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Geographic information — Metadata —

Part 2:
Extensions for imagery and gridded data

Information géographique — Métadonnées —

Partie 2: Extensions pour les images et les matrices

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

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

ISO 19115-2 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

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

— *Geographic information — Metadata*

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

Introduction

Imagery and gridded data are important information sources and products used within a geospatial environment by geographic information systems. The production of imagery and gridded data follows one or more process chains that begin with remote sensing data, scanned maps, field data collection or other sensing methods and end with the creation of the end data products. The production process needs to be documented in order to maintain quality control over the end products. In addition, metadata about the geometry of the measuring process and the properties of the measuring equipment need to be retained with the raw data in order to support the production process.

Within the suite of ISO geographic information standards, ISO 19115 defines the guidelines for describing geographic information and services. While the ISO 19115 metadata model does provide some provisions for imagery and gridded data, the requirements were not fully developed at the time ISO 19115:2003 was drafted. To permit the development of ISO 19115 to proceed, inclusion of metadata definitions for imagery and gridded data was deferred until the framework for these data was more fully specified within the suite of ISO geographic information standards. Additionally, other standards that implement metadata for imagery and gridded data have been surveyed and are described in ISO/TR 19121.

The object of this part of ISO 19115 is to provide the additional structure to more extensively describe the derivation of geographic imagery and gridded data. This structure is intended to augment ISO 19115.

Geographic information — Metadata —

Part 2:
Extensions for imagery and gridded data

1 Scope

This part of ISO 19115 extends the existing geographic metadata standard by defining the schema required for describing imagery and gridded data. It provides information about the properties of the measuring equipment used to acquire the data, the geometry of the measuring process employed by the equipment, and the production process used to digitize the raw data. This extension deals with metadata needed to describe the derivation of geographic information from raw data, including the properties of the measuring system, and the numerical methods and computational procedures used in the derivation. The metadata required to address coverage data in general is addressed sufficiently in the general part of ISO 19115.

2 Conformance

2.1 Conformance requirements

Metadata shall be provided as specified in Clause 6 and Annexes A and B of this part of ISO 19115 and ISO 19115:2003, Clause 6 and Annexes A and B.

User-defined metadata extensions to this part of ISO 19115 shall be defined and provided as specified in ISO 19115:2003, Annex C.

Any metadata claiming conformance with this part of ISO 19115 shall pass the requirements described in Annex C of this part of ISO 19115 and the abstract test suite presented in ISO 19115:2003, Annex D.

2.2 Metadata profiles

Any profile conforming to this part of ISO 19115 shall conform to the rules for creating a profile given in ISO 19115:2003, C.6.

3 Normative references

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

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

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

ISO 19115:2003, *Geographic information — Metadata*

ISO/TS 19139:2007, *Geographic information — Metadata — XML schema implementation*

4   Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19115:2003 and the following apply.

4.1
attribute
named property of an entity

[ISO/IEC 2382-17:1999]

NOTE   Describes a geometrical, topological, thematic, or other characteristic of an entity.

4.2
band
range of wavelengths of electromagnetic radiation that produce a single response by a sensing device

[ISO/TS 19101-2:2008]

4.3
class
description of a set of objects that share the same **attributes**, operations, methods, relationships, and semantics

[ISO/TS 19103:2005]

4.4
coverage
feature that acts as a function to return **values** from its range for any direct position within its spatial, temporal or spatiotemporal **domain**

[ISO 19123:2005]

EXAMPLE   Examples include a raster **image**, polygon overlay, or digital elevation matrix

4.5
data
reinterpretable representation of information in a formalised manner suitable for communication, interpretation, or processing

[ISO/IEC 2382-1:1993]

4.6
data type
specification of a **value domain** with operations allowed on **values** in this **domain**

[ISO/TS 19103:2005]

4.7
dataset
identifiable collection of **data**

[ISO 19115:2003]

4.8
dataset series
collection of **datasets** sharing the same product specification

[ISO 19115:2003]

4.9
domain
well-defined set

[ISO/TS 19103:2005]

4.10
event
action which occurs at an instant

[ISO 19108:2002]

4.11
geolocation information
information used to determine geographic location corresponding to **image** location

4.12
georectified
corrected for positional displacement with respect to the surface of the earth

4.13
georeferencing
process of determining the relation between the position of **data** in the image coordinates and its geographic or map location

4.14
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

[ISO 19123:2005]

NOTE   The curves partition a space into **grid** cells.

4.15
grid coordinate system
coordinate system in which a position is specified relative to the intersection of curves

4.16
grid coordinates
sequence of two or more numbers specifying a position with respect to its location on a **grid**

4.17
gridded data
data whose **attribute values** are associated with positions on a **grid coordinate system**

4.18
ground control point
point on the earth that has an accurately known geographic position

4.19
image
gridded **coverage** whose **attribute values** are a numerical representation of a physical parameter

NOTE   The physical parameters are the result of measurement by a **sensor** or a prediction from a model.

4.20
imagery
representation of phenomena as **images** produced by electronic and/or optical techniques

[ISO 19101-2:2008]

NOTE   In this part of ISO 19115, it is assumed that the objects and phenomena have been sensed or detected by camera, infrared and multispectral scanners, radar and photometers, or similar devices.

4.21
metadata
data about data

[ISO 19115:2003]

4.22
pass

single instance of a remote, mobile measuring system going by a target of interest

NOTE   In this part of ISO 19115, the measuring system will usually be a remote sensing platform. In a navigation context, the measuring system might be a GPS satellite.

4.23
pixel

smallest element of a digital image to which attributes are assigned

[ISO/TS 19101-2:2008]

NOTE   It is the smallest unit of display for a visible image.

4.24
platform
structure which supports a **sensor**, or sensors

4.25
polarization
restricting radiation, especially light, vibrations to a single plane

4.26
remote sensing
collection and interpretation of information about an object without being in physical contact with the object

4.27
resolution (of a **sensor**)
smallest difference between indications of a **sensor** that can be meaningfully distinguished

NOTE   For imagery, resolution refers to radiometric, spectral, spatial and temporal resolutions.

[ISO/TS 19101-2:2008]

4.28
sensor
element of a measuring system that is directly affected by a phenomenon, body, or substance carrying a quantity to be measured

[ISO/IEC GUIDE 99:2007)]

4.29
sensor model
description of the radiometric and geometric characteristics of a **sensor**

[ISO19101-2:2008]

4.30
spectral resolution
specific wavelength interval within the electromagnetic spectrum

EXAMPLE   Band 1 of Landsat TM lies between 0,45 and 0,52 μm in the visible part of the spectrum.

4.31
value
element of a type **domain**

[ISO/TS 19103:2005]

4.32
value domain
set of accepted **values**

[ISO/TS 19103:2005]

EXAMPLE   The range 3-28, all integers, any ASCII character, enumeration of all accepted values (green, blue, white).

5   Symbols and abbreviated terms

5.1   Abbreviations

IDL   Interface Definition Language

OCL   Object Constraint Language

UML   Unified Modeling Language

5.2   UML notations

The diagrams that appear in this part of ISO 19115 are presented using the Unified Modelling Language (UML) static structure diagram with the ISO Interface Definition Language (IDL) basic type definitions and the UML Object Constraint Language (OCL) as the conceptual schema language. The UML notations used in this part of ISO 19115 are described in Figure 1.

Association

Aggregation

Composition

Generalization

Dependency
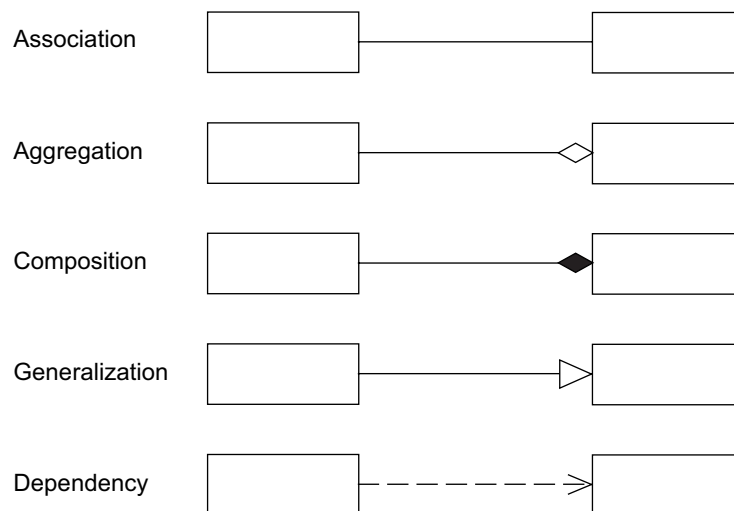
Figure 1 — UML notation

5.3 UML model relationships

5.3.1 Associations

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

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

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

5.3.2 Generalization

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

5.3.3 Instantiation/Dependency

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

— client class accesses a value (constant or variable) defined in the supplier class/interface;

— operations of the client class invoke operations of the supplier class/interface;

— operations of the client class have signatures whose return class or arguments are instances of the supplier class/interface.

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

5.3.4 Roles

If an association is navigable in a particular direction, the model shall supply a "role name" that is appropriate for the role of the target object in relation to the source object. Thus in a two-way association, two role names will be supplied. Figure 2 represents how role names and cardinalities are expressed in UML diagrams.

Association between classes

Association cardinality

Aggregation between classes

Class inheritance (subtyping of classes)
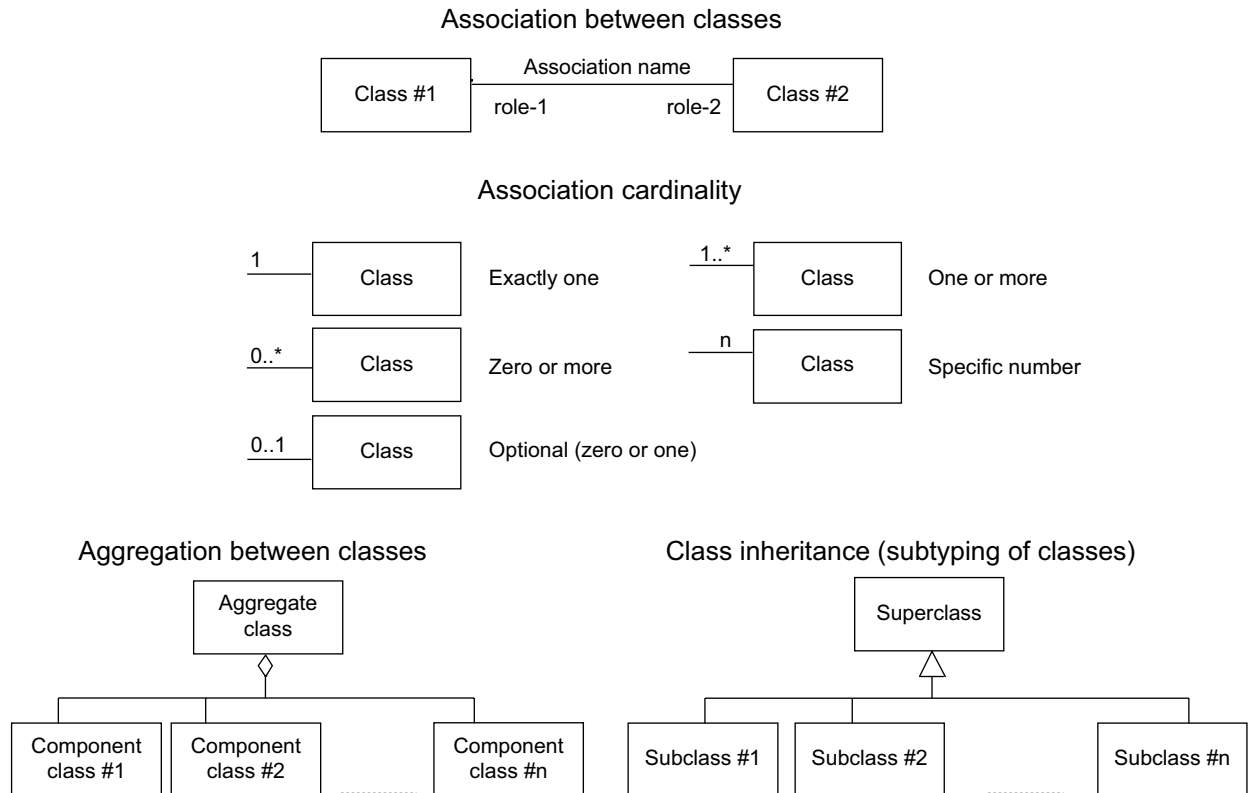
Figure 2 — UML roles

5.4 UML model stereotypes

A UML stereotype is an extension mechanism for existing UML concepts. It is a model element that is used to classify (or mark) other UML elements so that they in some respect behave as if they were instances of new virtual or pseudo metamodel classes whose form is based on existing base metamodel classes. Stereotypes augment the classification mechanisms on the basis of the built-in UML metamodel class hierarchy. Below are brief descriptions of the stereotypes used in this part of ISO 19115. For more detailed descriptions consult ISO/TS 19103.

In this part of ISO 19115 the following stereotypes are used.

a) <<Type>> class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A type may have attributes and associations.

b) <<Enumeration>> data type whose instances form a list of named literal values. Both the enumeration name and its literal values are declared. Enumeration means a short list of well-understood potential values within a class.

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

d) <<CodeList>> used to describe a more open enumeration. <<CodeList>> is a flexible enumeration. Code lists are useful for expressing a long list of potential values. If the elements of the list are completely known, an enumeration should be used; if only the likely values of the elements are known, a code list should be used.

e)   <<Union>> describes a selection of one of the specified types. This is useful to specify a set of alternative classes/types that can be used, without the need to create a common super-type/class.

f)   <<Abstract>> class (or other classifier) that cannot be directly instantiated. UML notation for this to show the name in italics.

g)   <<Metaclass>> class whose instances are classes. Metaclasses are typically used in the construction of metamodels. A metaclass is an object class whose primary purpose is to hold metadata about another class.

h)   <<Interface>> named set of operations that characterize the behaviour of an element.

i)   <<Package>> cluster of logically related components, containing sub-packages.

j)   <<Leaf>> package that contains definitions, without any sub-packages.

6   Imagery and gridded data metadata

6.1   Metadata for geospatial imagery and gridded data requirement

ISO 19115 identifies the metadata required to describe digital geographic data. This part of ISO 19115 extends the metadata identified in ISO 19115 and identifies the metadata required to describe digital geospatial imagery and gridded data. ISO 19115 identifies some of the metadata for imagery and gridded data and this part of ISO 19115 builds upon that foundation. The extended metadata shall be provided for geographic images and gridded datasets which include the geospatial imagery and gridded data and may optionally be provided for aggregations of datasets.

6.2   Imagery and gridded data metadata packages

6.2.1   Introduction

Figure 3 illustrates the relationships among the packages described in this part of ISO 19115 and the relevant packages specified in ISO 19115. The ISO 19115 UML model diagrams and data dictionary for each package are fully specified in ISO 19115. The additional metadata for geospatial imagery and gridded data is fully specified in the UML model diagrams and data dictionary for each additional package, which is given in Annex A and Annex B, respectively. If a discrepancy between the two annexes exists, Annex A shall be considered authoritative.
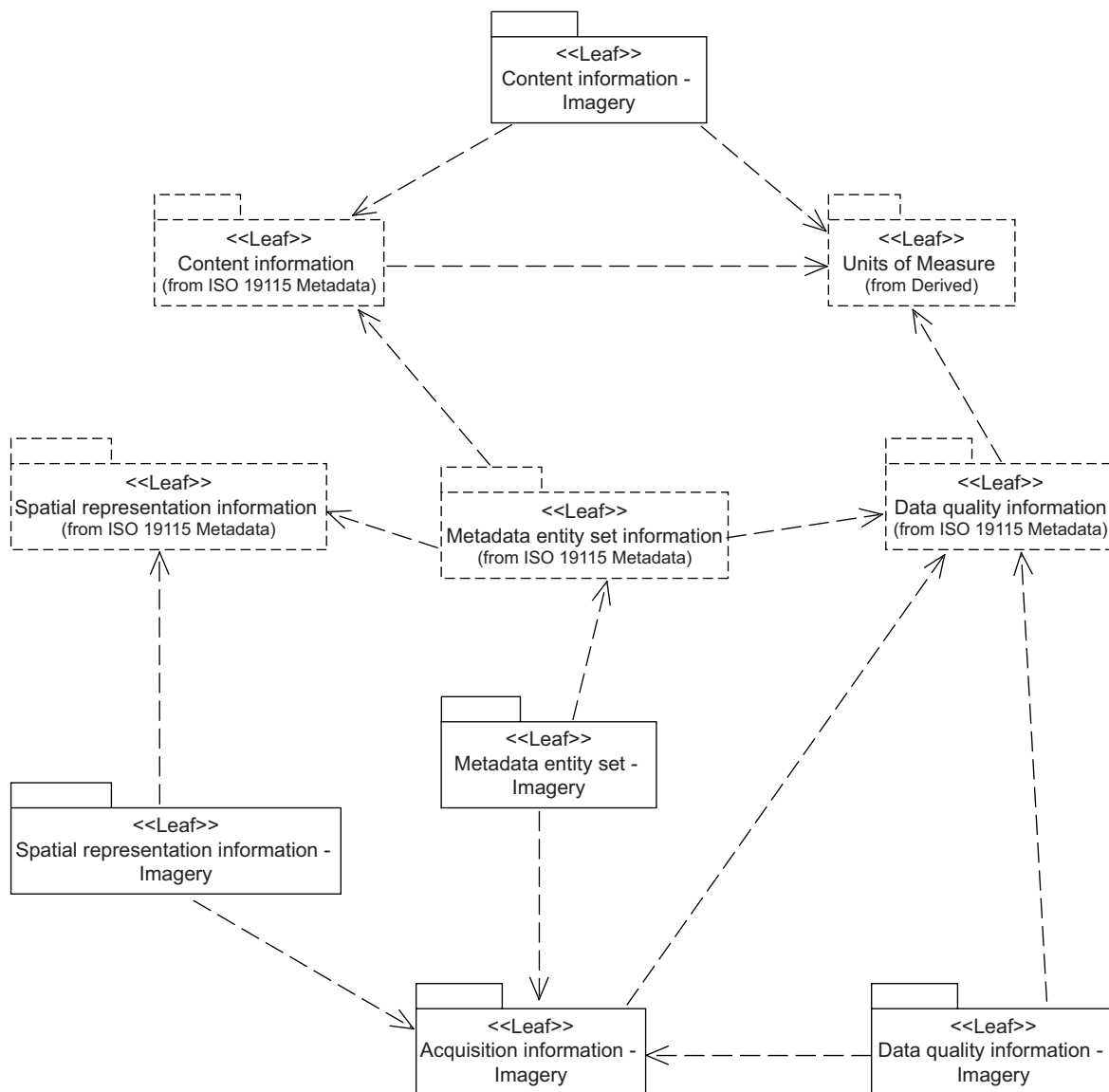
Figure 3 — Metadata packages

To ensure global uniqueness of class names, ISO/TS 19103 requires that all class names be defined with a bi-alpha prefix that identifies the package in which the class is defined. ISO 19115 uses the prefixes MD (Metadata), CI (Citation), DQ (Data quality), EX (Extent), and LI (Lineage). To differentiate between ISO 19115 and entities of this part of ISO 19115, this part uses different prefixes. The prefixes used are MI (Metadata for imagery and gridded data), LE (Lineage extended) and QE (Data quality extended). Table 1 contains the list of package identifiers for the classes used in this part of this part of ISO 19115.

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Table 1 —UML Package Identifiers

Identifier	Information Type	Standard
CI	Citation	ISO 19115
DQ	Data Quality	ISO 19115
EX	Extent	ISO 19115
GM	Geometry	ISO 19107
LE	Lineage Extended	ISO 19115-2
LI	Lineage	ISO 19115
MD	Metadata	ISO 19115
MI	Metadata for Imagery	ISO 19115-2
MX	Metadata — XML schema	ISO/TS 19139
QE	Data quality Extended	ISO 19115-2

6.2.2   Package Descriptions

6.2.2.1   Metadata Entity Set — Imagery

An additional package of metadata is specified here. MI_Metadata is a specified subclass of MD_Metadata and aggregates the optional entity MI_AcquisitionInformation. This additional package is described in A.2.1.

6.2.2.2   Data quality information — Imagery

The original data quality package is defined in ISO 19115 as a container of a general assessment of the quality of the dataset. In addition, the package contains information about the sources and production processes used in producing a dataset, which is of particular importance for imagery and gridded data. The data quality packages specified in this part of ISO 19115 add the following classes to those specified in ISO 19115:

— QE_CoverageResult is a specified subclass of DQ_Result and aggregates information required to report data quality for a coverage. From ISO 19115, the classes MD_SpatialRepresentation, MD_CoverageDescription, and MD_Format are aggregated as a description of the coverage data quality result. In addition, an association with MX_DataFile (defined in ISO/TS 19139) provides a means to identify a complete report of the quality of the coverage;

— QE_Usability is a specified subclass of DQ_Element used to provide user specific quality information about a dataset's suitability for a particular application;

— LE_ProcessStep is a specified subclass of LI_ProcessStep and contains additional information on the history of the algorithms used and processing performed to produce the data. LE_ProcessStep aggregates the following entities;

   — LE_Processing, describes the procedure (such as software used, parameters, and processing documentation) by which the algorithm is applied to generate the data from the source data. LE_Processing aggregates LE_Algorithm, which describes the methodology used to derive the data from the source data;

   — LE_ProcessStepReport identifies external information describing the processing of the data;

   — LE_Source, is a specified subclass of LI_Source and describes the output of a process step.

6.2.2.3 Spatial representation information — Imagery

The spatial representation package contains information concerning the mechanisms used to represent spatial information. MI_GeoreferencingDescription is a specified subclass of MD_Georeferenceable that contains additional information used to support georectification of the data. MI_GeoreferencingDescription is an aggregation of the following entities:

— MI_Georectified is a specified subclass of MD_Georectified that contains check point information to further specify georectification details of the imagery or gridded data. MI_Georectified aggregates MI_GCP;

— MI_Georeferenceable is a specified subclass of MD_Georeferenceable that includes additional information that can be used to geolocate the data. MI_Georeferenceable aggregates MI_GeolocationInformation.

6.2.2.4 Content information — Imagery

The package content information is defined in ISO 19115 and describes the content of a coverage dataset. This part of ISO 19115 expands it:

— MI_Band is a specified subclass of MD_Band defining additional attributes for specifying properties of individual wavelength bands in an imagery and gridded dataset;

— MI_ImageDescription is a specified subclass of MD_ImageDescription used to aggregate MI_RangeElementDescription;

— MI_CoverageDescription is a specified subclass of MD_CoverageDescription used to aggregate MI_RangeElementDescription;

— MI_RangeElementDescription provides identification of the range elements used in a coverage dataset.

6.2.2.5 Acquisition Information — Imagery

This package is particular to this part of ISO 19115 and provides details specific to the acquisition of imagery and gridded data. MI_AcquisitionInformation is an aggregate of the following entities:

— MI_Instrument, designations of the measuring instruments used to acquire the data;

— MI_Operation, designations of the overall data gathering program to which the data contribute;

— MI_Platform, designations of the platform from which the data were taken;

— MI_Objective, the characteristics and geometry of the intended object to be observed;

— MI_Requirement, the user requirements used to derive the acquisition plan;

— MI_Plan, the acquisition plan that was implemented to acquire the data.

Two additional classes are required to provide information on the acquisition of the data. These are:

— MI_Event, describes a significant event that occurred during data acquisition. An event can be associated with an operation, objective, or platform pass, and

— MI_PlatformPass, identifies a particular pass made by the platform during data acquisition. A platform pass is used to provide supporting identifying information for an event and for data acquisition of a particular objective.

6.3   Unified Modeling Language (UML) diagrams

Annex A provides the metadata schemas in the form of Unified Modeling Language (UML) class diagrams. These diagrams illustrate the extension entities defined in this part of 19115 and augment the UML diagrams in ISO 19115. Annex A includes the packages specified in this part of ISO 19115. When classes from ISO 19115 are extended to meet the requirements of this part of the standard, the classes from ISO 19115 are included in the diagrams in this annex. Combined with the data dictionary in Annex B and the UML diagrams and data dictionary in ISO 19115:2003, this part of ISO 19115 fully defines the total abstract model for metadata.

6.4   Data dictionary

Annex B contains the element and entity definitions for the metadata schemas defined in this part of the standard. This dictionary, in conjunction with the diagrams presented in Annex A and in combination with the UML diagrams and data dictionary presented in ISO 19115, serves to fully define the total abstract model for metadata.

Codelists and their values provided in this part of ISO 19115 are normative. User extensions to codelists shall follow the rules as described in ISO 19115 and Annex C. ISO/IEC 11179-6 defines the information to be specified, conditions to be fulfilled, and procedures to be followed for registering data elements.

Annex A
(normative)

Imagery and gridded data metadata schemas

A.1 Metadata UML models

Metadata for describing geographic data, geospatial imagery and gridded data is defined using an abstract object model in the Unified Modeling Language (UML). The diagrams in the following subclauses provide views, which are portions of the total abstract model for metadata. Each diagram defines the extensions for a metadata section (UML package) of related entities, elements, data types, and code lists augmenting the corresponding metadata section in ISO 19115. Related entities, which are defined in another diagram, are shown with elements suppressed and the defining package specified under the entity name in parentheses. Throughout the following models, entities may have mandatory and/or optional elements and associations. In some cases, optional entities may have mandatory elements; those elements become mandatory only if the optional entity is used.

Entities, elements and associations shown in light grey are defined in their entirety in ISO 19115:2003. They are shown here for informational purposes.

A.2 Imagery and gridded data metadata package UML diagrams

A.2.1 Metadata entity set extension

Figure A.1 defines MI_Metadata. which is an extension to the MD_Metadata class. The MI_Metadata class is used to provide information describing imagery and gridded data. The extension provided through MI_Metadata adds an association to the MI_AcquisitionInformation class, the root class of the Acquisition Information package. The data dictionary for this extension is given in B.2.1.
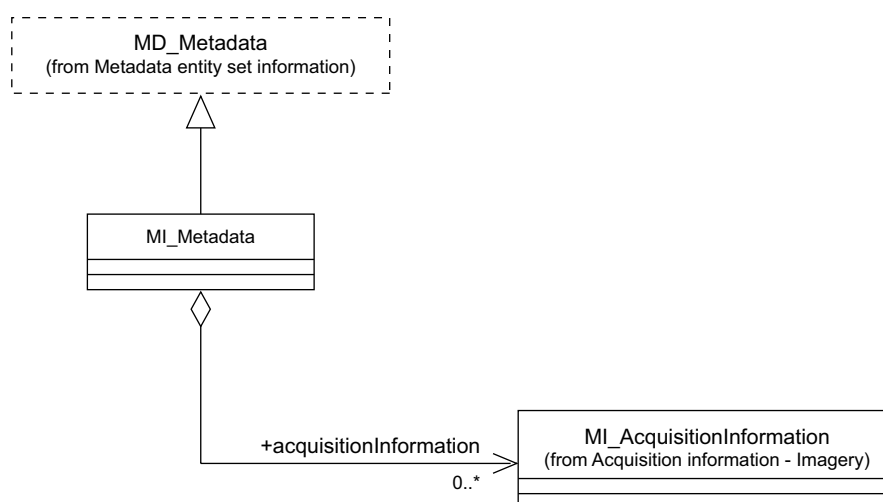
Figure A.1 — Metadata entity set extension

A.2.2 Data quality information

A.2.2.1 Extension to data quality result to support coverage quality

Figure A.2 defines an extension required to specify the reported quality for coverage data. The additional elements provide information about the representation of the quality result documenting the data in the dataset. The data dictionary for this diagram is given in B.2.2.1.
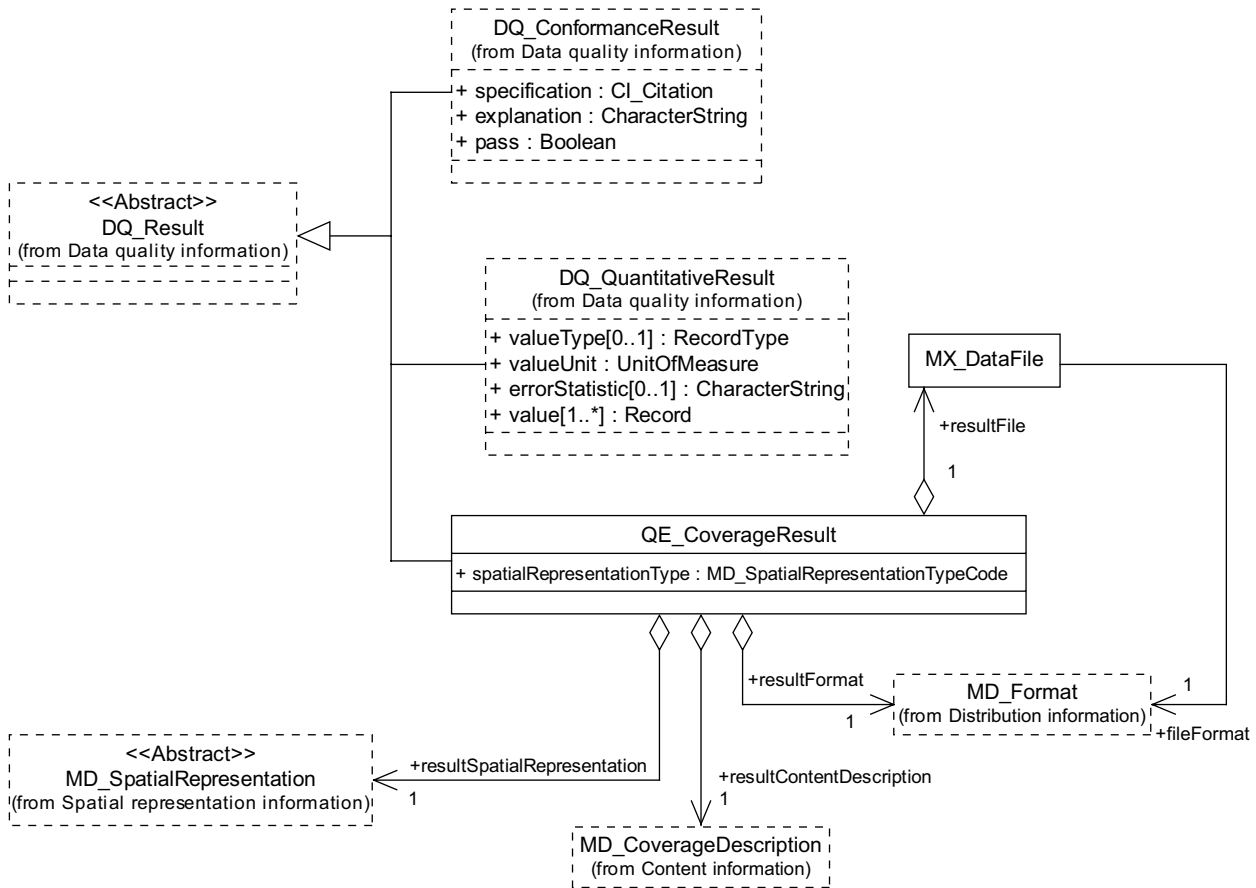
Figure A.2 — Data quality result

The following specification of **QE_CoverageResult** is simply based on existing concepts from ISO 19115 and ISO/TS 19139 .

— The coverage result has a spatial representation which, in some cases, can be exactly the same as the resource spatial representation or may differ (e.g. coverage result computed on a vector database or coverage result using a sample of the resource). The construct used to describe the spatial representation of the coverage result is the **MD_SpatialRepresentation** class. The *resultSpatialRepresentation* property is mandatory but can be implemented as a reference to the instance of **MD_SpatialRepresentation** related to the resource.

— The coverage result has a content description. The construct used to describe the content of the result coverage is **MD_CoverageDescription**. The resulting coverage will often be defined by the distribution of a single attribute over the result coverage domain, but it is anticipated that the range type of the result coverage can comprise many attributes.

— The coverage result has a format which is expressed through the **MD_Format** class.

— The coverage result is associated to a data file containing the coverage result data. The construct used to describe the result coverage data file is **MX_DataFile** (from ISO/TS 19139).

A.2.2.2 Lineage information

Figure A.3 defines the extensions required to specify the lineage of imagery and gridded data datasets. The additional elements provide information about the processing of the raw data that was performed to produce the data in the dataset. The data dictionary for this diagram is given in B.2.2.2.
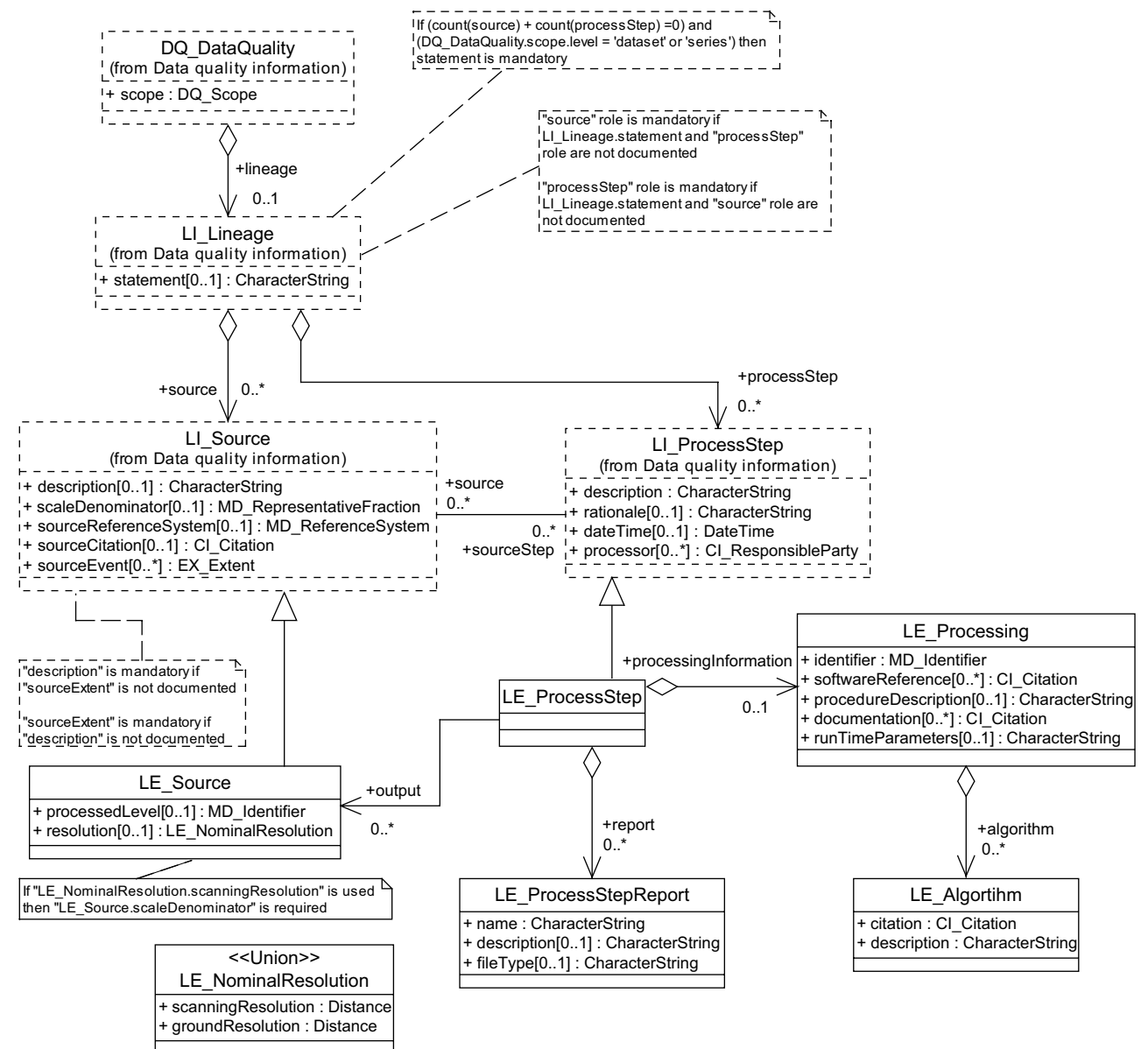
Figure A.3 — Data quality information lineage

A.2.2.3 Extension to data quality classes and subclasses

Figure A.4 defines an extension required to provide information on the usability of a dataset. QE_Usability provides information about the dataset indicating that it can be used in a specific user context. This data quality measure differs from those specified in the base standard in that it provides a measure of the data quality complementary to those in the base standard but containing a set of measures specific to a user's requirements. The data dictionary for this diagram is given in B.2.2.3.
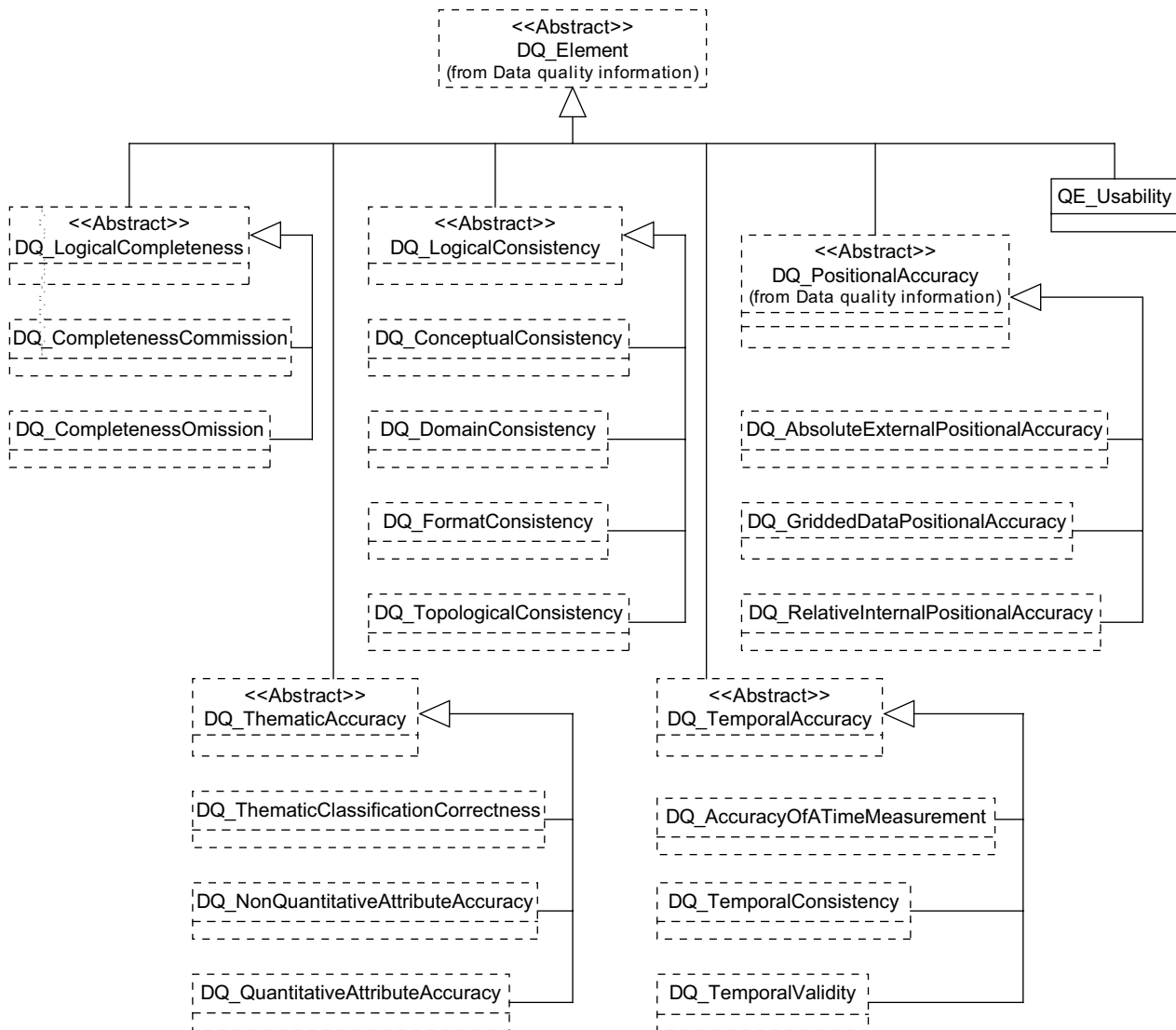
Figure A.4 — Extension to data quality subclasses

A.2.3 Spatial representation information

A.2.3.1   Extension to georectified and georeferenceable classes

Figure A.5 defines the extensions required to specify the spatial representation for imagery and gridded data. The data dictionary for this diagram is given in B.2.3.
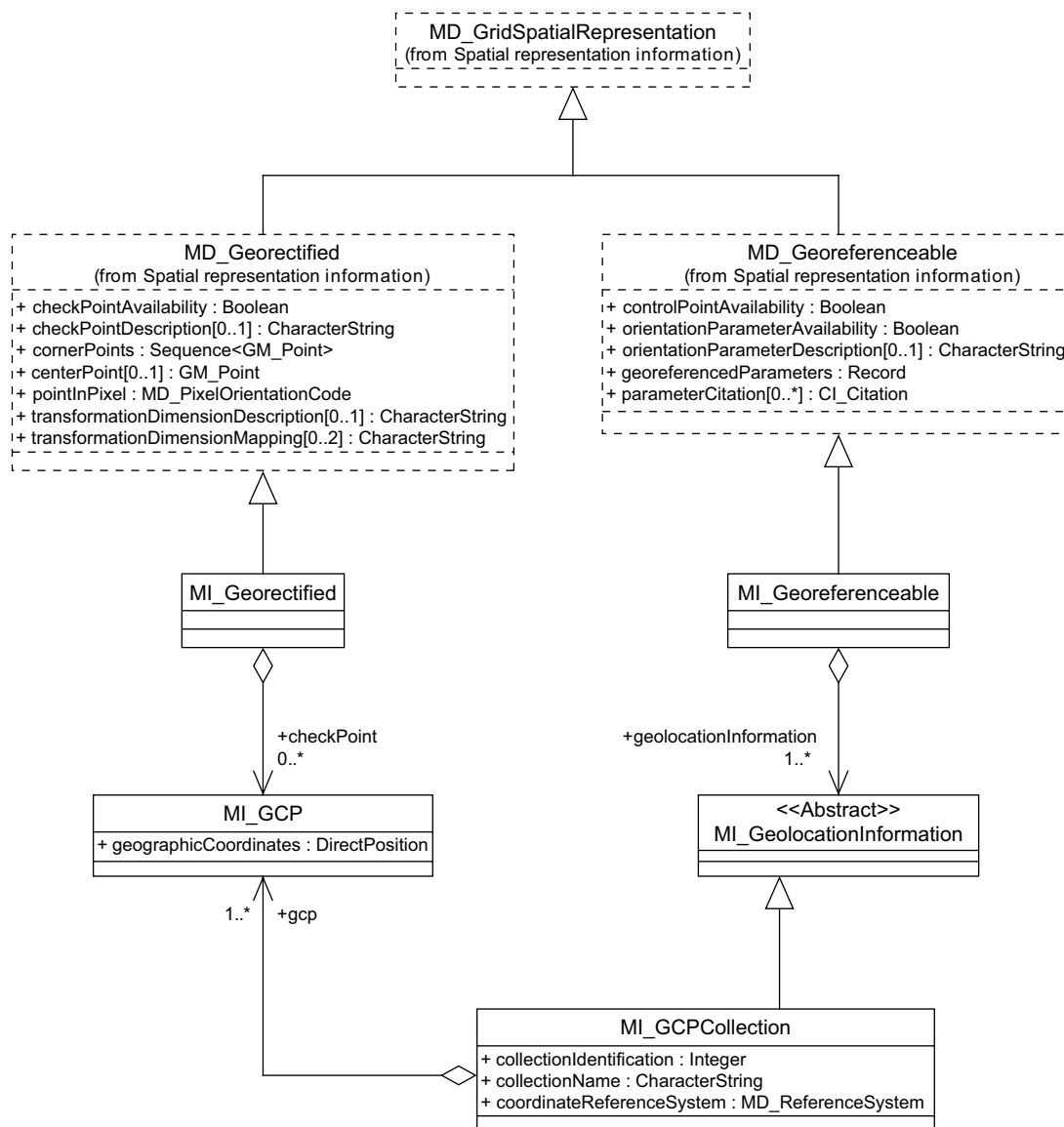
Figure A.5 — Spatial representation information

A.2.3.2 Ground control point quality

Figure A.6 defines the extensions required to describe the quality of ground control points. The data dictionary for this diagram is given in B.2.3.
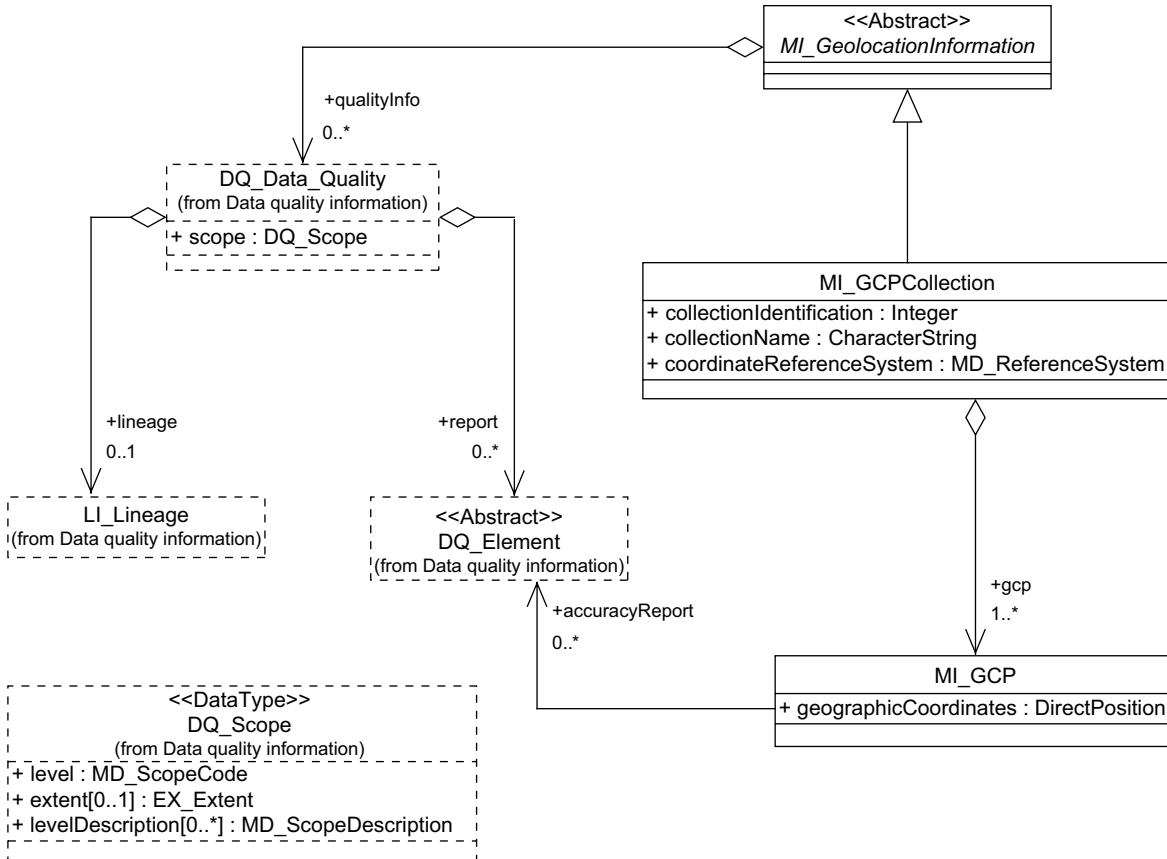
Figure A.6 — Quality of ground control points

A.2.4 Content information

Figure A.7 defines the extensions required to describe the content of imagery and gridded data datasets. The data dictionary for this diagram is given in B.2.4.
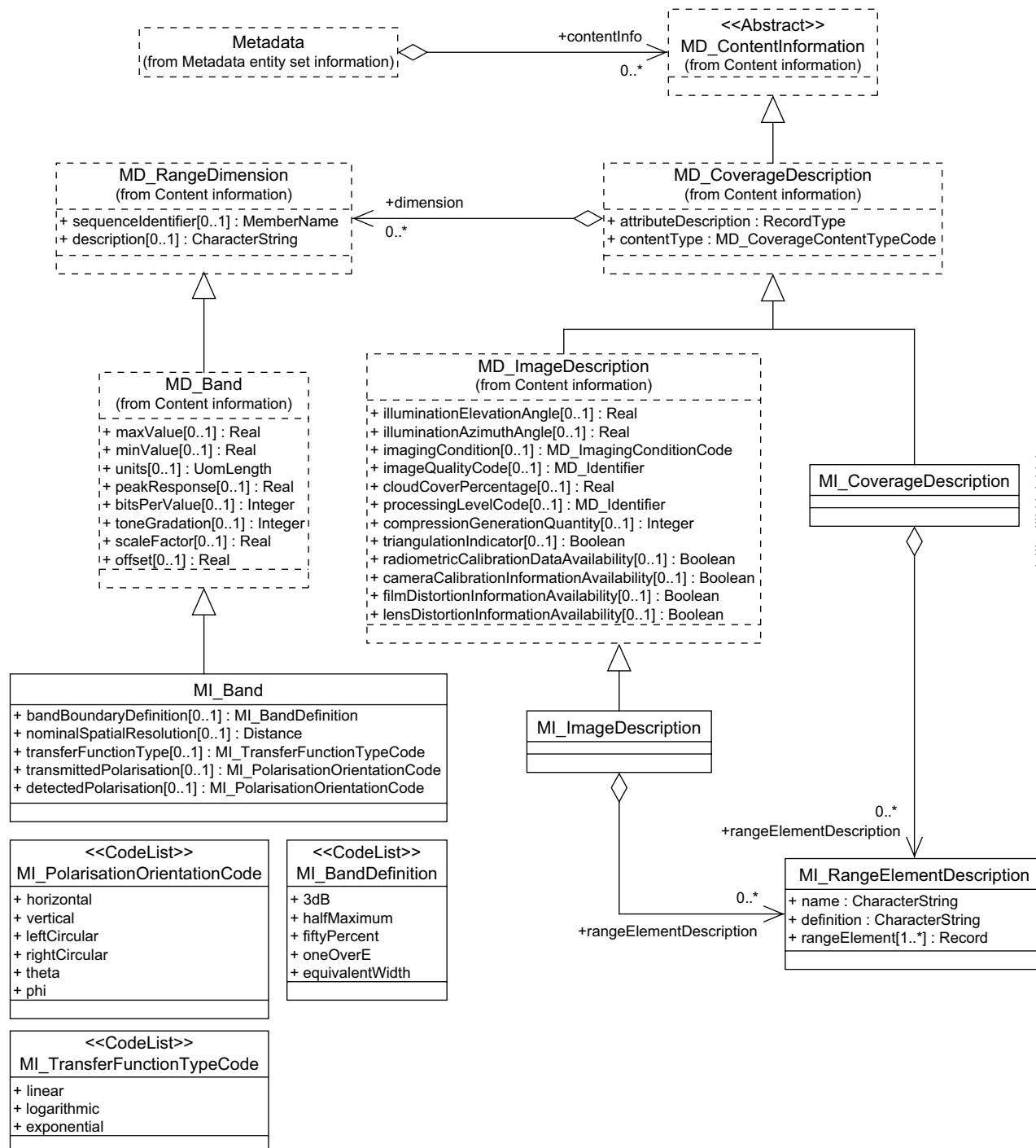
Figure A.7 — Content information

A.2.5 Acquisition Information

A.2.5.1   Acquisition Overview

Figure A.8 defines an overview of the metadata classes required to define the acquisition of imagery and gridded datasets. The data dictionary for this diagram is given in B.2.5.

Figure A.8 — Acquisition Overview

A.2.5.2   Acquisition Details

Figure A.9 defines, in detail, the metadata classes necessary to define the acquisition of imagery and gridded datasets. The data dictionary for this diagram is given in B.2.5.

MI_Requirement
+ citation[0..1] : CI_Citation
+ identifier : MD_Identifier
+ requestor[1..*] : CI_ResponsibleParty
+ recipient[1..*] : CI_ResponsibleParty
+ priority : MI_PriorityCode
+ requestedDate : MI_RequestedDate
+ expiryDate : DateTime

**<<DataType>>
MI_RequestedDate**
+ requestedDateOfCollection : DateTime
+ latestAcceptableDate : DateTime

**<<CodeList>>
MI_TriggerCode**
+ automatic
+ manual
+ preProgrammed

+satisfiedRequirement
0..*

**<<CodeList>>
MI_PriorityCode**
+ critical
+ highImportance
+ mediumImportance
+ lowImportance

+satisfiedPlan
0..*

**<<CodeList>>
MI_GeometryTypeCode**
+ point
+ linear
+ areal
+ strip

**<<CodeList>>
MD_ProgressCode**
(from Identification information)
+ completed
+ historicalArchive
+ obsolete
+ onGoing
+ planned
+ requied
+ underDevelopment

**<<CodeList>>
MI_ContextCode**
+ acquisition
+ pass
+ wayPoint

MI_Plan
+ type[0..1] : MI_GeometryTypeCode
+ status : MD_ProgressCode
+ citation : CI_Citation

**<<CodeList>>
MI_SequenceCode**
+ start
+ end
+ instantaneous

+plan
0..1

+childOperation
0..*

+operation
0..*

**<<CodeList>>
MI_OperationTypeCode**
+ real
+ simulated
+ synthetic

+parentOperation
1

MI_Operation
+ description[0..1] : CharacterString
+ citation[0..1] : CI_Citation
+ identifier : MD_Identifier
+ status : MD_ProgressCode
+ type[0..1] : MI_OperationTypeCode

+significantEvent
0..*

MI_Event
+ identifier : MD_Identifier
+ trigger : MI_TriggerCode
+ context : MI_ContextCode
+ sequence : MI_SequenceCode
+ time : Date_Time

+objectiveOccurence
1..*

+relatedEvent
0..*

**<<CodeList>>
MI_ObjectiveTypeCode**
+ instantaneousCollection
+ persistentView
+ survey

+relatedPass
0..1

MI_PlatformPass
+ identifier : MD_Identifier
+ extent[0..1] : GM_Object

+platform
0..*

+objective
0..*

MI_Platform
+ citation[0..*] : CI_Citation
+ identifier : MD_Identifier
+ description : CharacterString
+ sponsor[0..*] : CI_ResponsibleParty

MI_Objective
+ identifier[1..*] : MD_Identifier
+ priority[0..1] : CharacterString
+ type[0..*] : MI_ObjectiveTypeCode
+ function[0..*] : CharacterString
+ extent[0..*] : EX_Extent

+Pass
0..*

+mountedOn
0..1

+expectedObjective
0..*

+instrument
1..*

+sensingInstrument
0..*

MI_Instrument
+ citation[0..*] : CI_Citation
+ identifier : MD_Identifier
+ type : CharacterString
+ description[0..1] : CharacterString

+relatedSensor
0..*

Figure A.9 — Acquisition Details

Annex B
(normative)

Imagery and gridded data metadata data dictionary

B.1 Data dictionary overview

B.1.1 Introduction

This data dictionary describes the characteristics of the metadata defined in Clause 6 and Annex A. The dictionary is specified in a hierarchy to establish relationships and an organization for the information. The dictionary is categorised into sections by UML model package diagram: Metadata entity set, data quality, spatial representation, content and acquisition. The titles of several of the tables have been expanded to reflect class specification within the respective diagram. Each model diagram from Annex A has a section within the data dictionary. Each UML model class equates to a data dictionary entity. Each UML model class attribute equates to a data dictionary element. The shaded rows define entities. The entities and elements within the data dictionary are defined by seven attributes (those attributes are listed below and are based on those specified in ISO/IEC 11179-3 for the description of data element concepts, i.e. data elements without representation). The term "dataset", when used as part of a definition, is synonymous with all types of geographic data resources (aggregations of datasets, individual features and the various classes that compose a feature).

B.1.2 Name/role name

A label assigned to a metadata entity or to a metadata element. Metadata entity names start with an upper case letter. Spaces do not appear in a metadata entity name. Instead, multiple words are concatenated, with each new subword starting with a capital letter (example: XnnnYmmm). Metadata entity names are unique within the entire data dictionary of ISO 19115 and this part of ISO 19115. Metadata element names are unique within a metadata entity, not the entire data dictionary of ISO 19115 and this part of ISO 19115. Metadata element names are made unique, within an application, by the combination of the metadata entity and metadata element names (example: MD_Metadata.characterSet). Role names are used to identify metadata abstract model associations a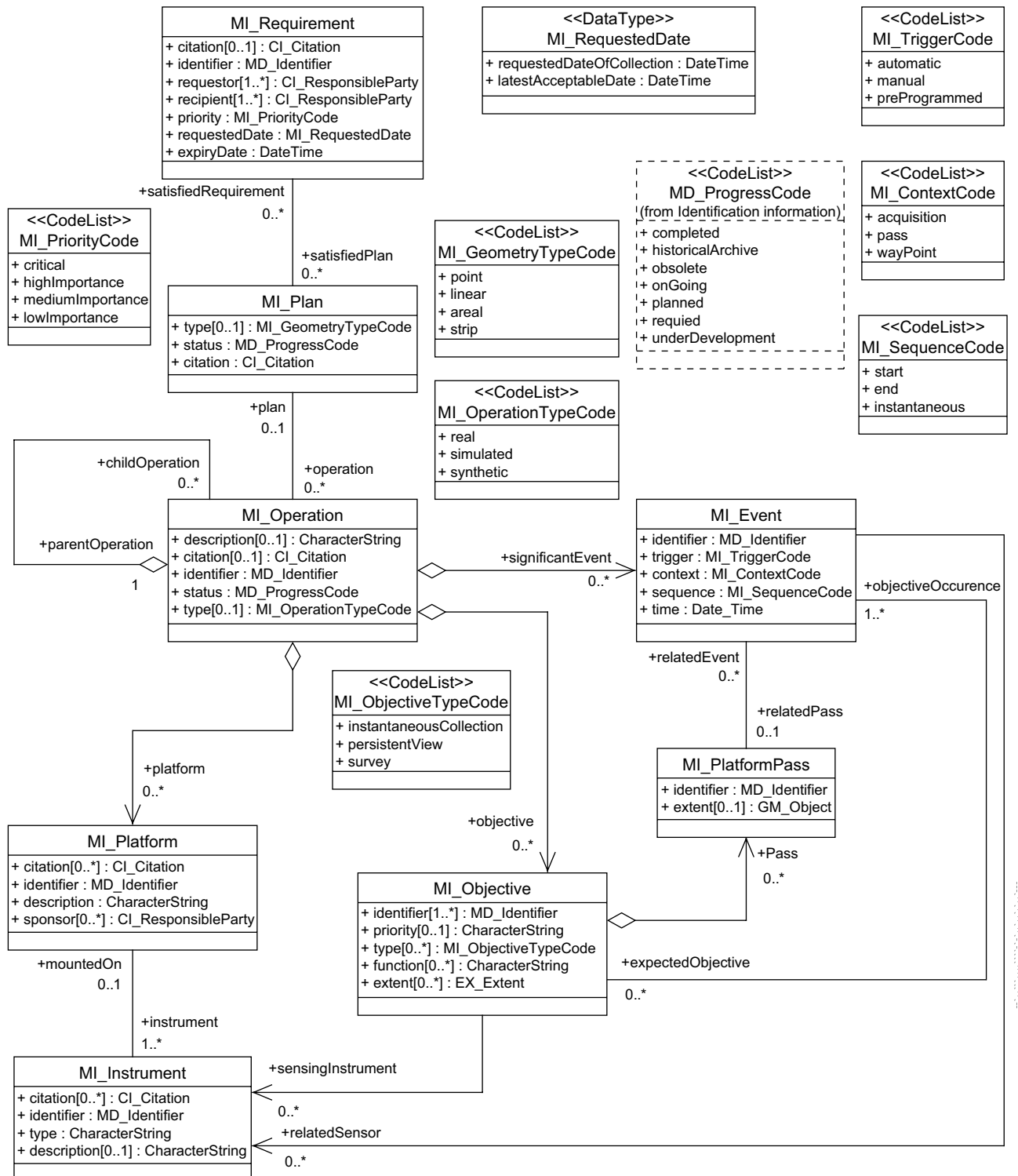nd are preceded by "Role name:" to distinguish them from other metadata elements. Names and role names may be in a language other than that used in this part of ISO 19115.

B.1.3 Short name and domain code

Those classes that are not CodeList stereotypes are provided with a short name for each element. These short names are unique within ISO 19115 and this part of ISO 19115 and may be used with the Extensible Markup Language (XML) and Standard Generalized Markup Language (SGML)[3] or other similar implementation techniques. A naming convention similar to that used to create the longer entity and element names was used to create the short names.

NOTE   Implementation using SGML and XML is not mandatory; other implementation methods are accommodated. For codelist stereotypes, a code is provided for each possible selection. These domain codes are numerical, unique within the codelist and 3 digits long. Row one of each codelist contains an alphabetic short name, described above, as row one is the name of the codelist.

B.1.4 Definition

The metadata entity/element description.

B.1.5 Obligation/condition

B.1.5.1 General

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

B.1.5.2 Mandatory (M):

The metadata entity or metadata element shall be documented.

B.1.5.3 Optional (O):

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

B.1.6 Maximum occurrence

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

B.1.7 Data type

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

NOTE   Data types are defined in ISO/TS 19103:2005, 6.5.2.

B.1.8 Domain

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

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

B.2 Imagery and gridded data metadata package data dictionaries

B.2.1 Metadata entity set information extension

- UML model shown in Figure A.1.

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
1.	MI_Metadata	MIMetadata	root entity that defines information about imagery or gridded data (MD_Metadata extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Metadata)	Line 2 (MD_Metadata, ISO 19115:2003, B.2.1)
2.	*Role name*: acquisitionInformation	acquisitionInfo	provides information about the acquisition of the data	O	N	Association	MI_AcquisitionInformation

B.2.2 Data quality information

B.2.2.1 Coverage result

- UML model shown in Figure A.2.

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
3.	QE_CoverageResult	CoverageResult	result of a data quality measure organising the measured values as a coverage (DQ_Result extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified class (DQ_Result)	Lines 4 to 8 (DQ_Result, ISO 19115:2003, B.2.4.4)
4.	spatialRepresentationType	spaRepType	method used to spatially represent the coverage result	M	1	Class	MD_SpatialRepresentationTypeCode <<CodeList>> (ISO 19115:2003, B.5.26)
5.	*Role name*: resultSpatialRepresentation	resSpaRep	provides the digital representation of data quality measures composing the coverage result	M	1	Association	MD_SpatialRepresentation <<Abstract>> (ISO 19115:2003, B.2.6)
6.	*Role name*: resultContentDescription	resCntDesc	provides the description of the content of the result coverage, i.e. semantic definition of the data quality measures	M	1	Association	MD_CoverageDescription (ISO 19115:2003, B.2.8.1)
7.	*Role name*: resultFormat	resFmt	provides information about the format of the result coverage data	M	1	Association	MD_Format (ISO 19115:2003, B.2.10.4)
8.	*Role name*: resultFile	resFile	provides information about the data file containing the result coverage data	M	1	Association	MX_DataFile (ISO/TS 19139:2007, B.2.3.3)

B.2.2.2 Lineage extensions

B.2.2.2.1 Introduction

- UML model shown in Figure A.3.

B.2.2.2.2 Algorithm

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
9.	LE_Algorithm	Algorithm	details of the methodology by which geographic information was derived from the instrument readings	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (LE_Processing)	Lines 10 and 11
10.	citation	algId	information identifying the algorithm and version or date	M	1	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
11.	description	algDesc	information describing the algorithm used to generate the data	M	1	CharacterString	Free text

B.2.2.2.3 Nominal resolution

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
12.	LE_NominalResolution	NomRes	distance between consistent parts of (centre, left side, right side) adjacent pixels	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<Union>>	Lines 13 and 14
13.	scanningResolution	scanRes	distance between consistent parts of (centre, left side, right side) adjacent pixels in the scan plane	M	1	Class	<<Type>> Distance
14.	groundResolution	groundRes	distance between consistent parts of (centre, left side, right side) adjacent pixels in the object space	M	1	Class	<<Type>> Distance

B.2.2.2.4 Processing

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
15.	LE_Processing	Procsg	comprehensive information about the procedure(s), process(es) and algorithm(s) applied in the process step	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (LE_ProcessStep)	Lines 16 to 21
16.	identifier	procInfoId	information to identify the processing package that produced the data	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
17.	softwareReference	procInfoSwRef	reference to document describing processing software	O	N	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
18.	procedureDescription	procInfoDesc	additional details about the processing procedures	O	1	CharacterString	Free text
19.	documentation	procInfoDoc	reference to documentation describing the processing	O	N	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
20.	runTimeParameters	procInfoParam	parameters to control the processing operations, entered at run time	O	1	CharacterString	Free text
21.	*Role name*: algorithm	algorithm	details of the methodology by which geographic information was derived from the instrument readings	O	N	Association	LE_Algorithm

B.2.2.2.5 Process step

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
22.	LE_ProcessStep	DetailProcStep	information about an event or transformation in the life of the dataset including details of the algorithm and software used for processing (LI_ProcessStep extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified class (LI_ProcessStep)	Lines 23 to 25 (LI_ProcessStep, ISO 19115:2003, B.2.4.2.2)
23.	*Role name*: output	procStepOut	description of the product generated as a result of the process step	O	N	Association	LE_Source
24.	*Role name*: processingInformation	procInfo	comprehensive information about the procedure by which the algorithm was applied to derive geographic data from the raw instrument measurements, such as datasets, software used, and the processing environment	O	1	Association	LE_Processing
25.	*Role name*: report	procReport	report generated by the process step	O	N	Association	LE_ProcessStepReport

B.2.2.2.6   Process Step Report

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
26.	LE_ProcessStep Report	ProcStepRep	report of what occurred during the process step	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (LE_ProcessSt ep)	Lines 27 to 29
27.	name	procRepName	name of the processing report	M	1	CharacterStrin g	Free text
28.	description	procRepDesc	textual description of what occurred during the process step	O	1	CharacterStrin g	Free text
29.	fileType	procRepFilTyp	type of file that contains the processing report	O	1	CharacterStrin g	Free text

B.2.2.2.7   Source extensions

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
30.	LE_Source	SourceExt	information on data sets input to or output by the processing step (LI_Source extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	SpecifiedClass (LI_Source)	Lines 31 and 32 (LI_Source, ISO 19115:2003, B.2.4.2.3)
31.	processedLevel	procLevel	processing level of the source data	O	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
32.	resolution	procResol	distance between consistent parts (centre, left side, right side) of two adjacent pixels	O	1	Class	<<Union>> LE_NominalResolu tion
NOTE If LE_Source.resolution.scanningResolution is specified, then LE_Source.scaleDenominator (inherited from LI_Source) is required.							

B.2.2.3   Data quality element extension for usability

- UML model shown in Figure A.4.

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
33.	QE_Usability	Usability	degree of adherence of a dataset to a specific set of user requirements (DQ_Element extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified class (DQ_Element)	(DQ_Element, ISO 19115:2003, B.2.4.3)

B.2.3 Spatial representation information

B.2.3.1 Introduction

- UML models shown in Figure A.5 and A.6

B.2.3.2 Georectified – Extensions

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
34.	MI_Georectified	IGeorect	extends georectified grid description to include associated checkpoints (MD_Georectified extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Georectified)	Line 35 (MD_Georectified, ISO 19115:2003, B.2.6.1)
35.	*Role name*: checkPoint	chkPt	geographic references used to validate georectification of the data	O	N	Association	MI_GCP

B.2.3.3 Georeferenceable – Extensions

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
36.	MI_Georeferenceable	IGeoref	description of information provided in metadata that allows the geographic or map location of the raster points to be located (MD_Georeferencable extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Georeferenceable)	Line 37 (MD_Georeferenceable, ISO 19115:2003, B.2.6.2)
37.	*Role name*: geolocationInformation	geolocInfo	information that can be used to geolocate the data	M	N	Association	MI_GeolocationInformation

B.2.3.4 Ground Control Point Collection

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
38.	MI_GeolocationInformation	GeolocInfo	information used to determine geographic location corresponding to image location	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Georeferenceable)	Line 39
39.	*Role name:* qualityInfo	geolocQual	provides an overall assessment of quality of geolocation information	O	N	Association	DQ_DataQuality (ISO 19115:2003, B.2.4)
40.	MI_GCPCollection	GCPColl	information about a control point collection	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MI_Geolocation Information)	Lines 41-44
41.	collectionIdentification	collID	identifier of the GCP collection	M	1	Integer	Integer

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
42	collectionName	collName	name of the GCP collection	M	1	CharacterString	Free text
43.	coordinateReferenceSystem	collCRS	coordinate system in which the ground control points are defined	M	1	Class	MD_ReferenceSystem
44.	*Role name*: gcp	collGCP	ground control point(s) used in the collection	M	*	Association	MI_GCP

B.2.3.5   Ground Control Points

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
45.	MI_GCP	gcp	information on ground control point	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_GCPCollection)	Lines 46-47
46.	geographicCoordinates	gcpGeoCoords	geographic or map position of the control point, in either two or three dimensions	M	1	Class	Direct Position (ISO/TS 19103)
47.	*Role name*: accuracyReport	gcpAccRep	accuracy of a ground control point	O	N	Association	DQ_Element (ISO 19115:2003, B.2.4.3)

B.2.4 Content information

B.2.4.1   Introduction

- UML model shown in Figure A.7.

B.2.4.2   Wavelength band information

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
48.	MI_Band	BandExt	extensions to electromagnetic spectrum wavelength description (MD_Band extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified Class (MD_Band)	Lines 49 to 53 MD_Band, ISO 19115:2003, B.2.8.2)
49.	bandBoundaryDefinition	bBndDef	designation of criterion for defining maximum and minimum wavelengths for a spectral band	O	1	Class	<<CodeList>> MI_BandDefinition
50.	nominalSpatialResolution	bndSpatRes	smallest distance between which separate points can be distinguished, as specified in instrument design	O	1	Class	<<DataType>> Distance

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
51.	transferFunctionType	scalXfrFunc	type of transfer function to be used when scaling a physical value for a given element	O	1	Class	<<CodeList>> MI_TransferFunctionType Code
52.	transmittedPolarization	transPolarization	polarization of the radiation transmitted	O	1	Class	<<CodeList>> MI_PolarizationOrientation Code
53.	detectedPolarization	detPolarization	polarization of the radiation detected	O	1	Class	<<CodeList>> MI_PolarizationOrientation Code

B.2.4.3   Coverage and image description – Extensions

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
54.	MI_CoverageDescription	CCovDesc	information about the content of a coverage, including the description of specific range elements (MD_CoverageDescription extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified class (MD_Coverage Description)	Line 55 (MD_CoverageDescription, ISO 19115:2003, B.2.8.1)
55.	*Role name*: rangeElementDescription	cRgEltDesc	provides the description of the specific range elements of a coverage	O	N	Association	MI_RangeElementDescription
56.	MI_ImageDescription	ICovDesc	information about the content of an image, including the description of specific range elements (MD_ImageDescription extended)	Use obligation from referencing object	Use maximum occurrence from referencing object	Specified class (MD_ImageDescription)	Line 57 (MD_ImageDescription, ISO 19115:2003, B.2.8.1)
57.	*Role name*: rangeElementDescription	iRgEltDesc	provides the description of the specific range elements of an image	O	N	Association	MI_RangeElementDescription
58.	MI_RangeElementDescription	RgEltDesc	description of specific range elements	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated class: (MI_Coverage Description, MI_ImageDescription)	Lines 59 to 61
59.	name	rgEltName	designation associated with a set of range elements	M	1	CharacterString	Free text
60.	definition	rgEltDef	description of a set of specific range elements	M	1	CharacterString	Free text
61.	rangeElement	rgElt	specific range elements, i.e. range elements associated with a name and their definition	M	N	Class	Record (ISO/TS 19103)

B.2.5 Acquisition Information

B.2.5.1 General

- UML model shown in Figures A.8 and A.9.

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
62.	MI_AcquisitionInformation	AquisitInfo	designations for the measuring instruments, the platform carrying them, and the mission to which the data contributes	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Metadata)	Lines 63 to 69
63.	*Role name*: acquisitionPlan	acquisPlan	identifies the plan as implemented by the acquisition	O	N	Association	MI_Plan
64.	*Role name*: acquisitionRequirement	acquisReq	identifies the requirement the data acquisition intends to satisfy	O	N	Association	MI_Requirement
65.	*Role name:* environmentalConditions	environCon	a record of the environmental circumstances during the data acquisition	O	1	Association	MI_Environmental Record
66.	*Role name*: instrument	instrId	general information about the instrument used in data acquisition	O	N	Association	MI_Instrument
67.	*Role name*: objective	objId	identification of the area or object to be sensed	O	N	Association	MI_Objective
68.	*Role name*: operation	operationId	general information about an identifiable activity which provided the data	O	N	Association	MI_Operation
69.	*Role name*: platform	platformId	general information about the platform from which the data were taken	O	N	Association	MI_Platform

B.2.5.2 Environmental record

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
70.	MI_Environmental Record	EnvironRec	information about the environmental conditions during the acquisition	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_ Acquisition Information)	Lines 71-74
71.	averageAirTemperature	avgAirTemp	average air temperature along the flight pass during the photo flight	M	1	Real	Real
72.	maxRelativeHumidity	maxRelHum	maximum relative humidity along the flight pass during the photo flight	M	1	Real	Real
73.	maxAltitude	maxAlt	maximum altitude during the photo flight	M	1	Real	Real
74.	meteorologicalConditions	meterCond	meteorological conditions in the photo flight area, in particular clouds, snow and wind	M	1	CharacterString	Free Text

B.2.5.3   Event identification

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
75.	MI_Event	Event	identification of a significant collection point within an operation	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Operation)	Lines 76 to 83
76.	identifier	evtId	event name or number	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
77.	trigger	evtTrig	initiator of the event	M	1	Class	<<CodeList>> MI_TriggerCode
78.	context	evtCntxt	meaning of the event	M	1	Class	<<CodeList>> MI_ContextCode
79.	sequence	evtSeq	relative time ordering of the event	M	1	Class	<<CodeList>> MI_SequenceCode
80.	time	evtTime	time the event occurred	M	1	Class	<<Type>> DateTime
81.	*Role name*: expectedObjective	evtObj	objective or objectives satisfied by an event	O	N	Association	MI_Objective
82.	*Role name*: relatedPass	evtPass	pass during which an event occurs	O	1	Association	MI_PlatformPass
83.	*Role name*: relatedSensor	evtSnsr	instrument or instruments for which the event is meaningful	O	N	Association	MI_Instrument

B.2.5.4   Instrument identification

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
84.	MI_Instrument	InstrumentId	designations for the measuring instruments	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisition Information)	Lines 85 to 89
85.	citation	instNam	complete citation of the instrument	O	N	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
86.	identifier	instId	unique identification of the instrument	M	1	Class	<<Date Type>> MD_Identifier (ISO 19115:2003, B.2.7.3)
87.	type	instType	name of the type of instrument Examples: framing, line-scan, push-broom, pan-frame	M	1	CharacterString	Free text
88.	description	instDesc	textual description of the instrument	O	1	CharacterString	Free text
89.	*Role name*: mountedOn	instPlatform	platform on which the instrument is mounted	O	1	Association	MI_Platform

B.2.5.5 Objective information

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
90.	MI_Objective	TargetId	describes the characteristics, spatial and temporal extent of the intended object to be observed	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisition Information, MI_Operation)	Lines 91 to 98
91.	identifier	targetId	code used to identify the objective	M	N	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
92.	priority	trgtPriority	priority applied to the target	O	1	CharacterString	Free text
93.	type	trgtType	collection technique for the objective	O	N	Class	<<CodeList>> MI_ObjectiveType Code
94.	function	trgtFunct	role or purpose performed by or activity performed at the objective	O	N	CharacterString	Free text
95.	extent	trgtExtent	extent information including the bounding box, bounding polygon, vertical and temporal extent of the objective	O	N	Class	<<DataType>> EX_Extent (ISO 19115:2003, B.3.1)
96.	*Role name*: objectiveOccurence	trgtEvt	event or events associated with objective completion	M	N	Association	MI_Event
97.	*Role name*: pass	trgtPass	pass of the platform over the objective	O	N	Association	MI_PlatformPass
98.	*Role name*: sensingInstrument	trgtInstr	instrument which senses the objective data	O	N	Association	MI_Instrument

B.2.5.6 Operation information

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
99.	MI_Operation	MssnId	designations for the operation used to acquire the dataset	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisition Information, MI_Operation)	Lines 100 to 110
100.	description	mssnDesc	description of the mission on which the platform observations are made and the objectives of that mission	O	1	CharacterString	Free text
101.	citation	mssnNam	identification of the mission	O	1	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
102.	identifier	mssnId	unique identification of the operation	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
103.	status	mssnStatus	status of the data acquisition	M	1	Class	<<CodeList>> MD_ProgressCode
104.	type	mssnType	collection technique for the operation	O	1	Class	<<CodeList>> MI_OperationType Code
105.	*Role name*: childOperation	subMission	sub-missions that make up part of a larger mission	O	N	Association	MI_Operation
106.	*Role name*: objective	mssnObj	object(s) or area(s) of interest to be sensed	O	N	Association	MI_Objective
107.	*Role name*: parentOperation	parentMission	heritage of the operation	M	1	Association	MI_Operation
108.	*Role name*: plan	mssnPlan	plan satisfied by the operation	O	1	Association	MI_Plan
109.	*Role name*: platform	mssnPltfrm	platform (or platforms) used in the operation	O	N	Association	MI_Platform
110.	*Role name*: significantEvent	mssnSigEvt	record of an event occurring during an operation	O	N	Association	MI_Event

B.2.5.7 Plan information

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
111.	MI_Plan	PlanId	designations for the planning information related to meeting the data acquisition requirements	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisitio n Information)	Lines 112 to 116
112.	type	planType	manner of sampling geometry that the planner expects for collection of objective data	O	1	Class	<<CodeList>> MI_GeometryType Code
113.	status	planStatus	current status of the plan (pending, completed, etc.)	M	1	Class	<<CodeList>> MD_ProgressCode (ISO 19115:2003, B.5.23)
114.	citation	planReqId	identification of authority requesting target collection	M	1	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
115.	*Role name*: operation	planOper	identification of the activity or activities that satisfy a plan	O	N	Association	MI_Operation
116.	*Role name*: satisfiedRequirem ent	planReq	requirement satisfied by the plan	O	N	Association	MI_Requirement

B.2.5.8   Platform identification

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
117.	MI_Platform	PltfrmId	designation of the platform used to acquire the dataset	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisition Information, MI_Operation)	Lines 118 to 1220
118.	citation	pltNam	source where information about the platform is described	O	1	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
119.	identifier	pltId	unique identification of the platform	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
120.	description	pltfrmDesc	narrative description of the platform supporting the instrument	M	1	CharacterString	Free text
121.	sponsor	pltfrmSpnsr	organization responsible for building, launch, or operation of the platform	O	N	Class	<<DataType>> CI_ResponsiblePa rty (ISO 19115:2003, B.3.2)
122.	*Role name*: instrument	pltInstr	instrument(s) mounted on a platform	M	N	Association	MI_Instrument

B.2.5.9   Platform pass identification

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
123.	MI_PlatformPass	PlatformPass	identification of collection coverage	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Objective)	Lines 124 to 126
124.	identifier	passId	unique name of the pass	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
125.	extent	passExt	area covered by the pass	O	1	Class	<<Type>> GM_Object (ISO 19107)
126.	*Role name:* relatedEvent	passEvt	occurrence of one or more events for a pass	O	N	Association	MI_Event

B.2.5.10 Request date range

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
127.	MI_RequestedDate	ReqstDate	range of date validity	Use obligation from referencing object	Use maximum occurrence from referencing object	Class <<DataType>>	Lines 128 to 129
128.	requestedDateOf Collection	collectDate	preferred date and time of collection	M	1	Class	<<Type>> DateTime (ISO/TS 19103)
129.	latestAcceptable Date	latestDate	latest date and time collection must be completed	M	1	Class	<<Type>> DateTime (ISO/TS 19103)

B.2.5.11 Requirement information

	Name	Short name	Definition	Obligation	Maximum occurrence	Data type	Domain
130.	MI_Requirement	Requirement	requirement to be satisfied by the planned data acquisition	Use obligation from referencing object	Use maximum occurrence from referencing object	Aggregated Class (MI_Acquisition Information)	Lines 131 to 138
131.	citation	reqRef	identification of reference or guidance material for the requirement	O	1	Class	<<DataType>> CI_Citation (ISO 19115:2003, B.3.2)
132.	identifier	reqId	unique name, or code, for the requirement	M	1	Class	<<DataType>> MD_Identifier (ISO 19115:2003, B.2.7.3)
133.	requestor	requestor	origin of requirement	M	N	Class	<<DataType>> CI_ResponsiblePa rty (ISO 19115:2003, B.3.2)
134.	recipient	recipient	person(s), or body(ies), to receive results of requirement	M	N	Class	<<DataType>> CI_ResponsiblePa rty (ISO 19115:2003, B.3.2)
135.	priority	reqPri	relative ordered importance, or urgency, of the requirement	M	1	Class	<<CodeList>> MI_PriorityCode
136.	requestedDate	reqDate	required or preferred acquisition date and time	M	1	Class	<<DataType>> MI_RequestedDat e
137.	expiryDate	reqExpire	date and time after which collection is no longer valid	M	1	Class	<<Type>> DateTime (ISO/TS 19103)
138.	*Role name*: satisfiedPlan	reqPlan	plan that identifies solution to satisfy the requirement	O	N	Association	MI_Plan

B.3 Codelists and enumerations

B.3.1 Introduction

This clause gives the classes that are stereotyped <<Codelist>>. This stereotype class does not contain "obligation/condition", "maximum occurrence", "data type", and "domain" attributes. <<Codelist>> classes are extendable as shown in ISO 19115:2003, Annexes C and F.

B.3.2 MI_BandDefinition <<Codelist>>

	Name	Domain code	Definition
1.	MI_BandDefinition	BndDefCd	designation of criterion for defining maximum and minimum wavelengths for a spectral band
2.	3dB	001	width of a distribution equal to the distance between the outer two points on the distribution having power level half of that at the peak
3.	halfMaximum	002	width of a distribution equal to the distance between the outer two points on the distribution having power level half of that at the peak
4.	fiftyPercent	003	full spectral width of a spectral power density measured at 50% of its peak height
5.	oneOverE	004	width of a distribution equal to the distance between the outer two points on the distribution having power level 1/e that of the peak
6.	equivalentWidth	005	width of a band with full sensitivity or absorption at every wavelength that detects or absorbs the same amount of energy as the band described

B.3.3 MI_ContextCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_ContextCode	CntCd	designation of criterion for defining the context of the scanning process event
2.	acquisition	001	event related to a specific collection
3.	pass	002	event related to a sequence of collections
4.	wayPoint	003	event related to a navigational manoeuvre

B.3.4 MI_GeometryTypeCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_GeometryTypeCode	GeoTypeCd	geometric description of the collection
2.	point	001	single geographic point of interest
3.	linear	002	extended collection in a single vector
4.	areal	003	collection of a geographic area defined by a polygon (coverage)
5.	strip	004	series of linear collections grouped by way points

B.3.5 MI_ObjectiveTypeCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_ObjectiveTypeCode	ObjTypCd	temporal persistence of collection objective
2.	instantaneousCollection	001	single instance of collection
3.	persistentView	002	multiple instances of collection
4.	survey	003	collection over specified domain

B.3.6 MI_OperationTypeCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_OperationTypeCode	OpTypCd	code indicating whether the data contained in this packet is real (originates from live-fly or other non-simulated operational sources), simulated (originates from target simulator sources), or synthesized (a mix of real and simulated data).
2.	real	001	originates from live-fly or other non-simulated operational source
3.	simulated	002	originates from target simulator sources
4.	synthesized	003	mix of real and simulated data

B.3.7 MI_PolarizationOrientationCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_PolarizationOrientationCode	PolOriCd	polarization of the antenna relative to the waveform
2.	horizontal	001	polarization of the sensor oriented in the horizontal plane in relation to swath direction
3.	vertical	002	polarization of the sensor oriented in the vertical plane in relation to swath direction
4.	leftCircular	003	polarization of the sensor oriented in the left circular plane in relation to swath direction
5.	rightCircular	004	polarization of the sensor oriented in the right circular plane in relation to swath direction
6.	theta	005	polarization of the sensor oriented in the angle between +90 ° and 0 ° parallel to swath direction
7.	phi	006	polarization of the sensor oriented in the +90 ° and 0 ° perpendicular to swath direction

B.3.8 MI_PriorityCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_PriorityCode	PriorCd	ordered list of priorities
2.	critical	001	decisive importance
3.	highImportance	002	requires resources to be made available
4.	mediumImportance	003	normal operation priority
5.	lowImportance	004	to be completed when resources are available

B.3.9 MI_SequenceCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_SequenceCode	SeqCd	temporal relation of activation
2.	start	001	beginning of a collection
3.	end	002	end of a collection
4.	instantaneous	003	collection without a significant duration

B.3.10 MI_TransferFunctionTypeCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_TransferFunctionTypeCode	TrnsfrFuncTypCd	transform function to be used when scaling a physical value for a given element
2.	linear	001	function used for transformation is first order polynomial
3.	logarithmic	002	function used for transformation is logarithmic
4.	exponential	003	function used for transformation is exponential

B.3.11 MI_TriggerCode <<Codelist>>

	Name	Domain code	Definition
1.	MI_TriggerCode	TrgCd	mechanism of activation
2.	automatic	001	event due to external stimuli
3.	manual	002	event manually instigated
4.	preProgrammed	003	event instigated by planned internal stimuli

Annex C
(normative)

Conformance

C.1 Introduction

The abstract test suite in this part of ISO 19115 includes the abstract test suite specified in ISO 19115:2003 by reference. Metadata in compliance with this International Standard shall meet the conformance requirements of ISO 19115:2003 and shall be provided as specified in Clause 6 and Annexes A and B of this part of ISO 19115. User-defined metadata shall be defined and provided as specified in ISO 19115:2003, Annex C. User-defined metadata shall satisfy the requirements of C.3.

C.2 Metadata test suite

C.2.1 Test case identifier: completeness test

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

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

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

c)   Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

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

C.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 section, metadata entity, and metadata element provided. The number of occurrences for each shall be compared with its "maximum occurrence" attribute specified in Annex B.

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.2.3 Test case identifier: short name test

a) Test purpose: to determine if short names used in a subject metadata set fall within the domain specified within this part of ISO 19115.

b) Test method: the short name for each metadata element in a subject metadata set is examined to determine if it is defined in this part of ISO 19115.

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.2.4 Test case identifier: data type test

a) Test purpose: to determine if each metadata element within a subject metadata set uses the specified data type.

b) Test method: the value of each provided metadata element is tested to ensure its data type adheres to the data type specified.

c) Reference: Annex B.

d) Test type: basic.

C.2.5 Test case identifier: domain test

a) Test purpose: to determine if each provided metadata element within a subject metadata set falls within the specified domain.

b) Test method: the values of each metadata element are tested to ensure they fall within the specified domain.

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.2.6 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 entity.

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.3 User-defined extension metadata test suite

C.3.1 Test case identifier: exclusiveness test

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

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

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.3.2 Test case identifier: definition test

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

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

c) Reference: Annex B and ISO 19115:2003, Annex B.

d) Test type: basic.

C.3.3 Test case identifier: standard metadata test

a) Test purpose: to verify that user-defined metadata within a subject metadata set fulfils the same requirements as ISO 19115 standard metadata.

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

c) Reference: C.2.1.

d) Test type: basic.

C.4 Metadata profiles

C.4.1 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 Clauses C.2 and C.3 of this part of ISO 19115.

c) Reference: C.2.2.

d) Test type: basic.

Bibliography

[1]   ISO/IEC GUIDE 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

[2]   ISO/IEC 2382-1:1993, *Information technology — Vocabulary — Part 1: Fundamental terms*

[3]   ISO/IEC 2382-17:1999, *Information technology — Vocabulary — Part 17: Databases*

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

[5]   ISO/IEC 11179-3, *Information technology — Metadata registries (MDR) — Part 3: Registry metamodel and basic attributes*

[6]   ISO/IEC 11179-6, *Information technology — Metadata registries (MDR) — Part 6: Registration*

[7]   ISO/TS 19101-2:2008, *Geographic information — Reference model — Part 2: Imagery*

[8]   ISO 19108:2002, *Geographic information — Temporal schema*

[9]   ISO 19123:2005, *Geographic information — Schema for coverage geometry and functions*

[10]   ISO/TR 19121, *Geographic information — Imagery and gridded data*

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