identifier	value uniquely identifying an object within a namespace	O	N	Class	MD_Identifier (Table B.17.2)
368.	citedResponsibleParty	roles, name, contact, and position information for an individual or organisation that is responsible for the resource	O	N	Class	CI_Responsibility (Table B.16.1)
369.	presentationForm	mode in which the resource is represented	O	N	Class	CI_PresentationFormCode <<CodeList>> (B.3.4)
370.	series	information about the series, or aggregate resource, of which the resource is a part	O	1	Class	CI_Series (Table B.16.7)
371.	otherCitationDetails	other information required to complete the citation that is not recorded elsewhere	O	N	CharacterString	Free text
372.	ISBN	international Standard Book Number	O	1	CharacterString	No specified domain
373.	ISSN	international Standard Serial Number	O	1	CharacterString	No specified domain
374.	onlineResource	online reference to the cited resource	O	N	Class	CI_OnlineResource (Table B.16.6)
375.	graphic	citation graphic or logo for the cited resource	O	N	Class	MD_BrowseGraphic (Table B.17.3)
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.1 — Responsible party information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
376.	**CI_Responsibility**	**information about the party and their role**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 377-379**
377.	role	function performed by the responsible party	M	1	Class	CI_RoleCode <<CodeList>> (B.3.5)
378.	extent	spatial or temporal extent of the role	O	N	Class	EX_Extent (Table B.15)
379.	*Role name:*party	information about the party	M	N	Association	*CI_Party* <<Abstract>> (Table B.16.2)
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.2 — Party information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
380.	***CI_Party***	**information about the individual and/or organisation of the party**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class <<Abstract>>**	**Lines 381-382**
381.	name	name of the party (individual or organization)	C / logo and position-Name not documented?	1	CharacterString	Free text
382.	contactInfo	contact information for the party	O	N	Class	CI_Contact (Table B.16.4)
383.	**CI_Individual**	**information about the party if the party is an individual**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (CI_Party)**	**Lines 381-382 and 384**
384.	positionName	position of the individual in an organization	C / name and logo not documented?	1	CharacterString	Free text
385.	**CI_Organisation**	**information about the party if the party is an organization**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Specified Class (CI_Party)**	**Lines 381-382 and 386-387**
386.	logo	graphic identifying the organization	C / name or position-Name not documented?	N	Class	MD_BrowseGraphic (Table B.17.3)
387.	*Role name:*individual	an individual in the named organization	O	N	Association	CI_Individual (Table B.16.2)
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.3 — Address information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
388.	**CI_Address**	**location of the responsible individual or organisation**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 389-394**
389.	deliveryPoint	address line for the location EXAMPLE Street number and name, Suite number, etc.	O	N	CharacterString	Free text
390.	city	city of the location	O	1	CharacterString	Free text
391.	administrativeArea	state, province of the location	O	1	CharacterString	Free text
392.	postalCode	ZIP or other postal code	O	1	CharacterString	No specified domain
393.	country	country of the address	O	1	CharacterString	No specified domain
394.	electronicMailAddress	address of the electronic mailbox of the responsible organisation or individual	O	N	CharacterString	No specified domain
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.4 — Contact information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
395.	**CI_Contact**	**information required to enable contact with the responsible person and/or organisation**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 396-401**
396.	phone	telephone numbers at which the organisation or individual may be contacted	O	N	Class	CI_Telephone (Table B.16.8)
397.	address	physical and email address at which the organisation or individual may be contacted	O	N	Class	CI_Address (Table B.16.3)
398.	onlineResource	on-line information that can be used to contact the individual or organisation	O	N	Class	CI_OnlineResource (Table B.16.6)
399.	hoursOfService	time period (including time zone) when individuals can contact the organisation or individual	O	N	CharacterString	Free text
400.	contactInstructions	supplemental instructions on how or when to contact the individual or organisation	O	1	CharacterString	Free text
401.	contactType	type of the contact	O	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.5 — Date information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
402.	**CI_Date**	**reference date and event used to describe it**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class <<DataType>>**	**Lines 403-404**
403.	date	reference date for the cited resource	M	1	Class	DateTime (B.2.2)
404.	dateType	event used for reference date	M	1	CodeList	CI_DateTypeCode <<CodeList>> (B.3.2)
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.6 — Online resource information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
405.	**CI_OnlineResource**	**information about on-line sources from which the resource, 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 <<DataType>>**	**Lines 406-412**
406.	linkage	location (address) for on-line access using a Uniform Resource Locator/ Uniform Resource Identifier address or similar addressing scheme such as http://www.statkart.no/isotc211	M	1	CharacterString	Text restricted to URL (see IETF RFC 3986)
407.	protocol	connection protocol to be used EXAMPLE ftp, http get KVP, http POST, etc.	O	1	CharacterString	No specified domain
408.	applicationProfile	name of an application profile that can be used with the online resource	O	1	CharacterString	Free text
409.	name	name of the online resource	O	1	CharacterString	Free text
410.	description	detailed text description of what the online resource is/does	O	1	CharacterString	Free text
411.	function	code for function performed by the online resource	O	1	Codelist	CI_OnLineFunctionCode <<CodeList>> (B.3.3)
412.	protocolRequest	request used to access the resource depending on the protocol (to be used mainly for POST requests) EXAMPLE POST/XML: <GetFeature service="WFS" version="2.0.0" outputFormat="application/gml+xml; version=3.2" xmlns=http://www.opengis.net/wfs/2.0 xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance xsi:schemaLocation="http://www.opengis.net/wfs/2.0http://schemas.opengis.net/wfs/2.0,0/wfs.xsd"> <Query typeNames="Roads"/> </GetFeature>	O	1	CharacterString	Unspecified domain
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.7 — Series information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
413.	**CI_Series**	**information about the series, or aggregate resource, to which a resource belongs**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 414-416**
414.	name	name of the series, or aggregate resource, of which the resource is a part	0	1	CharacterString	Free text
415.	issueIdentification	information identifying the issue of the series	0	1	CharacterString	Free text
416.	page	details on which pages of the publication the article was published	0	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.16.8 — Telephone information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
417.	**CI_Telephone**	**telephone numbers for contacting the responsible individual or organisation**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class <<DataType>>**	**Lines 418-419**
418.	number	telephone number by which individuals can contact responsible organisation or individual	M	1	CharacterString	No specified domain
419.	numberType	type of telephone number	O	1	Class	CI_TelephoneTypeCode <<CodeList>> (B.3.6)
NOTE: The UML model for this table is shown in Figures 20 and 21.						

Table B.17 — Commonly used class information — Scope information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
420.	**<<DataType>> MD_Scope**	**the target resource and physical extent for which information is reported**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 421-423**
421.	level	target resource covered	M	1	Class	MD_ScopeCode <<CodeList>> (B.3.28)
422.	extent	information about the horizontal, vertical and temporal extent of the resource specified by the scope	O	N	Class	EX_Extent (Table B.15)
423.	levelDescription	detailed description/listing of the items specified by the level	O	N	Codelist	MD_ScopeDescription <<Union>> (Table B.17.1)
NOTE: The UML model for this table is shown in Figure 22.						

Table B.17.1 — Scope description information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
424.	**MD_ScopeDescription**	**description of the class of information covered by the information**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Class <<Union>>**	**Lines 425-430**
425.	attributes	instances of attribute types to which the information applies	C / features, featureInstances, attributeInstances, dataset and other not documented?	1	Set CharacterString (B.2.6)	No specified domain
426.	features	instances of feature types to which the information applies	C / attributes, featureInstances, attributeInstances, dataset and other not documented?	1	Set CharacterString (B.2.6)	No specified domain
427.	featureInstances	feature instances to which the information applies	C / attributes, features, attributeInstances, dataset and other not documented?	1	Set CharacterString (B.2.6)	No specified domain
428.	attributeInstances	attribute instances to which the information applies	C / attributes, features, featureInstances, dataset and other not documented?	1	Set CharacterString (B.2.6)	No specified domain
429.	dataset	dataset to which the information applies	C / attributes, features, featureInstances, attributeInstances, and other not documented?	1	CharacterString	No specified domain
430.	other	class of information that does not fall into the other categories to which the information applies	C / attributes, features, featureInstances, attributeInstances, and dataset not documented?	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 22.						

Table B.17.2 — Identifier information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
431.	**<<DataType>> MD_Identifier**	**value uniquely identifying an object within a namespace**	**Use obligation/condition from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 432-436**
432.	authority	the person or party responsible for maintenance of that namespace	O	1	Class	CI_Citation (Table B.16)
433.	code	alphanumeric value identifying an instance in the namespace NOTE Avoid characters that are not legal in URLs. EXAMPLE EPSG::4326	M	1	CharacterString	No specified domain
434.	codeSpace	identifier or namespace in which the code is valid	O	1	CharacterString	No specified domain
435.	version	version identifier for the namespace	O	1	CharacterString	No specified domain
436.	description	natural language description of the meaning of the code value EXAMPLE For codeSpace = EPSG, code = 4326, description = WGS-84.	O	1	CharacterString	Free text
NOTE: The UML model for this table is shown in Figure 22.						

Table B.17.3 — Browse graphic information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
437.	**MD_BrowseGraphic**	**graphic that provides an illustration of a resource** **NOTE Should include a legend for the graphic, if applicable.** **EXAMPLE A dataset, an organisation logo, security constraint or citation graphic.**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Aggregated Class (MD_Identification)**	**Lines 438-442**
438.	fileName	name of the file that contains a graphic that provides an illustration of the resource	M	1	CharacterString	No specified domain
439.	fileDescription	text description of the illustration	O	1	CharacterString	Free text
440.	fileType	format in which the illustration is encoded EXAMPLE EPS, GIF, JPEG, PBM, PS, TIFF, PDF	O	1	CharacterString	No specified domain
441.	imageConstraints	restriction on access and/or use of browse graphic	O	N	Class	MD_Constraints (Table B.4)
442.	linkage	link to browse graphic	O	N	Class	CI_OnlineResource (Table B.16.6)
NOTE: The UML model for this table is shown in Figure 22.						

Table B.18 — Multilingual text information — Free text

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
443.	**PT_FreeText**	**multi-language free text data type** **NOTE A metadata element who's data type is CharacterString and domain is free text can be alternatively expressed using the PT_FreeText subtype of CharacterString. A free text instance acts as a normal character string except that it handles complementary translations of the character string value in different locales.**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified class (CharacterString)**	**Line 444**
444.	*Role name:*textGroup	provides the list of localised character strings expressing each free text value (sequence of characters) in a given locale	M	N	Association	LocalisedCharacterString (Table B.18.1)
NOTE: The UML model for this table is shown in Figure 23.						

Table B.18.1 — Localised characterstring information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
445.	**LocalisedCharacterString**	**expression of a free text in a given locale**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Specified class (CharacterString)**	**Line 446**
446.	*Role name:*locale	defines the locale in which the value (sequence of characters) of the localised character string is expressed	M	1	Class	PT_Locale (Table B.18.2)
NOTE: The UML model for this table is shown in Figure 23.						

Table B.18.2 — Locale information

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
447.	**PT_Locale**	**description of a locale**	**Use obligation from referencing object**	**Use maximum occurrence from referencing object**	**Class**	**Lines 448-450**
448.	language	designation of the locale language	M	1	Class	LanguageCode <<Codelist>> (B.3.11 – ISO 639-2, 3-alphabetic digits code)
449.	country	designation of the specific country of the locale language	O	1	Class	CountryCode <<Codelist>> (B.3.7 – ISO 3166-1, other parts may be used)
450.	characterEncoding	designation of the character set to be used to encode the textual value of the locale	M	1	Class	MD_CharacterSetCode <<Codelist>> (B.3.14 - use IANA register http://www.iana.org/assignments/character-sets)
NOTE: The UML model for this table is shown in Figure 23.						

Table B.18.3 — Locale container

	Name / Role name	Definition	Obligation / Condition	Maximum occurrence	Data type	Domain
451.	**PT_LocaleContainer**	**container of localised character strings** **NOTE It provides a means to isolate the localised strings related to a given locale.**	**O**	**N**	**Class**	**Lines 452-456**
452.	description	designation of the locale language	M	1	CharacterString	Free text
453.	locale	locale in which the localised strings of the container are expressed	M	1	Class	PT_Locale (Table B.18.2)
454.	date	date of creation or revision of the locale container	M	N	Class	CI_Date (Table B.16.5)
455.	responsibleParty	responsible parties of the locale container	M	N	Class	CI_Responsibility (Table B.16.1)
456.	*Role name:*localisedString	provides the list of localised character string expressing the linguistic translation of a set of textual information in a given locale	M	N	Association	LocalisedCharacterString (Table B.18.1)
NOTE: The UML model for this table is shown in Figure 24.						

B.2 Externally referenced classes

B.2.1 Introduction

There are several classes referenced by this part of ISO 19115 that are documented by other, external, standards. Those externally referenced entities are explained in B.2.2 to B.2.9.

B.2.2 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.

NOTE 1 The precision of the date can be defined by showing a combination of century plus year plus month plus day, e.g. YY (century), YYYY (year), YYYY-MM (year-month), YYYY-MM-DD or YYYYMMDD (year, month and day).

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.

NOTE 2 Although the DateTime definition allows for more precise temporal statements, the less precise values can also be used. For example, YY (century), YYYY (year), YYYY-MM(year, month), YYYY-MM-DD or YYYYMMDD (year, month, day), YYYY-MM-DDThh (year, month, day, hour), YYYY-MM-DDThh:mm (year, month, day, hour, minute), YYYY-MM-DDThh:mm:ss.d or YYYYMMDDThhmmss.d (year, month, day, hour, minute, second and decimals of seconds). The time zone should also be added, e.g. YYYY-M-DDThh:mm:ss.d+hh:mm.

NOTE 3 DateTime inherits both from Date and Time, which means that:

— a DateTime property can be instantiated either as a Date or as a DateTime;

— a Time property can be instantiated either as a Time or as a DateTime.

B.2.3 Distance, angle, measure, number, record, recordType, scale and UomLength information

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

Angle: Amount of rotation needed 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.

UnitOfMeasure: 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.2.4 PeriodDuration and temporal primitive information

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

TM_Duration: duration of time 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.2.5 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.2.6 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.2.7 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.

MemberName: This class is documented in full in ISO/TS 19103.

ScopedName: This class is documented in full in ISO/TS 19103.

B.2.8 Vertical coordinate reference system information

SC_CRS: set of parameters describing the relation of gravity-related heights to the Earth. This class is fully documented in ISO 19111 and ISO 19111-2.

B.2.9 Internet protocol standards

Uniform Resource Identifier (URI): Generic syntax. This class is documented in full in IETF RFC 3986.

B.3 CodeLists and enumerations

B.3.1 Introduction

The stereotype classes <<CodeList>> and <<Enumeration>>, as used in this part of ISO 19115, do not contain any "other" values as <<Enumeration>>s are closed (not extendable) and <<CodeList>>s are extendable. Consult Annex C for information about how to extend <<CodeList>>s. The concept name is the name of the item (English is the language of this version of the standard and it should be translated into the language of the nation or entity developing a profile). The code is a language neutral identifier.

B.3.2 CI_DateTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	CI_DateTypeCode		**identification of when a given event occurred**
1.	creation	creation	date identifies when the resource was brought into existence
2.	publication	publication	date identifies when the resource was issued

	Concept name (English)	Code	Definition
3.	revision	revision	date identifies when the resource was examined or re-examined and improved or amended
4.	expiry	expiry	date identifies when resource expires
5.	lastUpdate	lastUpdate	date identifies when resource was last updated
6.	lastRevision	lastRevision	date identifies when resource was last reviewed
7.	nextUpdate	nextUpdate	date identifies when resource will be next updated
8.	unavailable	unavailable	date identifies when resource became not available or obtainable
9.	inForce	inForce	date identifies when resource became in force
10.	adopted	adopted	date identifies when resource was adopted
11.	deprecated	deprecated	date identifies when resource was deprecated
12.	superseded	superseded	date identifies when resource was superseded or replaced by another resource
13.	validityBegins	validityBegins	time at which the data are considered to become valid. NOTE There could be quite a delay between creation and validity begins
14.	validityExpires	validityExpires	time at which the data are no longer considered to be valid
15.	released	released	the date that the resource shall be released for public access
16.	distribution	distribution	date identifies when an instance of the resource was distributed

B.3.3 CI_OnLineFunctionCode <<CodeList>>

	Concept name (English)	Code	Definition
	CI_OnLineFunctionCode		**function performed by the resource**
1.	download	download	online instructions for transferring data from one storage device or system to another
2.	information	information	online information about the resource
3.	offlineAccess	offlineAccess	online instructions for requesting the resource from the provider
4.	order	order	online order process for obtaining the resource
5.	search	search	online search interface for seeking out information about the resource
6.	completeMetadata	completeMetadata	complete metadata provided
7.	browseGraphic	browseGraphic	browse graphic provided
8.	upload	upload	online resource upload capability provided
9.	emailService	emailService	online email service provided
10.	browsing	browsing	online browsing provided
11.	fileAccess	fileAccess	online file access provided

B.3.4 CI_PresentationFormCode <<CodeList>>

	Concept name (English)	Code	Definition
	CI_PresentationFormCode		**mode in which the data are represented**

	Concept name (English)	Code	Definition
1	documentDigital	documentDigital	digital representation of a primarily textual item (can contain illustrations also)
2.	documentHardcopy	documentHard-copy	representation of a primarily textual item (can contain illustrations also) on paper, photographic material, or other media
3.	imageDigital	imageDigital	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
4.	imageHardcopy	imageHardcopy	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
5.	mapDigital	mapDigital	map represented in raster or vector form
6.	mapHardcopy	mapHardcopy	map printed on paper, photographic material, or other media for use directly by the human user
7.	modelDigital	modelDigital	multi-dimensional digital representation of a feature, process, etc.
8.	modelHardcopy	modelHardcopy	3-dimensional, physical model
9.	profileDigital	profileDigital	vertical cross-section in digital form
10.	profileHardcopy	profileHardcopy	vertical cross-section printed on paper, etc.
11.	tableDigital	tableDigital	digital representation of facts or figures systematically displayed, especially in columns
12.	tableHardcopy	tableHardcopy	representation of facts or figures systematically displayed, especially in columns, printed on paper, photographic material, or other media
13.	videoDigital	videoDigital	digital video recording
14.	videoHardcopy	videoHardcopy	video recording on film
15.	audioDigital	audioDigital	digital audio recording
16.	audioHardcopy	audioHardcopy	audio recording delivered by analog media, such as a magnetic tape
17.	multimediaDigital	multimediaDigital	information representation using simultaneously various digital modes for text, sound, image
18.	multimediaHardcopy	multimediaHard-copy	information representation using simultaneously various analog modes for text, sound, image
19.	physicalObject	physicalSample	a physical object EXAMPLE Rock or mineral sample, microscope slide.
20.	diagramDigital	diagramDigital	information represented graphically by charts such as pie chart, bar chart, and other type of diagrams and recorded in digital format
21.	diagramHardcopy	diagramHardcopy	information represented graphically by charts such as pie chart, bar chart, and other type of diagrams and printed on paper, photographic material, or other media

B.3.5 CI_RoleCode <<CodeList>>

	Concept name (English)	Code	Definition
	CI_RoleCode		**function performed by the responsible party**
1.	resourceProvider	resourceProvider	party that supplies the resource
2.	custodian	custodian	party that accepts accountability and responsibility for the resource and ensures appropriate care and maintenance of the resource
3.	owner	owner	party that owns the resource
4.	user	user	party who uses the resource
5.	distributor	distributor	party who distributes the resource
6.	originator	originator	party who created the resource
7.	pointOfContact	pointOfContact	party who can be contacted for acquiring knowledge about or acquisition of the resource
8.	principalInvestigator	principalInvestigator	key party responsible for gathering information and conducting research
9.	processor	processor	party who has processed the data in a manner such that the resource has been modified
10.	publisher	publisher	party who published the resource
11.	author	author	party who authored the resource
12.	sponsor	sponsor	party who speaks for the resource
13.	coAuthor	coAuthor	party who jointly authors the resource
14.	collaborator	collaborator	party who assists with the generation of the resource other than the principal investigator
15.	editor	editor	party who reviewed or modified the resource to improve the content
16.	mediator	mediator	a class of entity that mediates access to the resource and for whom the resource is intended or useful
17.	rightsHolder	rightsHolder	party owning or managing rights over the resource
18.	contributor	contributor	party contributing to the resource
19.	funder	funder	party providing monetary support for the resource
20.	stakeholder	stakeholder	party who has an interest in the resource or the use of the resource

B.3.6 CI_TelephoneTypeCode<<CodeList>>

	Concept name (English)	Code	Definition
	CI_TelephoneTypeCode		**type of telephone**
1.	voice	voice	telephone provides voice service
2.	facsimile	fax	telephone provides facsimile service
3.	sms	sms	telephone provides sms service

B.3.7 CountryCode <<CodeList>>

Use ISO 3166-1 or equivalent.

https://www.iso.org/obp/ui/#search

B.3.8 DS_AssociationTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	DS_AssociationTypeCode		**justification for the correlation of two resources**
1.	crossReference	crossReference	reference from one resource to another
2.	largerWorkCitation	largerWorkCitation	reference to a master resource of which this one is a part
3.	partOfSeamlessDatabase	partOfSeamlessDatabase	part of same structured set of data held in a computer
4.	stereoMate	stereoMate	part of a set of imagery that when used together, provides three-dimensional images
5.	isComposedOf	isComposedOf	reference to resources that are parts of this resource
6.	collectiveTitle	collectiveTitle	common title for a collection of resources NOTE Title identifies elements of a series collectively, combined with information about what volumes are available at the source cite.
7.	series	series	associated through a common heritage such as produced to a common product specification
8.	dependency	dependency	associated through a dependency
9.	revisionOf	revisionOf	resource is a revision of associated resource

B.3.9 DCPList <<CodeList>>

	Concept name (English)	Code	Definition
	DCPList		**class of information to which the referencing entity applies**
1.	XML	XML	Extensible Markup Language
2.	CORBA	CORBA	Common Object Request Broker Architecture
3.	JAVA	JAVA	Object-oriented programming language
4.	COM	COM	Component Object Model
5.	SQL	SQL	Structured Query Language
6.	SOAP	SOAP	Simple Object Access Protocol
7.	Z3950	Z3950	ISO 23950
8.	HTTP	HTTP	HyperText Transfer Protocol
9.	FTP	FTP	File Transfer Protocol
10.	WebServices	WebServices	Web service

B.3.10 DS_InitiativeTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	DS_InitiativeTypeCode		**type of aggregation activity in which resources are related**
1.	campaign	campaign	series of organized planned actions
2.	collection	collection	accumulation of resources assembled for a specific purpose
3.	exercise	exercise	specific performance of a function or group of functions
4.	experiment	experiment	process designed to find if something is effective or valid
5.	investigation	investigation	search or systematic inquiry
6.	mission	mission	specific operation of a data collection system
7.	sensor	sensor	device or piece of equipment which detects or records
8.	operation	operation	action that is part of a series of actions
9.	platform	platform	vehicle or other support base that holds a sensor
10.	process	process	method of doing something involving a number of steps
11.	program	program	specific planned activity
12.	project	project	organized undertaking, research, or development
13.	study	study	examination or investigation
14.	task	task	piece of work
15.	trial	trial	process of testing to discover or demonstrate something

B.3.11 LanguageCode <<CodeList>>

Use ISO 639-2. ISO 639-2 is the alpha-3 code in *Codes for the representation of names of languages*.

B.3.12 MD_CellGeometryCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_CellGeometryCode		**code indicating the geometry represented by the grid cell value**
1.	point	point	each cell represents a point
2.	area	area	each cell represents an area
3.	voxel	voxel	each cell represents a volumetric measurement on a regular grid in three dimensional space
4.	stratum	stratum	height range for a single point vertical profile

B.3.13 MD_ClassificationCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_ClassificationCode		**name of the handling restrictions on the resource**
1.	unclassified	unclassified	available for general disclosure
2.	restricted	restricted	not for general disclosure
3.	confidential	confidential	available for someone who can be entrusted with information
4.	secret	secret	kept or meant to be kept private, unknown, or hidden from all but a select group of people
5.	topSecret	topSecret	of the highest secrecy
6.	sensitiveButUnclassified	SBU	although unclassified, requires strict controls over its distribution
7.	forOfficialUseOnly	forOfficialUseOnly	unclassified information that is to be used only for official purposes determined by the designating body
8.	protected	protected	compromise of the information could cause damage
9.	limitedDistribution	limitedDistribution	desimination limited by designating body

B.3.14 MD_CharacterSetCode <<CodeList>>

Use IANA Character Set register: http://www.iana.org/assignments/character-sets. These are the official names for character sets that may be used in the Internet and may be referred to in Internet documentation. These names are expressed in ANSI_X3.4-1968 which is commonly called US-ASCII or simply ASCII.

B.3.15 MD_CoverageContentTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_CoverageContentTypeCode		**specific type of information represented in the cell**
1.	image	image	meaningful numerical representation of a physical parameter that is not the actual value of the physical parameter
2.	thematicClassification	thematicClassification	code value with no quantitative meaning, used to represent a physical quantity
3.	physicalMeasurement	physicalMeasurement	value in physical units of the quantity being measured
4.	auxillaryInformation	auxillaryInformation	data, usually a physical measurement, used to support the calculation of the primary physicalMeasurement coverages in the dataset EXAMPLE Grid of aerosol optical thickness used in the calculation of a sea surface temperature product.
5.	qualityInformation	qualityInformation	data used to characterize the quality of the physicalMeasurement coverages in the dataset. NOTE Typically included in a gmi:QE_CoverageResult.
6.	referenceInformation	referenceInformation	reference information used to support the calculation or use of the physicalMeasurement coverages in the dataset EXAMPLE Grids of latitude/longitude used to geolocate the physical measurements.

	Concept name (English)	Code	Definition
7.	modelResult	modelResult	resources with values that are calculated using a model rather than being observed or calculated from observations
8.	coordinate	coordinate	data used to provide coordinate axis values

B.3.16 MD_DatatypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_DatatypeCode		**datatype of element or entity**
1.	class	class	descriptor of a set of objects that share the same attributes, operations, methods, relationships, and behaviour
2.	codelist	codelist	flexible enumeration useful for expressing a long list of values, can be extended
3.	enumeration	enumeration	data type whose instances form a list of named literal values, not extendable
4.	codelistElement	codelistElement	permissible value for a codelist or enumeration
5.	abstractClass	abstractClass	class that cannot be directly instantiated
6.	aggregateClass	aggregateClass	class that is composed of classes it is connected to by an aggregate relationship
7.	specifiedClass	specifiedClass	subclass that may be substituted for its superclass
8.	datatypeClass	datatypeClass	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
9.	interfaceClass	interfaceClass	named set of operations that characterize the behaviour of an element
10.	unionClass	unionClass	class describing a selection of one of the specified types
11.	metaClass	metaClass	class whose instances are classes
12.	typeClass	typeClass	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
13.	characterString	characterString	textual information
14.	integer	integer	numerical field
15.	association	association	semantic relationship between two classes that involves connections among their instances

B.3.17 MD_DimensionNameTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_DimensionName-TypeCode		**name of the dimension**
1.	row	row	ordinate (y) axis
2.	column	column	abscissa (x) axis
3.	vertical	vertical	vertical (z) axis
4.	track	track	along the direction of motion of the scan point
5.	crossTrack	crossTrack	perpendicular to the direction of motion of the scan point
6.	line	line	scan line of a sensor
7.	sample	sample	element along a scan line
8.	time	time	duration

B.3.18 MD_GeometricObjectTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_GeometricObject-TypeCode		**name of point or vector objects used to locate zero-, one-, two-, or three-dimensional spatial locations in the dataset**
1.	complex	complex	set of geometric primitives such that their boundaries can be represented as a union of other primitives
2.	composite	composite	connected set of curves, solids or surfaces
3.	curve	curve	bounded, 1-dimensional geometric primitive, representing the continuous image of a line
4.	point	point	zero-dimensional geometric primitive, representing a position but not having an extent
5.	solid	solid	bounded, connected 3-dimensional geometric primitive, representing the continuous image of a region of space
6.	surface	surface	bounded, connected 2-dimensional geometric primitive, representing the continuous image of a region of a plane

B.3.19 MD_ImagingConditionCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_ImagingCondition-Code		**code which indicates conditions which may affect the image**
1.	blurredImage	blurredImage	portion of the image is blurred
2.	cloud	cloud	portion of the image is partially obscured by cloud cover
3.	degradingObliquity	degradingObliquity	acute angle between the plane of the ecliptic (the plane of the Earth's orbit) and the plane of the celestial equator
4.	fog	fog	portion of the image is partially obscured by fog
5.	heavySmokeOrDust	heavySmokeOr-Dust	portion of the image is partially obscured by heavy smoke or dust
6.	night	night	image was taken at night
7.	rain	rain	image was taken during rainfall
8.	semiDarkness	semiDarkness	image was taken during semi-dark conditions – twilight conditions
9.	shadow	shadow	portion of the image is obscured by shadow
10.	snow	snow	portion of the image is obscured by snow
11.	terrainMasking	terrainMasking	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.3.20 MD_KeywordTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_KeywordTypeCode		**methods used to group similar keywords**
1.	discipline	discipline	keyword identifies a branch of instruction or specialized learning
2.	place	place	keyword identifies a location
3.	stratum	stratum	keyword identifies the layer(s) of any deposited substance or levels within an ordered system
4.	temporal	temporal	keyword identifies a time period related to the resource
5.	theme	theme	keyword identifies a particular subject or topic
6.	dataCentre	dataCentre	keyword identifies a repository or archive that manages and distributes data
7.	featureType	featureType	keyword identifies a resource containing or about a collection of feature instances with common characteristics
8.	instrument	instrument	keyword identifies a device used to measure or compare physical properties
9.	platform	platform	keyword identifies a structure upon which an instrument is mounted
10.	process	process	keyword identifies a series of actions or natural occurrences
11.	project	project	keyword identifies an endeavour undertaken to create or modify a product or service
12.	service	service	keyword identifies an activity carried out by one party for the benefit of another

	Concept name (English)	Code	Definition
13.	product	product	keyword identifies a type of product
14.	subTopicCategory	subTopicCategory	refinement of a topic category for the purpose of geographic data classification
15.	taxon	taxon	keyword identifies a taxonomy of the resource

B.3.21 MD_MaintenanceFrequencyCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_MaintenanceFrequencyCode		**frequency with which modifications and deletions are made to the data after it is first produced**
1.	continual	continual	resource is repeatedly and frequently updated
2.	daily	daily	resource is updated each day
3.	weekly	weekly	resource is updated on a weekly basis
4.	fortnightly	fortnightly	resource is updated every two weeks
5.	monthly	monthly	resource is updated each month
6.	quarterly	quarterly	resource is updated every three months
7.	biannually	biannually	resource is updated twice each year
8.	annually	annually	resource is updated every year
9.	asNeeded	asNeeded	resource is updated as deemed necessary
10.	irregular	irregular	resource is updated in intervals that are uneven in duration
11.	notPlanned	notPlanned	there are no plans to update the data
12.	unknown	unknown	frequency of maintenance for the data is not known
13.	periodic	periodic	resource is updated at regular intervals
14.	semimonthly	semimonthly	resource updated twice monthly
15	biennially	biennially	resource is updated every 2 years

B.3.22 MD_MediumFormatCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_MediumFormatCode		**method used to write to the medium**
1.	cpio	cpio	Copy In / Out (UNIX file format and command)
2.	tar	tar	Tape Archive
3.	highSierra	highSierra	high sierra file system
4.	iso9660	iso9660	information processing – volume and file structure of CD-ROM
5.	iso9660RockRidge	iso9660RockRidge	rock ridge interchange protocol (UNIX)
6.	iso9660AppleHFS	iso9660AppleHFS	hierarchical file system (Macintosh)
7.	udf	udf	universal disk format

B.3.23 MD_ObligationCode <<Enumeration>>

	Concept name (English)	Code	Definition
	MD_ObligationCode		**obligation of the element or entity**
1.	mandatory	mandatory	element is always required
2.	optional	optional	element is not required
3.	conditional	conditional	element is required when a specific condition is met

B.3.24 MD_PixelOrientationCode <<Enumeration>>

	Concept name (English)	Code	Definition
	MD_PixelOrientation-Code		**point in a pixel corresponding to the Earth location of the pixel**
1.	centre	centre	point halfway between the lower left and the upper right of the pixel
2.	lowerLeft	lowerLeft	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
3.	lowerRight	lowerRight	next corner counterclockwise from the lower left
4.	upperRight	upperRight	next corner counterclockwise from the lower right
5.	upperLeft	upperLeft	next corner counterclockwise from the upper right

B.3.25 MD_ProgressCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_ProgressCode		**status of the resource**
1.	completed	completed	has been completed
2.	historicalArchive	historicalArchive	stored in an offline storage facility
3.	obsolete	obsolete	no longer relevant
4.	onGoing	onGoing	continually being updated
5.	planned	planned	fixed date has been established upon or by which the resource will be created or updated
6.	required	required	needs to be generated or updated
7.	underDevelopment	underDevelopment	currently in the process of being created
8.	final	final	progress concluded and no changes will be accepted
9.	pending	pending	committed to, but not yet addressed
10.	retired	retired	item is no longer recommended for use. It has not been superseded by another item
11.	superseded	superseded	replaced by new
12.	tentative	tentative	provisional changes likely before resource becomes final or complete
13.	valid	valid	acceptable under specific conditions
14.	accepted	accepted	agreed to by sponsor
15.	notAccepted	notAccepted	rejected by sponsor
16.	withdrawn	withdrawn	removed from consideration

	Concept name (English)	Code	Definition
17.	proposed	proposed	suggested that development needs to be undertaken
18.	deprecated	deprecated	resource superseded and will become obsolete, use only for historical purposes

B.3.26 MD_ReferenceSystemTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_ReferenceSystem-TypeCode		**defines type of reference system used**
1.	compoundEngineering-Parametric	compoundEngi-neering Parametric	compound spatio-parametric coordinate reference system containing an engineering coordinate reference system and a parametric reference system EXAMPLE [local] x, y, pressure
2.	compoundEngineering-Parametric Temporal	compoundEngi-neering ParametricTem-poral	compound spatio-parametric-temporal coordinate reference system containing an engineering, a parametric, and a temporal coordinate reference system EXAMPLE [local] x, y, pressure, time
3.	compoundEngineer-ingTemporal	compoundEngi-neering Temporal	compound spatio-temporal coordinate reference system containing an engineering and a temporal coordinate reference system EXAMPLE [local] x, y, time
4.	compoundEngineeringVer-tical	compoundEngi-neering Vertical	compound spatial reference system containing a horizontal engineering coordinate reference system and a vertical coordinate reference system EXAMPLE [local] x, y, height
5.	compoundEngineeringVer-tical Temporal	compoundEngi-neering VerticalTemporal	compound spatio-temporal coordinate reference system containing an engineering, a vertical, and a temporal coordinate reference system EXAMPLE [local] x, y, height, time
6.	compoundGeographic2D Parametric	compoundGe-ographic 2DParametric	compound spatio-parametric coordinate reference system containing a 2 dimensional geographic horizontal coordinate reference system and a parametric reference system EXAMPLE latitude, longitude, pressure
7.	compoundGeographic2D ParametricTemporal	compoundGe-ographic 2DParametricTem-poral	compound spatio-parametric-temporal coordinate reference system containing a 2 dimensional geographic horizontal, a parametric and a temporal coordinate reference system EXAMPLE latitude, longitude, pressure, time
8.	compoundGeographic2D Temporal	compoundGe-ographic 2DTemporal	compound spatio-temporal coordinate reference system containing a 2 dimensional geographic horizontal coordinate reference system and a temporal reference system EXAMPLE latitude, longitude, time
9.	compoundGeographic2D-Vertical	compoundGe-ographic 2DVertical	compound coordinate reference system in which one constituent coordinate reference system is a horizontal geodetic coordinate reference system and one is a vertical coordinate reference system EXAMPLE latitude, longitude, [gravity-related] height or depth

	Concept name (English)	Code	Definition
10.	compoundGeographic2D-Vertical Temporal	compoundGe-ographic VerticalTemporal	compound spatio-temporal coordinate reference system containing a 2 dimensional geographic horizontal, a vertical, and a temporal coordinate reference system EXAMPLE latitude, longitude, height, time
11.	compoundGeographic3D Temporal	compoundGe-ographic 3DTemporal	compound spatio-temporal coordinate reference system containing a 3 dimensional geographic and a temporal coordinate reference system EXAMPLE latitude, longitude, ellipsoidal height, time
12.	compoundProjected2DPar-ametric	compoundPro-jected 2DParametric	compound spatio-parametric coordinate reference system containing a projected horizontal coordinate reference system and a parametric reference system EXAMPLE easting, northing, density
13.	compoundProjected2DPar-ametricTemporal	compoundPro-jected 2DParametricTem-poral	compound spatio-parametric-temporal coordinate reference system containing a projected horizontal, a parametric, and a temporal coordinate reference system EXAMPLE easting, northing, density, time
14.	compoundProjectedTem-poral	compoundPro-jected Temporal	compound spatio-temporal coordinate reference system containing a projected horizontal and a temporal coordinate reference system EXAMPLE easting, northing, time
15.	compoundProjectedVerti-cal	compoundPro-jected Vertical	compound spatial reference system containing a horizontal projected coordinate reference system and a vertical coordinate reference system EXAMPLE easting, northing, [gravity-related] height or depth
16.	compoundProjectedVerti-cal Temporal	compoundPro-jected VerticalTemporal	compound spatio-temporal coordinate reference system containing a projected horizontal, a vertical, and a temporal coordinate reference system EXAMPLE easting, northing, height, time
17.	engineering	engineering	coordinate reference system based on an engineering datum (datum describing the relationship of a coordinate system to a local reference) EXAMPLE [local] x,y
18.	engineeringDesign	engineeringDesign	engineering coordinate reference system in which the base representation of a moving object is specified EXAMPLE [local] x,y
19.	engineeringImage	engineeringImage	coordinate reference system based on an image datum (engineering datum which defines the relationship of a coordinate system to an image) EXAMPLE row, column
20.	geodeticGeocentric	geodeticGeocentric	geodetic CRS having a Cartesian 3D coordinate system EXAMPLE [geocentric] X,Y,Z
21.	geodeticGeographic2D	geodeticGeograph-ic2D	geodetic CRS having an ellipsoidal 2D coordinate system EXAMPLE latitude, longitude
22.	geodeticGeographic3D	geodeticGeograph-ic3D	geodetic CRS having an ellipsoidal 3D coordinate system EXAMPLE latitude, longitude, ellipsoidal height

	Concept name (English)	Code	Definition
23.	geographicIdentifier	geographicIdentifier	spatial reference in the form of a label or code that identifies a location EXAMPLE post code
24.	linear	linear	reference system that identifies a location by reference to a segment of a linear geographic feature and distance along that segment from a given point EXAMPLE x km along road
25.	parametric	parametric	coordinate reference system based on a parametric datum (datum describing the relationship of a parametric coordinate system to an object) EXAMPLE pressure
26.	projected	projected	coordinate reference system derived from a two-dimensional geodetic coordinate reference system by applying a map projection EXAMPLE easting, northing
27.	temporal	temporal	reference system against which time is measured EXAMPLE time
28.	vertical	vertical	one-dimensional coordinate reference system based on a vertical datum (datum describing the relation of gravity-related heights or depths to the Earth) EXAMPLE [gravity-related] height or depth

B.3.27 MD_RestrictionCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_RestrictionCode		**limitation(s) placed upon the access or use of the data**
1.	copyright	copyright	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
2.	patent	patent	government has granted exclusive right to make, sell, use or license an invention or discovery
3.	patentPending	patentPending	produced or sold information awaiting a patent
4.	trademark	trademark	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer
5.	licence	licence	formal permission to do something
6.	intellectualPropertyRights	intellectualPropertyRights	rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity
7.	restricted	restricted	withheld from general circulation or disclosure
8.	otherRestrictions	otherRestrictions	limitation not listed
9.	unrestricted	unrestricted	no constraints exist
10.	licenceUnrestricted	licenceUnrestricted	formal permission not required to use the resource
11.	licenceEndUser	licenceEndUser	formal permission required for a person or an entity to use the resource and that may differ from the person that orders or purchases it

	Concept name (English)	Code	Definition
12.	licenceDistributor	licenceDistributor	formal permission required for a person or an entity to commercialize or distribute the resource
13.	private	private	protects rights of individual or organisations from observation, intrusion, or attention of others
14.	statutory	statutory	prescribed by law
15.	confidential	confidential	not available to the public NOTE Contains information that could be prejudicial to a commercial, industrial, or national interest.
16.	sensitiveButUnclassified	SBU	although unclassified, requires strict controls over its distribution.
17.	in-confidence	in-confidence	with trust

B.3.28 MD_ScopeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_ScopeCode		**class of information to which the referencing entity applies**
1.	attribute	attribute	information applies to the attribute value
2.	attributeType	attributeType	information applies to the characteristic of a feature
3.	collectionHardware	collectionHard-ware	information applies to the collection hardware class
4.	collectionSession	collectionSession	information applies to the collection session
5.	dataset	dataset	information applies to the dataset
6.	series	series	information applies to the series
7.	nonGeographicDataset	nonGeographic-Dataset	information applies to non-geographic data
8.	dimensionGroup	dimensionGroup	information applies to a dimension group
9.	feature	feature	information applies to a feature
10.	featureType	featureType	information applies to a feature type
11.	propertyType	propertyType	information applies to a property type
12.	fieldSession	fieldSession	information applies to a field session
13.	software	software	information applies to a computer program or routine
14.	service	service	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
15.	model	model	information applies to a copy or imitation of an existing or hypothetical object
16.	tile	tile	information applies to a tile, a spatial subset of geo-graphic data
17.	metadata	metadata	information applies to metadata
18.	initiative	initiative	information applies to an initiative
19.	sample	sample	information applies to a sample
20.	document	document	information applies to a document
21.	repository	repository	information applies to a repository
22.	aggregate	aggregate	information applies to an aggregate resource

	Concept name (English)	Code	Definition
23.	product	product	metadata describing an ISO 19131 data product specification
24.	collection	collection	information applies to an unstructured set
25.	coverage	coverage	information applies to a coverage
26.	application	application	information resource hosted on a specific set of hardware and accessible over a network

B.3.29 MD_SpatialRepresentationTypeCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_SpatialRepresentationType Code		**method used to represent geographic information in the resource**
1.	vector	vector	vector data are used to represent geographic data
2.	grid	grid	grid data are used to represent geographic data
3.	textTable	textTable	textual or tabular data are used to represent geographic data
4.	tin	tin	triangulated irregular network
5.	stereoModel	stereoModel	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
6.	video	video	scene from a video recording

B.3.30 MD_TopicCategoryCode << Enumeration>>

	Concept name (English)	Code	Definition
	MD_TopicCategoryCode		**high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets** **NOTE 1 Can be used to group keywords as well. Listed examples are not exhaustive.** **NOTE 2 It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.**
1.	farming	farming	rearing of animals and/or cultivation of plants EXAMPLES Agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock.
2.	biota	biota	flora and/or fauna in natural environment EXAMPLES Wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat.
3.	boundaries	boundaries	legal land descriptions, maritime boundaries EXAMPLES Political and administrative boundaries, territorial seas, EEZ, port security zones.
4.	climatologyMeteorology Atmosphere	climatologyMeteorology Atmosphere	processes and phenomena of the atmosphere EXAMPLES Cloud cover, weather, climate, atmospheric conditions, climate change, precipitation.

	Concept name (English)	Code	Definition
5.	economy	economy	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.
6.	elevation	elevation	height above or below a vertical datum EXAMPLES Altitude, bathymetry, digital elevation models, slope, derived products.
7.	environment	environment	environmental resources, protection and conservation EXAMPLES Environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape.
8.	geoscientificInformation	geoscientificInformation	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.
9.	health	health	health, health services, human ecology, and safety EXAMPLES Disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services.
10.	imageryBaseMapsEarthCover	imageryBaseMapsEarthCover	base maps EXAMPLES Land cover, topographic maps, imagery, unclassified images, annotations.
11.	intelligenceMilitary	intelligenceMilitary	military bases, structures, activities EXAMPLES Barracks, training grounds, military transportation, information collection.
12.	inlandWaters	inlandWaters	inland water features, drainage systems and their characteristics EXAMPLES Rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrologic information.
13.	location	location	positional information and services EXAMPLES Addresses, geodetic networks, control points, postal zones and services, place names.
14.	oceans	oceans	features and characteristics of salt water bodies (excluding inland waters) EXAMPLES Tides, tsunamis, coastal information, reefs.
15.	planningCadastre	planningCadastre	information used for appropriate actions for future use of the land EXAMPLES Land use maps, zoning maps, cadastral surveys, land ownership.
16.	society	society	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.

	Concept name (English)	Code	Definition
17.	structure	structure	man-made construction EXAMPLES Buildings, museums, churches, factories, housing, monuments, shops, towers.
18.	transportation	transportation	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.
19.	utilitiesCommunication	utilitiesCommunication	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.
20.	extraTerrestrial	extraTerrestrial	region more than 100 km above the surface of the Earth
21.	disaster	disaster	information related to disasters EXAMPLES Site of the disaster, evacuation zone, disaster-prevention facility, disaster relief activities.

B.3.31 MD_TopologyLevelCode <<CodeList>>

	Concept name (English)	Code	Definition
	MD_TopologyLevelCode		**degree of complexity of the spatial relationships**
1.	geometryOnly	geometryOnly	geometry objects without any additional structure which describes topology
2.	topology1D	topology1D	1-dimensional topological complex – commonly called "chain-node" topology
3.	planarGraph	planarGraph	1-dimensional topological complex that is planar NOTE A planar graph is a graph that can be drawn in a plane in such a way that no two edges intersect except at a vertex.
4.	fullPlanarGraph	fullPlanarGraph	2-dimensional topological complex that is planar NOTE A 2-dimensional topological complex is commonly called "full topology" in a cartographic 2D environment.
5.	surfaceGraph	surfaceGraph	1-dimensional topological complex that is isomorphic to a subset of a surface NOTE A geometric complex is isomorphic to a topological complex if their elements are in a one-to-one, dimensional-and boundary-preserving correspondence to one another.
6.	fullSurfaceGraph	fullSurfaceGraph	2-dimensional topological complex that is isomorphic to a subset of a surface
7.	topology3D	topology3D	3-dimensional topological complex NOTE A topological complex is a collection of topological primitives that are closed under the boundary operations.
8.	fullTopology3D	fullTopology3D	complete coverage of a 3D Euclidean coordinate space
9.	abstract	abstract	topological complex without any specified geometric realisation

B.3.32 SV_CouplingType <<CodeList>>

	Concept name (English)	Code	Definition
	SV_CouplingType		**class of information to which the referencing entity applies**
1.	loose	loose	service instance is loosely coupled with a data instance, i.e. no MD_DataIdentification class has to be described
2.	mixed	mixed	service instance is mixed coupled with a data instance, i.e. MD_DataIdentification describes the associated data instance and additionally the service instance might work with other external data instances
3.	tight	tight	service instance is tightly coupled with a data instance, i.e. MD_DataIdentification class MUST be described

B.3.33 SV_ParameterDirection <<Enumeration>

	Concept name (English)	Code	Definition
	SV_ParameterDirection		**class of information to which the referencing entity applies**
1.	in	in	the parameter is an input parameter to the service instance
2.	out	out	the parameter is an output parameter to the service instance
3.	in/out	in/out	the parameter is both an input and output parameter to the service instance

Annex C
(normative)

Metadata extensions and profiles

C.1 Background

Clause 6 and Annex B of this part of ISO 19115 provide standard metadata and an associated structure that will serve a wide variety of resources. The definitions and domain values are intended to be sufficiently generic to satisfy the metadata needs of various disciplines. However, the diversity of information means that generic metadata may not accommodate all applications. ISO 19106:2004 provides a detailed set of guidelines for defining and applying additional metadata to better serve special user needs (profiles). Those guidelines are used here.

C.2 Types of extensions

The following types of extensions shall be allowed:

1) adding a new metadata package;

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 class;

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 part of ISO 19115 must be performed to confirm that suitable metadata does not already exist. For each extended metadata package, class, and/or element, the name, definition, obligation, condition, maximum occurrence, data type, and domain values shall be defined. Relationships as provided in Clause 6 shall be defined so that 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 classes and may include extended and existing metadata elements as components.

3) An extension is permitted to impose more stringent obligations 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. This part of ISO 19115 uses codelists to control vocabularies. Extending codelists is discouraged, even in profiles. When they must be extended care should be taken to minimize the number of additional entries. Also, the extended codelist should be published or otherwise made available.

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 class, specific to a discipline or application, co-ordination of the proposed extension via user groups and creation of a community profile is recommended.

This part of ISO 19115 defines over 400 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 organisations may develop a "community profile" of this part of ISO 19115. 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 part of ISO 19115. For example, a community may want to develop metadata elements for the status of resources 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 minimum mandatory metadata components, a full set of metadata defined in this part of ISO 19115 and national, regional, domain specific or organisational "community" profiles.

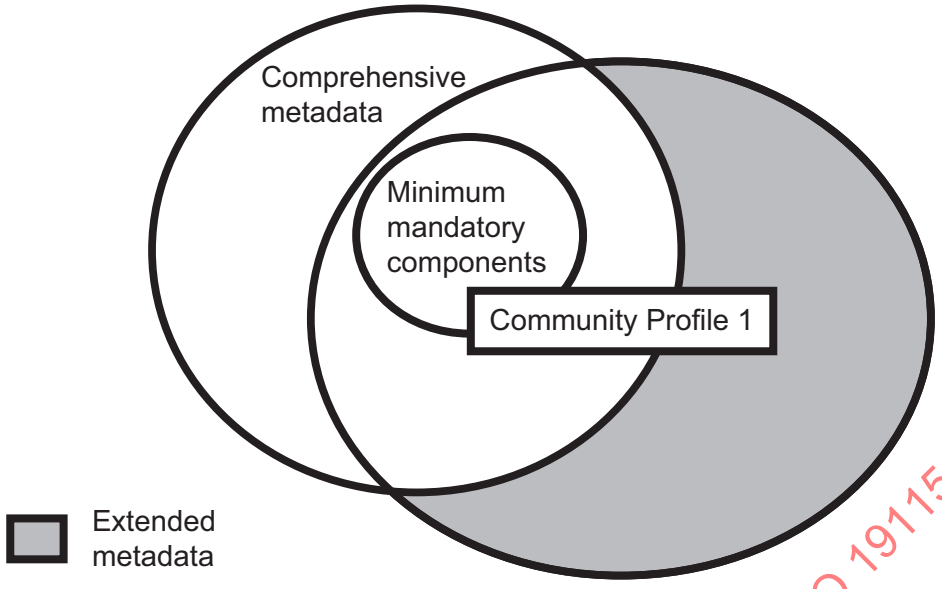

Figure C.1 — Metadata community profile

The inner circle contains a minimum set of required metadata components. Comprehensive metadata includes the minimum mandatory components plus the entire set of components defined in this part of ISO 19115. A community profile shall contain the minimum mandatory 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:

   — all mandatory metadata elements in all mandatory sections;

   — all conditional metadata elements in all mandatory sections, if the resource meets the condition required by the metadata element;

   — all mandatory metadata elements in all conditional sections, if the resource meets the condition required by the section;

   — all conditional metadata elements in all conditional sections, if the resource meets the condition required by the metadata element and the section.

5) Relationships, as provided in the models in 6.2 to 6.6, should be provided in UML or some other modelling language so that a structure and schema can be determined.

6) Metadata shall be created for the extensions and/or profile.

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

Annex D
(informative)

Implementation examples

D.1 Metadata examples

Four examples are provided. One example is for a dataset titled “Boundaries of Exploration Licences for Minerals”. A second illustrates how hierarchical metadata might change over time. A third example illustrates an extension of the metadata standard. The fourth is an example of the use of multiple languages in a metadata element.

Examples are presented in English. However, countries and users are allowed to use their own natural language(s) in the implementation of this part of ISO 19115.

D.2 Example 1 — Boundaries of Exploration Licences for Minerals

This example is provided in a tabbed-outline format with element values underlined. This example illustrates the hierarchical structure of ISO 19115-1 metadata and is based on an implementation schema that governs the ordering of the elements within the metadata instance document.

(MD_Metadata)
metadataIdentifier: (MD_Identifier)
code: ANZSA1000001233
characterSet: (MD_CharacterSetCode) utf8
contact: (CI_Responsibility)
role: (CI_RoleCode) author
party: (CI_Organisation)
name: Department of Primary Industries and Resources SA
dateInfo: (CI_Date)
date:
DateTime: 20000803
dateType: (CI_DateTypeCode) creation
metadataStandard: (CI_Citation)
title: ISO 19115-1
version: Draft International Standard

referenceSystemInfo: (MD_ReferenceSystem)
referenceSystemIdentifier: (RS_Identifier)
code: GDA 94
codeSpace: DIPR

identificationInfo: (MD_DataIdentification)
citation: (CI_Citation)
title: Exploration Licences for Minerals
date: (CI_Date)
date: 1930-01
dateType: (CI_DateTypeCode) creation
onlineResource: (CI_OnlineResource)
linkage: (URL) https://info.pir.sa.gov.au/geometa/migs/MIGS_Down_cat.jsp
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: (MD_ProgressCode) onGoing