# OGC (OGC Points of Interest)

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|---|---|
| **NOTE** | *Preface*<br>Insert Preface Text here. Give OGC specific commentary: describe the technical content, reason for document, history of the document and precursors, and plans for future work. |



**Abstract**

*<Insert Abstract Text here>*

# Scope

This document describes a data model for representing information about points of interest (POI).

In the most broad terms, a "point of interest" is a location about which information of general interest is available. A POI can be as simple as a set of coordinates and an identifier, or more complex such as a three dimensional model of a building with names in various languages, information about open and closed hours, and a civic address.

POI data has many uses including navigation systems, mapping, geocaching, location-based social networking games, and augmented reality browsers.

POI data has traditionally been exchanged in proprietary formats by various transport mechanisms. This specification defines a flexible, lightweight, extensible POI data model. This will enable content publishers to effectively describe and efficiently serve and exchange POI data.

To achieve these goals, this document describes a generic data model that may be instantiated in a variety of serializations, including XML, JSON and RDF.

# Conformance

This standard defines a Conceptual Model which is independent of any encoding or formatting techniques. The Standardization Targets for this standard are:

1. Conceptual Models (extended versions of this conceptual model)
2. Implementation Specifications (encodings of this conceptual model)

## Conceptual Models

A Conceptual Model standardization target is a version of the POI Conceptual Model (CM) tailored for a specific user community. This tailoring can include:

1. Omission of one or more of the optional UML packages
2. Reduction of the multiplicity for an attribute or association
3. Restriction on the valid values for an attribute
4. Additional POI properties documented through the POIProperty class.

Of these options, actions #1, #2, and #3 can be performed when creating an implementation specification. Only action #4 requires an extension of the POI conceptual model. These extensions are accomplished using the POI Property mechanism described in section <TBD>.

## Implementation Specifications

Implementation Specifications define how a Conceptual Model should be implemented using a specific technology. Conformant Implementation Specifications provide evidence that they are an accurate representation of the Conceptual Model. This evidence should include implementations of the abstract tests specified in Annex A (normative) of this document.

Since this standard is agnostic to the implementing technologies, the specific techniques to be used for conformance testing cannot be specified. Implementation Specifications need to provide evidence of conformance which is appropriate for the implementing technologies. This evidence should be provided as an annex to the Implementation Specification document.

## Conformance Classes

This standard identifies one "Core" conformance class. This conformance class defines the conformance criteria for the requirements defined in one "Core" requirements class. The tests for each conformance class are documented in Annex A. These tests are organized by Requirements Class. So an implementation of the Core conformance class must pass all tests specified in Annex A for the Core requirements class.

The POI Conceptual Model is defined by the POI UML model. This standard is a representation of that UML model in document form. In the case of a discrepancy between the UML model and this document, the UML model takes precedence.

# References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

- [RFC 3986] *IETF: RFC 3986, Uniform Resource Identifier (URI): Generic Syntax*. (January 2005)

- [ISO 19103] *ISO: ISO 19103:2015, Geographic Information – Conceptual Schema Language*
- [ISO 19107] *ISO: ISO 19107:2003, Geographic Information – Spatial Schema*
- [ISO 19108] *ISO: ISO 19108:2002/Cor 1:2006, Geographic information – Temporal schema — Technical Corrigendum 1*
- [ISO 19109] *ISO: ISO 19109:2015, Geographic Information – Rules for Application Schemas*
- [ISO 19111] *ISO: ISO 19111:2019, Geographic information – Referencing by coordinates*
- [OGC 08-126] *OGC: The OpenGIS® Abstract Specification Topic 5: Features, OGC document 08-126*
- [OGC 88-018] *OGC: The OpenGIS™ Abstract Specification Topic 8: Relationships Between Features, OGC document 99-108r2*
- [OGC 99-119] *OGC: The OpenGIS™ Abstract Specification Topic 10: Feature Collections, OGC document 99-110*

# Terms and Definitions

This document uses the terms defined in OGC Policy Directive 49, which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this Standard and OGC documents do not use the equivalent phrases in the ISO/IEC Directives, Part 2.

This document also uses terms defined in the OGC Standard for Modular specifications (OGC 08-131r3), also known as the 'ModSpec'. The definitions of terms such as standard, specification, requirement, and conformance test are provided in the ModSpec.

For the purposes of this document, the following additional terms and definitions apply.

**application schema**

*conceptual schema* ([conceptual-schema]) for data required by one or more applications.

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| **NOTE** | An *application schema* ([application-schema]) contains selected parts of the base schemas presented in the ORM Information Viewpoint. |
| **NOTE** | Designers of *application schemas* ([application-schema]) may extend or restrict the types defined in the base schemas to define appropriate types for an application *domain* ([domain]). |
| **NOTE** | *Application schemas* ([application-schema]) are information models for a specific information community. |

clause 4.1.2 OGC Definitions Register at http://www.opengis.net/def/glossary/term/ApplicationSchema

**attribute**

named *property* ([property]) of an entity

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

clause 2121440

**class**

description of a set of *objects* ([object]) that share the same *attributes* ([attribute]), *operations* ([operation]), methods, relationships, and semantics

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| **NOTE** | A *class* ([class]) may use a set of interfaces to specify collections of *operations* ([operation]) it provides to its environment. The term was first used in this way in the general theory of object-oriented programming, and later adopted for use in this same sense in UML. |

clause 4.27, Note 1 to entry has been added from ISO 19117:2012, 4.2

**code**

representation of a label according to a specified scheme

clause 4.3

**codelist**

value *domain* ([domain]) including a *code* ([code]) for each permissible value.

clause 3.1.7

**concept**

unit of knowledge created by a unique combination of characteristics

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|---|---|
| **NOTE** | *Concepts* ([concept]) are not necessarily bound to particular languages. They are, however, influenced by the social or cultural background which often leads to different categorizations. |

clause 3.2.1

**conceptual model**

model that defines *concepts* ([concept]) of a universe of discourse

clause 4.1.5

**conceptual schema**

1. formal description of a *conceptual model* ([conceptual-model]) [ISO 19101-1:2014, 4.1.6]
2. base schema. Formal description of the model of any geospatial information. *Application schemas* ([application-schema]) are built from *conceptual schemas* ([conceptual-schema]).

OGC Definitions Register at http://www.opengis.net/def/glossary/term/ConceptualSchema

**coordinate**

one of a sequence of numbers designating the *position* ([position]) of a *point* ([point])

**NOTE** In a spatial *coordinate reference system* ([coordinate-reference-system]), the *coordinate* ([coordinate]) numbers are qualified by units.

clause 3.1.5

**coordinate reference system**

coordinate system that is related to an *object* ([object]) by a *datum* ([datum])

**NOTE** For geodetic and vertical *datums* ([datum]), the *object* ([object]) will be the Earth.

clause 3.1.9

**coordinate system**

set of mathematical rules for specifying how *coordinates* ([coordinate]) are to be assigned to *points* ([point])

clause 3.1.11

**data type**

specification of a value *domain* ([domain]) with *operations* ([operation]) allowed on values in this *domain* ([domain])

[example] Integer, Real, Boolean, String, Date and SG Point (conversion of data into a series of *codes* ([code])).

**NOTE** Data types include primitive predefined types and user-definable types.

clause 4.14

**dataum**

parameter or set of parameters that realize the *position* ([position]) of the origin, the scale, and the orientation of a *coordinate system* ([coordinate-system])

clause 3.1.15

**direct position**

*position* ([position]) described by a single set of *coordinates* ([coordinate]) within a *coordinate reference system* ([coordinate-reference-system])

clause 3.1.20

**domain**

well-defined set

**NOTE** *Domains* ([domain]) are used to define the *domain* ([domain]) set and range set of *attributes* ([attribute]), operators and functions.

clause 4.8

**domain <general vocabulary>**

distinct area of human knowledge to which a terminological entry is assigned

| | |
|---|---|
| **NOTE** | Within a database or other terminology collection, a set of *domains* ([domain]) will generally be defined. More than one *domain* ([domain]) can be associated with a given *concept* ([concept]). |

clause 4.11

**domain <ontology>**

restriction to constrain the subject *class* ([class]) which participates in a subject-predicate-object triple

clause 3.1.12

**domain <postal address>**

an area in which a set of specific postal address types and postal address renderings is prescribed by postal operators

[example] The most typical example of a postal address *domain* ([domain]) is a country where a designated postal operator provides postal delivery services.

clause 3.14

**feature**

abstraction of real-world phenomena

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| **NOTE** | A *feature* ([feature]) may occur as a type or an instance. In this document, *feature* ([feature]) instance is meant unless otherwise specified. |

clause 4.1.11, Note 1 to entry has been added from ISO 19156, 4.6

**feature type**

*class* ([class]) of *features* ([feature]) having common characteristics

clause 4.7

**geometric aggregate**

collection of *geometric objects* ([geometric-object]) that has no internal structure

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|---|---|
| **NOTE** | No assumptions about the spatial relationships between the elements can be made. |

clause 3.45

**geometric boundary**

boundary represented by a set of *geometric primitives* ([geometric-primitive]) that limits the extent of a *geometric object* ([geometric-object])

clause 3.46

**geometric complex**

set of disjoint *geometric primitives* ([geometric-primitive]) where the boundary of each *geometric primitive* ([geometric-primitive]) can be represented as the union of other *geometric primitives* ([geometric-primitive]) of smaller dimensions within the same set

**NOTE** The *geometric primitives* ([geometric-primitive]) in the set are disjoint in the sense that no *direct position* ([direct-position]) is interior to more than one *geometric primitive* ([geometric-primitive]). The set is closed under boundary *operations* ([operation]), meaning that for each element in the *geometric complex* ([geometric-complex]), there is a collection (also a *geometric complex* ([geometric-complex])) of *geometric primitives* ([geometric-primitive]) that represents the boundary of that element. Recall that the boundary of a *point* ([point]) (the only 0D primitive *object* ([object]) type in geometry) is empty. Thus, if the largest dimension *geometric primitive* ([geometric-primitive]) is a solid (3D), the composition of the boundary operator in this definition terminates after at most three steps. It is also the case that the boundary of any *object* ([object]) is a cycle.

clause 3.47

**geometric dimension**

lagest number n such that each *poin* ([point]) in a set of *points* ([point]) can be associated with a subset that has that point in its interior and is topologically isomporphic to □n, Euclidean n-space

clause 3.48

**geometric object**

spatial *object* ([object]) representing a *geometric set* ([geometric-set])

**NOTE** A *geometric object* ([geometric-object]) consists of a *geometric primitive* ([geometric-primitive]), a collection of *geometric primitives* ([geometric-primitive]), or a *geometric complex* ([geometric-complex]) treated as a single entity. A *geometric object* ([geometric-object]) may be the spatial representation of an *object* ([object]) such as a *feature* ([feature]) or a significant part of a *feature* ([feature]).

clause 3.49

**geometric primitive (geometry)**

*geometric object* ([geometric-object]) representing a single, connected, homogeneous (isotopic) element of space

**NOTE** *Geometric primitives* ([geometric-primitive]) are non-decomposed *objects* ([object]) that present information about geometric configuration. They include *points* ([point]), curves, surfaces, and solids. Many *geometric objects* ([geometric-object]) behave like primitives (supporting the same interfaces defined for geometric primitives) but are actually composites composed of some number of other primitives. General collections may be aggregates and incapable of acting like a primitive (such as the lines of a complex network, which is not connected and thus incapable of being traceable as a single line). By this definition, a *geometric primitive* ([geometric-primitive]) is topological open, since the boundary *points* ([point]) are not isotropic to the interior *points* ([point]). Geometry is assumed to be closed. For *points* ([poin]), the boundary is empty.

clause 3.50

**geometric set**

set of *points* ([point])

clause 3.53

**location**

particular *place* ([place]) or *position* ([position])

**NOTE** A *location* ([location]) identifies a geographic *place*.

**NOTE** *Locations* ([location]) are physically fixed *points* ([point]), typically on the surface of the Earth, although *locations* ([location]) can be relative to other, non-earth centric coordinate reference systems.

**NOTE** *Locations* ([location]) can be a single *point* ([point]), a centroid, a minimum bounding rectangle, or a set of vectors.

**NOTE** A *location* ([location]) should be persistent over time and does not change.

**NOTE** Multiple *POIs* ([point-of-interest]) may share the same *location* ([location]).

**NOTE** When a *POI* ([point-of-interest]) physically moves it is understood to have acquired a new *location* ([location]).

clause 3.1.3

**metaclass**

a *class* ([class]) whose instances are also *classes* ([class])

clause 22 not sure how best to reference this https://www.omg.org/spec/UML/2.5.1/PDF

**method**

implementation of an *operation* ([operation])

**NOTE** It specifies the algorithm or procedure associated with an *operation* ([operation]).

[ISO/IEC19501:2005]

**object**

entity with a well defined boundary and identity that encapsulates state and behaviour

**NOTE** This term was first used in this way in the general theory of object oriented programming, and later adopted for use in this same sense in UML. An *object* ([object]) is an instance of a *class* ([class]). *Attributes* ([attribute]) and relationships represent state. *Operations* ([operation]), methods, and state machines represent behavior.

version 1.3, 1997.

**OGC implementation specification**

*OGC implementation specification* ([OGC-implementation-specification]) document type defined on the OGC Document Types Register

OGC Definitions Register at http://www.opengis.net/def/doc-type/is

**operation**

specification of a transformation or query that an *object* ([object]) may be called to execute

**NOTE** An *operation* ([operation]) has a name and a list of parameters.

**NOTE** See clause 7.2 for a discussion of *operation* ([operation])

clause 4.1.10

**place**

identifiable part of any space

clause 4.8

**Platform (Model Driven Architecture)**

the set of resources on which a system is realized.

[mdaguide] Object Management Group, Model Driven Architecture Guide rev. 2.0

Platform Independent Model:

a model that is independent of a specific *platform* ([platform])

[mdaguide] Object Management Group, Model Driven Architecture Guide rev. 2.0

Platform Specific Model:

a model of a system that is defined in terms of a specific *platform* ([platform])

[mdaguide] Object Management Group, Model Driven Architecture Guide rev. 2.0

**point**

0-dimensional geometric primitive, representing a *position* ([position])

clause 3.1.47

**point of interest**

alt:[POI]

*location* ([location]) where one can find a *place*, product or service

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|---|---|
| **NOTE** | A *POI* ([point-of-interest]) is typically identified by *name* rather than by an *address*. |
| **NOTE** | A *POI* ([point-of-interest]) is characterized by *type*, which may be used as a reference *point* ([point]) or a target in a *location* ([location]) based service request. |
| **NOTE** | A *POI* ([point-of-interest]) does not exclude the labeling, identification, and tracking of persons and other physical *objects* ([object]) that have no permanent *location* ([location]). |

destination of a route; such as, Boston

**position**

data type that describes a *point* ([point]) or *geometry* potentially occupied by an *object* ([object]) or person

| | |
|---|---|
| **NOTE** | A *direct position* ([direct-position]) is a semantic subtype of *position* ([position]). *Direct positions* ([direct-position]) as described can only define a *point* ([point]), and therefore not all *positions* ([position]) can be represented by a *direct position* ([direct-position]). That is consistent with the is type of relation. An ISO 19107 geometry is also a *position* ([position]), but not a *direct position* ([direct-position]) |

[ISO19133:2020]

**property**

facet or *attribute* ([attribute]) of an *object* ([object]) referenced by a name

Abby's car has the colour red, where "colour red" is a *property* ([property]) of the car.

clause 4.21, Note 1 to entry has been added from ISO 19156, 4.15

**stereotype**

extension of an existing *metaclass* ([metaclass]) that enables the use of *platform* ([platform]) or *domain* ([domain]) specific terminology or notation in place of, or in addition to, the ones used

for the extended *metaclass* ([metaclass])

clause 4.1.35

# Conventions

## Identifiers

The normative provisions in this document are denoted by the URI

http://www.opengis.net/spec/POI/1.0

All requirements and conformance tests that appear in this document are denoted by partial URIs relative to this base.

## UML Notation

The POI Conceptual Model (CM) Standard is presented in this document through diagrams using the Unified Modeling Language (UML) static structure diagram (see Booch et al. 1997). The UML notations used in this standard are described in the diagram in UML notation (see ISO TS 19103, Geographic information - Conceptual schema language)..

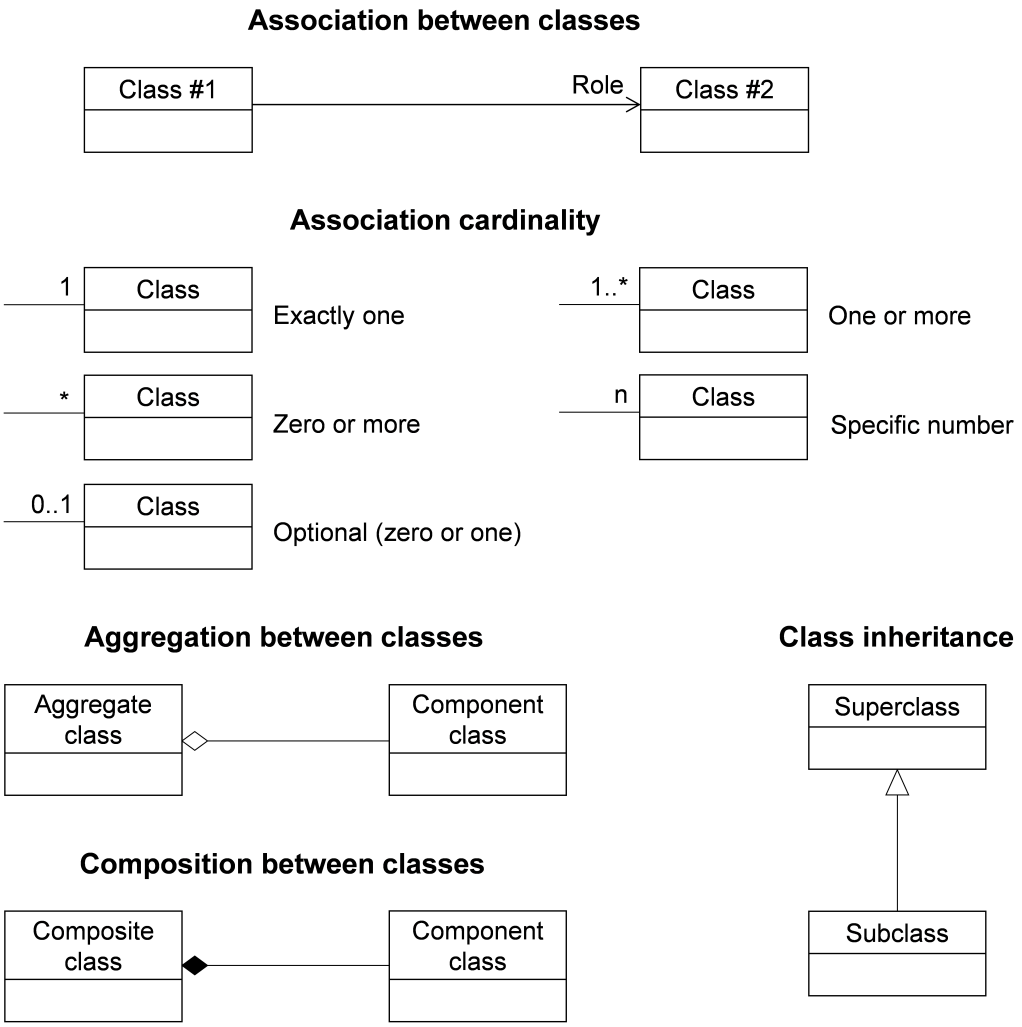



*Figure 1. UML notation (see ISO TS 19103, Geographic information - Conceptual schema language).*

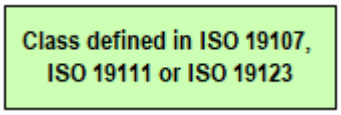
All associations between model elements in the POI Conceptual Model are uni-directional. Thus, associations in the model are navigable in only one direction. The direction of navigation is depicted by an arrowhead. In general, the context an element takes within the association is indicated by its role. The role is displayed near the target of the association. If the graphical representation is ambiguous though, the position of the role has to be drawn to the element the association points to.

The following stereotypes are used in this model:

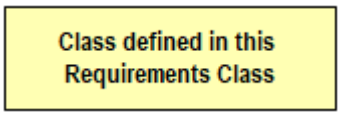
- «FeatureType» represents features that are similar and exhibit common characteristics. Features are abstractions of real-world phenomena and have an identity.
- «TopLevelFeatureType» denotes features that represent the main components of the conceptual model. Top-level features may be further semantically and spatially decomposed and substructured into parts.
- «Type» denotes classes that are not directly instantiable, but are used as an abstract collection of operation, attribute and relation signatures. The stereotype is used in the POI Conceptual Model only for classes that are imported from the ISO standards 19107, 19109, 19111, and 19123.
- «ObjectType» represents objects that have an identity, but are not features.
- «DataType» defines a set of properties that lack identity. A data type is a classifier with no operations, whose primary purpose is to hold information.

- «Enumeration» enumerates the valid attribute values in a fixed list of named literal values. Enumerations are specified in the POI Conceptual Model.
- «BasicType» defines a basic data type.
- «CodeList» enumerates the valid attribute values. In contrast to Enumeration, the list of values is open and, thus, not given inline in the POI UML Model. The allowed values can be provided within an external code list.
- «Union» is a list of attributes. The semantics are that only one of the attributes can be present at any time.
- «Property» denotes attributes and association roles. This stereotype does not add further semantics to the conceptual model, but is required to be able to add tagged values to the attributes and association roles that are relevant for the encoding.

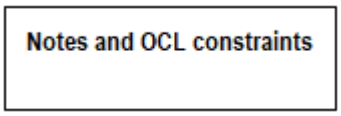
In order to enhance the readability of the POI UML diagrams, classes are depicted in different colors. The following coloring scheme is applied:




Classes painted in green belong to the POI Requirements Class.




Classes painted in yellow are defined in the ISO standards 19107, 19109, or 19115. Their class names are preceded by the UML package name, in which the classes are defined.




The color white is used for notes and Object Constraint Language (OCL) constraints that are provided in the UML diagrams.

The example UML diagram in Example UML diagram demonstrating the UML notation and coloring scheme used throughout the POI Standard. demonstrates the UML notation and coloring scheme used throughout this standard. In this example, the yellow classes are associated with the *CityGML Building* module, the blue classes are from the *CityGML Core* and *Construction* modules, and the green class depicts a geometry element defined by ISO 19107.

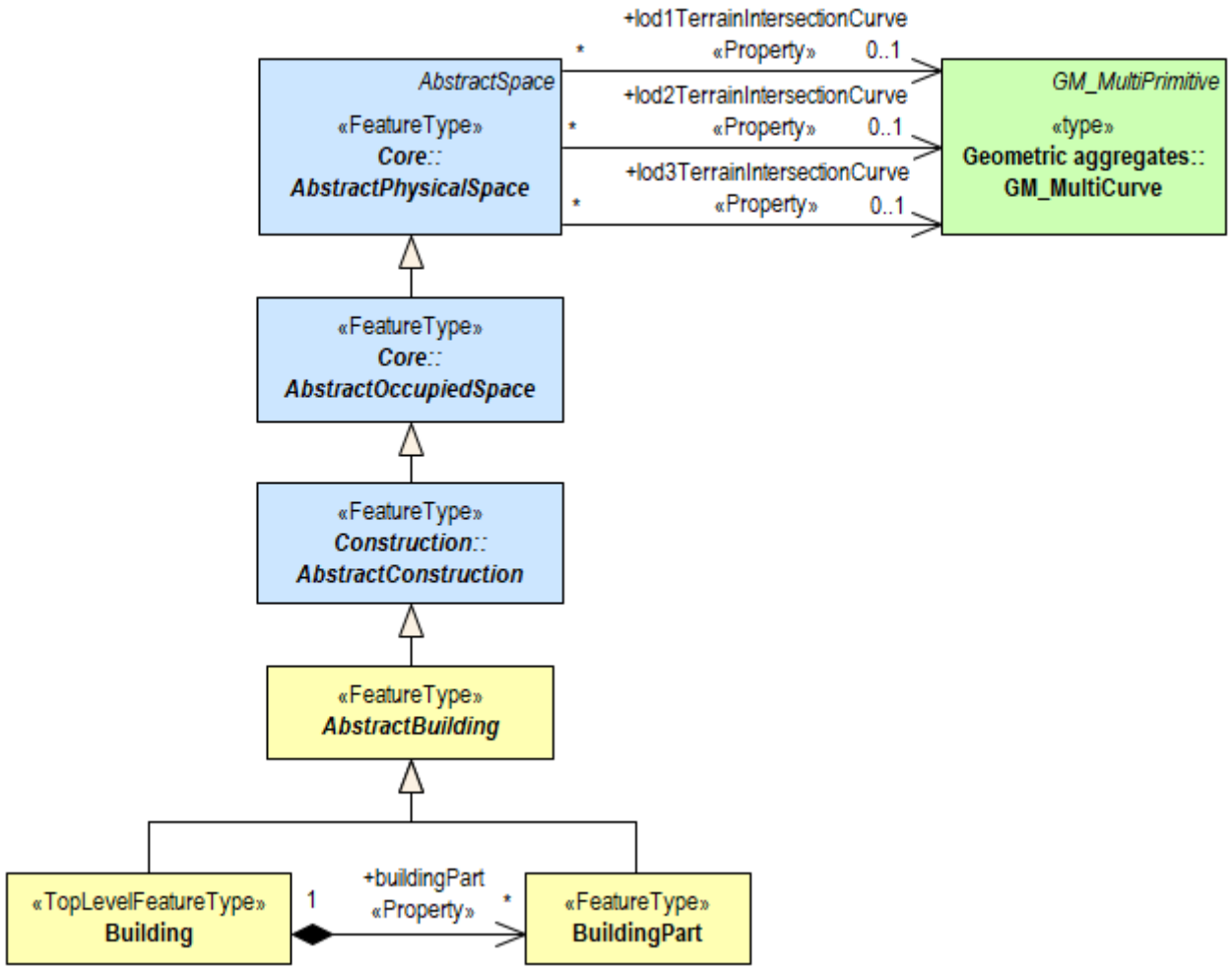



*Figure 2. Example UML diagram demonstrating the UML notation and coloring scheme used throughout the POI Standard.*

# POI

## Feature Model

A Point of Interest (POI) is a Feature. Therefore, it is important to understand what a POI inherits from the OGC Feature model.

The OGC Feature Model is defined in ISO 19109:2015 Geographic Information - Rules for application schema. A UML model showing applicable portions of the General Feature Model is provided in Figure 1.

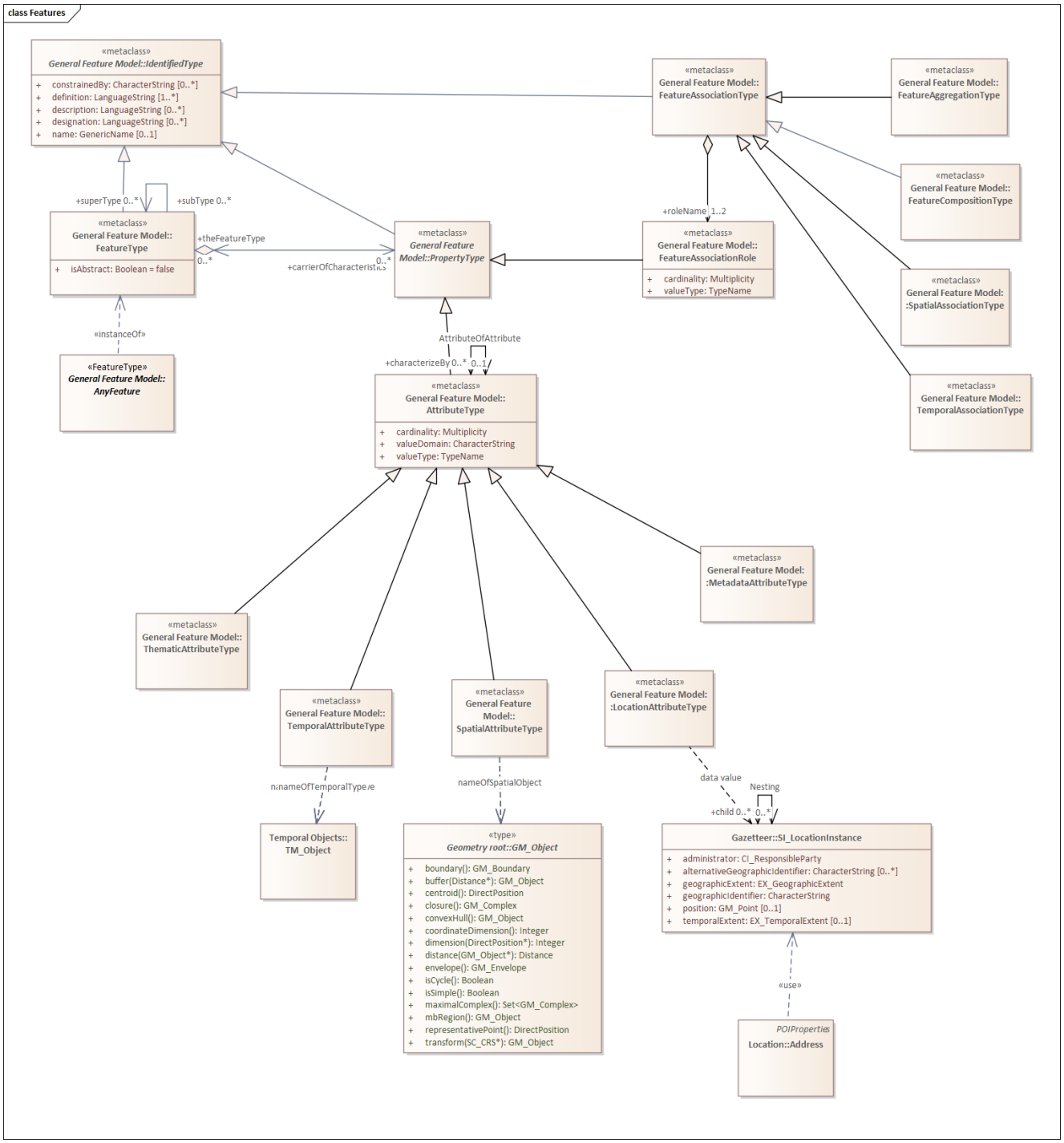



*Figure 3. Feature Model*

The most relevant classes defined by this model are described below:

**FeatureType:** This class describes how a feature class shall be constructed in an Application Schema. In accordance with the conformance clause of the standard, instances of this class are instanciated as feature classes in an Application Schema

**AnyFeature:** The class AnyFeature is an instance of the «metaclass» FeatureType (ISO 19109). It represents the set of all classes which are feature types.

In an implementation this abstract class shall be substituted by a concrete class representing a feature type from an application schema associated with a domain of discourse (ISO 19109, ISO 19101).

**AttributeType:** characteristic of a feature

**label**

/req/core/req-generalfeaturemodel

A encoding of the POI Conceptual Model SHALL be compliant with the General Feature Model defined in ISO 19109.

A POI instance SHALL include a spatial geometry property using the SpatialAttributeType attribute type and GM_Object class.

The spatial geometry properties of all POI instances SHALL be defined using the GM_Object class.

# POI Class Model

In this Standard we extend the General Feature Model to support the concept of a Point of Interest.

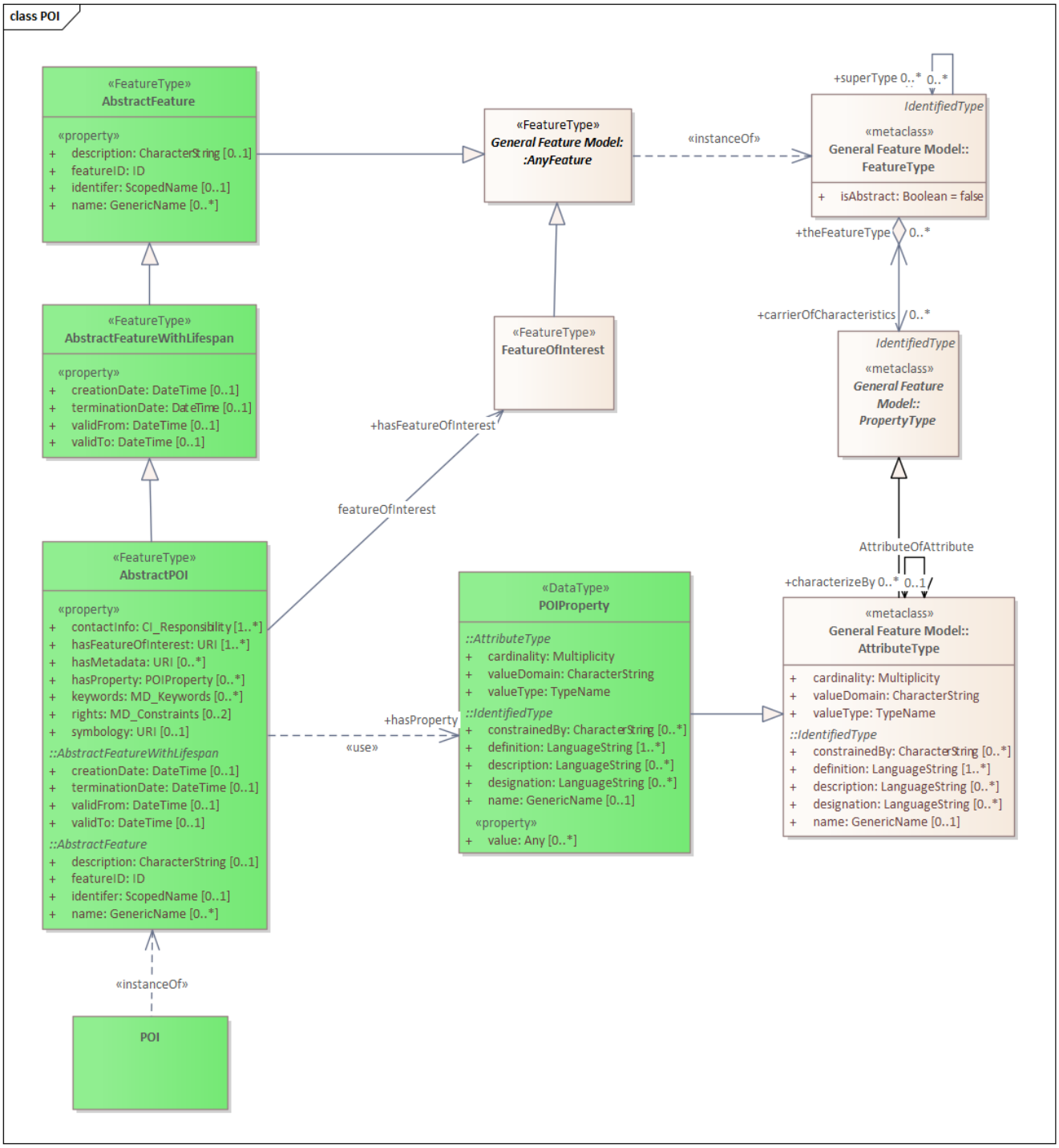



*Figure 4. POI UML Model*

**AbstractFeature:** The root Feature class for this standard. This class has been borrowed from the CityGML 3.0 Conceptual Model.

**AbstractFeatureWithLifespan:** Adds temporality to AbstractFeature. This class was borrowed from the CityGML 3.0 Conceptual Model.

**AbstractPOI:** The abstract model for a Point of Interest. All POI instances will contain these attributes.

**POIProperty:** The abstract model for a Property of a Feature of Interest which is to be represented in a POI.

**POI:** A POI instance.

**FeatureOfInterest:** This is an OGC Feature which has been defined independently from the POI. Conceptually, the purpose of the POI is to provide a user friendly synopsys of this Feature.

Requirements Class

- urn:iso:ts:iso:19103
- urn:iso:ts:iso:19107
- urn:iso:ts:iso:19108
- urn:iso:ts:iso:19109

# Geometry

The OGC Geometry model is defined in ISO 19107:2003 - Geographic Information - Spatial schema. While there is a new version of this standard, it has not been widely implemented. So the 2003 version has been used in this Standard.

The OGC Geometry Model is calable of representing very complex geometries. Much more complex than are needed for a POI. Therefore, POI geometries are restricted to Points, lines, and Polygons. Figure 2 provides a UML model of the classes from ISO 19107 which are applicable to POIs.

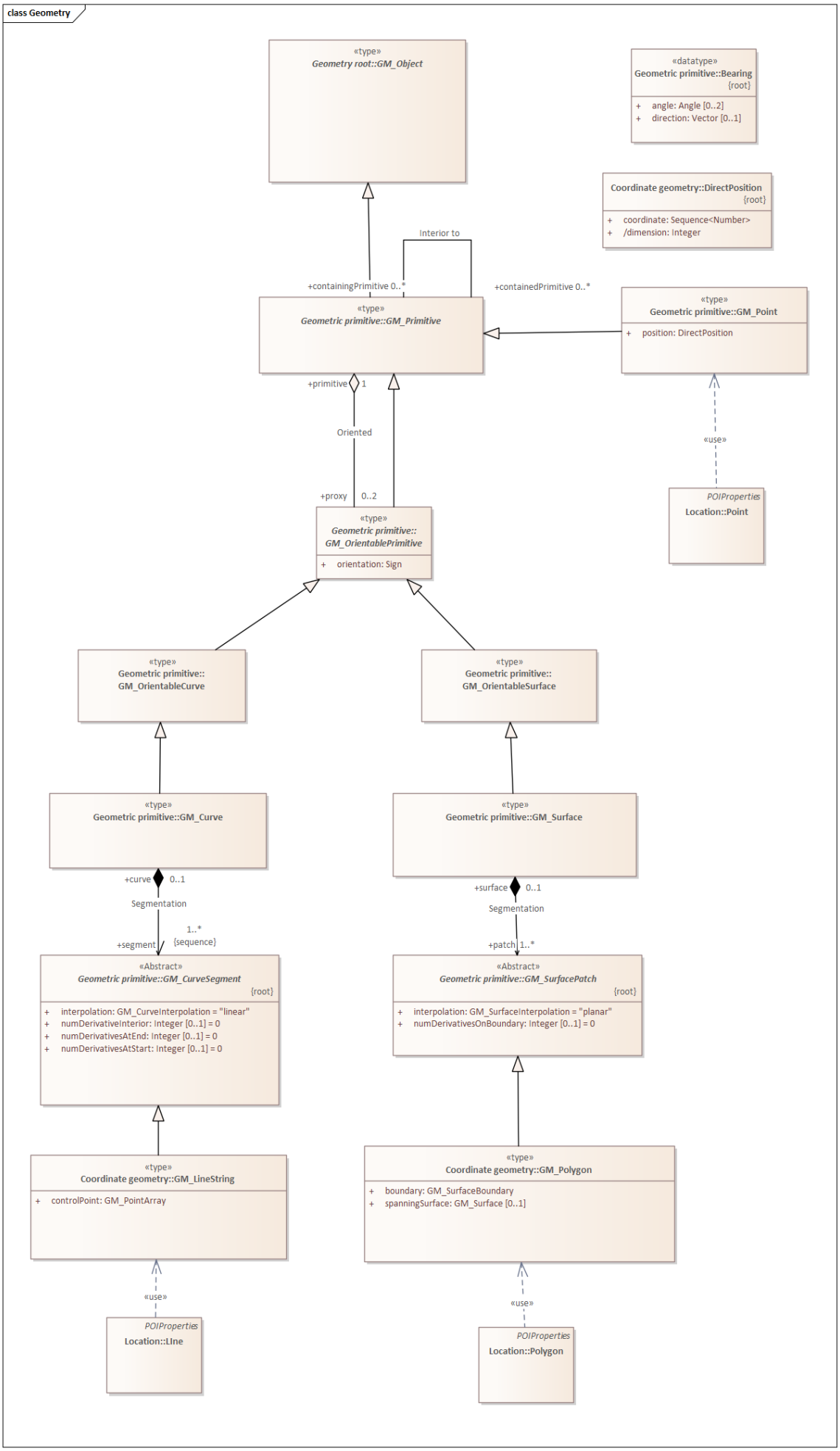



*Figure 5. Geometry Model*

The key classes desecribed in this figure are:

**GM_Object:** Root class for all OGC geometries.

**GM_Point:** The geometric primitive for Points

**GM_LineString:** The geometric primitive for line strings.

**GM_Polygon:** The geometric primitive for areas.

**label**

/req/core/req-geometry

The POI Conceptual Model spatial geometry properties SHALL be compliant with the Geometry Model defined in ISO 19107.

POI Spatial geometry properties SHALL be one or more of the following:

- GM_Point
- GM_LineString
- GM_Polygon

# POI Data Dictionary

The POI UML model is the normative definition of the POI Conceptual Model. The Data Dictionary tables in this section were software generated from the UML model. As such, this section provides a normative representation of the POI Conceptual Model.

| **AbstractFeature** | |
|---|---|
| Definition: | AbstractFeature is the abstract superclass of all feature types within the PoI Model. |
| Subclass of: | AnyFeature |
| Stereotype: | «FeatureType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| description «property» | CharacterString [0..1] | Provides further information on the feature. |
| featureID «property» | ID [1..1] | Specifies the unique identifier of the feature that is valid in the instance document within which it occurs. |
| identifer «property» | ScopedName [0..1] | Specifies the unique identifier of the feature that is valid globally. |
| name «property» | GenericName [0..*] | Specifies the name of the feature. |

**label**

/req/core/req-abstractfeature

An encoding of the AbstractFeature class SHALL be a compliant extension of the AnyFeature class defined in ISO 19109.

An encoding of the AbstractFeature class SHALL comply with requirement /req/core/req-abstractfeature-description.

An encoding of the AbstractFeature class SHALL comply with requirement /req/core/req-abstractfeature-featureID.

An encoding of the AbstractFeature class SHALL comply with requirement /req/core/req-abstractfeature-identifier.

An encoding of the AbstractFeature class SHALL comply with requirement /req/core/req-abstractfeature-name.

**label**

/req/core/req-abstractfeature-description

An encoding of the AbstractFeature class SHALL include zero or one `description` attributes.

Encodings of the `description` attribute SHALL be a valid implementation of the CharacterString class from ISO 19103.

**label**

/req/core/req-abstractfeature-featureid

An encoding of the AbstractFeature class SHALL include one `featureID` attributes.

Encodings of the `featureID` attribute SHALL be a valid implementation of the ID class from ISO 19103.

**label**

/req/core/req-abstractfeature-identifier

An encoding of the AbstractFeature class SHALL include zero or one `identifier` attributes.

Encodings of the `identifier` attribute SHALL be a valid implementation of the ScopedName class from ISO 19103.

**label**

/req/core/req-abstractfeature-name

An encoding of the AbstractFeature class SHALL include zero or more `name` attributes.

Encodings of the `name` attribute SHALL be a valid implementation of the GenericName class from ISO 19103.

| **AbstractFeatureWithLifespan** | |
|---|---|
| Definition: | AbstractFeatureWithLifespan is the base class for all PoI features. This class allows the optional specification of the real-world and database times for the existence of each feature. |
| Subclass of: | AbstractFeature |
| Stereotype: | «FeatureType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| creationDate «property» | DateTime [0..1] | Indicates the date at which a POI feature was added to the containing model. |
| terminationDate «property» | DateTime [0..1] | Indicates the date at which a POI feature was removed from the containing model. |
| validFrom «property» | DateTime [0..1] | Indicates the date at which a POI feature started to exist in the real world. |
| validTo «property» | DateTime [0..1] | Indicates the date at which a POI feature ceased to exist in the real world. |

**label**

/req/core/req-featurewithlifespan

An encoding of the AbstractFeatureWithLifespan class SHALL be a compliant extension of the AbstractFeature class.

An encoding of the AbstractFeatureWithLifespan class SHALL comply with requirement /req/core/req-featurewithlifespan-creationdate.

An encoding of the AbstractFeatureWithLifespan class SHALL comply with requirement /req/core/req-featurewithlifespan-terminationdate.

An encoding of the AbstractFeatureWithLifespan class SHALL comply with requirement /req/core/req-featurewithlifespan-validfrom.

An encoding of the AbstractFeatureWithLifespan class SHALL comply with requirement /req/core/req-featurewithlifespan-validto.

**label**

/req/core/req-featurewithlifespan-creationdate

An encoding of the AbstractFeatureWithLifespan class SHALL include zero or one `creationDate` attributes.

Encodings of the `creationDate` attribute SHALL be a valid implementation of the DateTime class from ISO 19103.

**label**

/req/core/req-featurewithlifespan-terminationdate

An encoding of the AbstractFeatureWithLifespan class SHALL include zero or one `terminationDate` attributes.

Encodings of the `terminationDate` attribute SHALL be a valid implementation of the DateTime class from ISO 19103.

**label**

/req/core/req-featurewithlifespan-validfrom

An encoding of the AbstractFeatureWithLifespan class SHALL include zero or one `validFrom` attributes.

Encodings of the `validFrom` attribute SHALL be a valid implementation of the DateTime class from ISO 19103.

**label**

/req/core/req-featurewithlifespan-validto

An encoding of the AbstractFeatureWithLifespan class SHALL include zero or one `validTo` attributes.

Encodings of the `validTo` attribute SHALL be a valid implementation of the DateTime class from ISO 19103.

**AbstractPOI**

| | |
|---|---|
| Definition: | A Point of Interest (POI) is a Feature which provides a concise summary of one or more associated Features. Its purpose is to provide easy access to key information about one or more real-world objects without the need to access or understand the underlying Feature data set. |
| Subclass of: | AbstractFeatureWithLifespan |
| Stereotype: | «FeatureType» |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| hasProperty | POIProperty [0..*] | An association with representations of zero of more properties of a Feature of Interest. This association allows Feature Property values from the Feature of Interest to be included in a POI using a standard representation. |
| hasFeatureOfInterest | FeatureOfInterest [1..*] | One or more Features which are represented by this POI. |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| contactInfo «property» | CI_Responsibility [1..*] | Contact information for the creators and maintainers of this POI. |
| hasFeatureOfInterest «property» | URI [1..*] | One or more Features which are represented by this POI. |
| hasMetadata «property» | URI [0..*] | An association with zero or more metadata records providing additional information about this POI and/or the associated Features of Interest. |
| hasProperty «property» | POIProperty [0..*] | An association with representations of zero of more properties of a Feature of Interest. This association allows Feature Property values from the Feature of Interest to be included in a POI using a standard representation. |
| keywords «property» | MD_Keywords [0..*] | Keywords used to aid in discovery of POIs of interest. |
| rights «property» | MD_Constraints [0..2] | Legal and security constraints applicable to this POI. |
| symbology «property» | URI [0..1] | A reference to information about rendering this POI. |

**label**

/req/core/req-poi-class

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-feature-with-lifespan.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-contactInfo.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-featureOfInterest.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-metadata.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-property.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-Keywords.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-rights.

An encoding of the POI class SHALL comply with requirement /req/core/req-poi-symbology.

**label**

/req/core/req-poi-contactInfo

An encoding of the POI class SHALL include one or more `contactInfo` attributes.

Encodings of the `contactInfo` attribute SHALL be a valid implementation of the CI_Responsibility class from ISO 19115-1:2014

**label**

/req/core/req-poi-featureOfInterest

An encoding of the POI class SHALL include one or more `featureOfInterest` attributes.

Encodings of the `featureOfInterest` attribute SHALL be a resolvable Uniform Resource Identifier (URI) for a Feature resource.

**label**

/req/core/req-poi-metadata

An encoding of the POI class SHALL include zero or more `metadata` attributes.

Encodings of the `metadata` attribute SHALL be a resolvable Uniform Resource Identifier (URI) for a Metadata resource.

**label**

/req/core/req-poi-property

An encoding of the POI class SHALL include zero or more `property` attributes.

Encodings of the `contactInfo` attribute SHALL be a valid implementation of the POIProperty class from this standard.

**label**

/req/core/req-poi-keywords

An encoding of the POI class SHALL include zero or more `keyword` attributes.

Encodings of the `keyword` attribute SHALL be a valid implementation of the MD_Keyword class from ISO 19115-1:2014

**label**

/req/core/req-poi-rights

An encoding of the POI class SHALL include zero, one, or two `rights` attributes.

Encodings of the `rights` attribute SHALL be a valid implementation of the MD_Constraints class from ISO 19115-1:2014

**label**

/req/core/req-poi-symbology

An encoding of the POI class SHALL include zero or one `symbology` attributes.

Encodings of the `symbology` attribute SHALL be a resolvable Uniform Resource Identifier (URI) for a sybology resource.

**FeatureOfInterest**

| | |
|---|---|
| Definition: | The thing whose property is being estimated or calculated in the course of an Observation to arrive at a Result, or whose property is being manipulated by an Actuator, or which is being sampled or transformed in an act of Sampling (SOSA). |
| Subclass of: | AnyFeature |
| Stereotype: | «FeatureType» |

**label**

/req/core/req-feature-of-interest

An encoding of the FeatureOfInterest class SHALL be a compliant extension of the AnyFeature class defined in ISO 19109.

**POIProperty**

| | |
|---|---|
| Definition: | A POIProperty provides a representation of one or more Properties of the Feature of Interest. The class contains two major parts: 1) A description of the Property and its represented in the POI. 2) Values generated from Properties of the Feature of Interest, encoded according to the representation defined in this class (1). |
| Subclass of: | AttributeType |
| Stereotype: | «DataType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| value «property» | Any [0..*] | Representations of zero or more property values from the Feature of Interest. |

**label**

/req/core/req-poi_property-class

An encoding of the POI-Property class SHALL be a compliant extension of the AttributeType class defined in ISO 19109.

An encoding of the POI class SHALL include zero or more `value` attributes of any type.

# Media Types for any data encoding(s)

A section describing the MIME-types to be used is mandatory for any standard involving data encodings. If no suitable MIME type exists in http://www.iana.org/assignments/media-types/index.html then this section may be used to define a new MIME type for registration with IANA.

Unresolved directive in 21-049.adoc - include::./sections/clause_12_security_considerations.adoc[]

# Appendix A: Conformance Class Abstract Test Suite (Normative)

| NOTE | Ensure that there is a conformance class for each requirements class and a test for each requirement (identified by requirement name and number) |
|---|---|

## Conformance Class A

### Requirement 1

**Test purpose**

Verify that…

**Test method**

Inspect…

### Requirement 2

# Appendix B: ISO Data Dictionary

ISO Technical Committee 211 maintains a harmonized UML model which covers many of their standards. All of the TC211 Standards which are relevant to the POI Standard are included. Therefore the full UML model for POI consists of the classes defined in the POI UML model as well as those which referenced from the TC211 Hamonized UML model.

The Data Dictionary tables in this section were software generated from the TC211 Hamonized UML model. As such, this section provides a normative representation of the TC211 classes which are leveraged by the POI Conceptual Model.

## General Feature Model (ISO 19109:2015)

| **AnyFeature** | |
|---|---|
| Definition: | The class AnyFeature is an instance of the «metaclass» FeatureType (ISO 19109). It represents the set of all classes which are feature types.<br>+ In an implementation this abstract class shall be substituted by a concrete class representing a feature type from an application schema associated with a domain of discourse (ISO 19109, ISO 19101). |
| StereoType: | «FeatureType» |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | FeatureType [1..1] | |

**AttributeType**

| | |
|---|---|
| Definition: | feature attribute<br>characteristic of a feature<br>NOTE: A feature attribute has a name, a data type, and a value domain associated to it. A feature attribute for a feature instance also has an attribute value taken from the value domain.<br>EXAMPLE: A feature attribute named 'color' may have an attribute value 'green' which belongs to the data type 'text'. A feature attribute named 'length' may have an attribute value '82.4' which belongs to the data type 'real'.+ |
| Subclass Of: | PropertyType |
| StereoType: | «Metaclass» |
| Constraint: | name is mandatory (Invariant): |

[cols="15,20,60",frame=none,grid=none,options="header"]<o:p></o:p>

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| featureAttributeMetadata | MD_Metadata [0..*] | |
| featureAttributeMetadata | MD_Metadata [0..*] | |
| characterizeBy | AttributeType [0..*] | |
| featureAttributeMetadata | MD_Metadata [0..*] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| cardinality | Multiplicity [1..1] | |
| valueDomain | CharacterString [1..1] | |
| valueType | TypeName [1..1] | |

**FeatureType**

| | |
|---|---|
| Definition: | feature: abstraction of real world phenomena<br>NOTE: A feature may occur as a type or an instance. Feature type or feature instance should be used when only one is meant.<br>This class describes how a feature class shall be constructed in an Application Schema. In accordance with the conformance clause of the standard, instances of this class are instanciated as feature classes in an Application Schema |
| Subclass Of: | IdentifiedType |
| StereoType: | «Metaclass» |
| Constraint: | name is mandatory (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | NS_AvoidList [0..*] | |
| superType | FeatureType [0..*] | |
| featureTypeMetadata | MD_Metadata [0..*] | |
| carrierOfCharacteristics | PropertyType [0..*] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| isAbstract | Boolean | |

# Geometry

The following classes are defined in (ISO 19107: 2003)

| GM_Object |
|---|

| | |
|---|---|
| Definition: | GM_Object is the root class of the geometric object taxonomy and supports interfaces common to all geographically referenced geometric objects. GM_Object instances are sets of direct positions in a particular coordinate reference system. A GM_Object can be regarded as an infinite set of points that satisfies the set operation interfaces for a set of direct positions, TransfiniteSet<DirectPosition>. Since an infinite collection class cannot be implemented directly, a Boolean test for inclusion shall be provided by the GM_Object interface. This international standard concentrates on vector geometry classes, but future work may use GM_Object as a root class without modification. NOTE As a type, GM_Object does not have a well-defined default state or value representation as a data type. Instantiated subclasses of GM_Object will. |
| Subclass Of: | none |
| StereoType: | «type» |
| Constraint: | dimension() > boundary().dimension (Invariant): |
| Constraint: | boundary().notEmpty() implies boundary().dimension() = dimension() -1 (Invariant): |
| Constraint: | boundary().isEmpty() = isCycle() (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | Geometry [1..1] | |
| | TransfiniteSet<DirectPosition> [1..1] | |
| | CV_DomainObject [1..1] | |
| CRS | CRS [0..1] | |
| CRS | SC_CRS [0..1] | |

**GM_Point**

| | |
|---|---|
| Definition: | GM_Point is the basic data type for a geometric object consisting of one and only one point. |
| Subclass Of: | GM_Primitive |
| StereoType: | «type» |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | Point [1..1] | |
| composite | GM_CompositePoint [0..*] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| position | DirectPosition [1..1] | The attribute "position" shall be the DirectPosition of this GM_Point. GM_Point::position [1] : DirectPosition NOTE In most cases, the state of a GM_Point is fully determined by its position attribute. The only exception to this is if the GM_Point has been subclassed to provide additional non-geometric information such as symbology. |

**GM_LineString**

| | |
|---|---|
| Definition: | A GM_LineString (Figure 16) consists of sequence of line segments, each having a parameterization like the one for GM_LineSegment (See 6.4.11). The class essentially combines a Sequence<GM_LineSegments> into a single object, with the obvious savings of storage space. |
| Subclass Of: | GM_Primitive |
| StereoType: | «type» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| controlPoint | GM_PointArray [1..1] | |

**GM_Polygon**

| | |
|---|---|
| Definition: | A GM_Polygon (Figure 21) is a surface patch that is defined by a set of boundary curves and an underlying surface to which these curves adhere. The default is that the curves are coplanar and the polygon uses planar interpolation in its interior. |
| Subclass Of: | GM_Primitive |
| StereoType: | «type» |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| surface | GM_PolyhedralSurface [0..1] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| boundary | GM_SurfaceBoundary | |
| spanningSurface | GM_Surface [0..1] | |

# Citation and responsible party information

The following classes are defined in ISO 19115-1 Edition 1

**CI_Address**

Definition: location of the responsible individual or organisation

StereoType: None

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| administrativeArea | CharacterString [0..1] | state, province of the location |
| city | CharacterString [0..1] | city of the location |
| country | CharacterString [0..1] | country of the physical address |
| deliveryPoint | CharacterString [0..*] | address line for the location Example Street number and name, suite number, etc |
| electronicMailAddress | CharacterString [0..*] | address of the electronic mailbox of the responsible organisation or individual |
| postalCode | CharacterString [0..1] | ZIP or other postal code |

**CI_Citation**

| | |
|---|---|
| Definition: | standardized resource reference |
| StereoType: | None |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| alternateTitle | CharacterString [0..*] | 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 |
| citedResponsibleParty | CI_Responsibility [0..*] | roles, name, contact, and position information for an individual or organisation that is responsible for the resource |
| date | CI_Date [0..*] | reference date for the cited resource |
| edition | CharacterString [0..1] | version of the cited resource |
| editionDate | DateTime [0..1] | date of the edition |
| graphic | MD_BrowseGraphic [0..*] | citation graphic or logo for cited party |
| identifier | MD_Identifier [0..*] | value uniquely identifying an object within a namespace |
| ISBN | CharacterString [0..1] | international Standard Book Number |
| ISSN | CharacterString [0..1] | international Standard Serial Number |
| onlineResource | CI_OnlineResource [0..*] | online reference to the cited resource |
| otherCitationDetails | CharacterString [0..*] | other information required to complete the citation that is not recorded elsewhere |
| presentationForm | CI_PresentationFormCode [0..*] | mode in which the resource is represented |
| series | CI_Series [0..1] | information about the series, or aggregate resource, of which the resource is a part |
| title | CharacterString | name by which the cited resource is known |

**CI_Contact**

| | |
|---|---|
| Definition: | information required to enable contact with the responsible person and/or organisation |
| StereoType: | None |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| address | CI_Address [0..*] | physical and email address at which the organisation or individual may be contacted |
| contactInstructions | CharacterString [0..1] | supplemental instructions on how or when to contact the individual or organisation |
| contactType | CharacterString [0..1] | type of contact |
| hoursOfService | CharacterString [0..*] | time period (including time zone) when individuals can contact the organisation or individual |
| onlineResource | CI_OnlineResource [0..*] | on-line information that can be used to contact the individual or organisation |
| phone | CI_Telephone [0..*] | telephone numbers at which the organisation or individual may be contacted |

**CI_Date**

Definition: reference date and event used to describe it

StereoType: «DataType»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| date | DateTime | reference date for the cited resource |
| dateType | CI_DateTypeCode | event used for reference date |

**CI_DateTypeCode**

Definition: identification of when a given event occurred

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| adopted | literal | date identifies when resource was adopted |
| creation | literal | date identifies when the resource was brought into existence |
| deprecated | literal | date identifies when resource was deprecated |
| distribution | literal | date identifies when an instance of the resource was distributed |
| expiry | literal | date identifies when resource expires |
| inForce | literal | date identifies when resource became in force |
| lastRevision | literal | date identifies when resource was last reviewed |
| lastUpdate | literal | date identifies when resource was last updated |
| nextUpdate | literal | date identifies when resource will be next updated |
| publication | literal | date identifies when the resource was issued |
| released | literal | the date that the resource shall be released for public access |
| revision | literal | date identifies when the resource was examined or re-examined and improved or amended |
| superseded | literal | date identifies when resource was superseded or replaced by another resource |
| unavailable | literal | date identifies when resource became not available or obtainable |
| validityBegins | literal | time at which the data is considered to become valid. Note: There could be quite a delay between creation and validity begins |
| validityExpires | literal | time at which the data is no longer considered to be valid |

**CI_Individual**

| | |
|---|---|
| Definition: | information about the party if the party is an individual |
| Subclass Of: | CI_Party |
| StereoType: | |
| Constraint: | count (name + positionName) > 0 (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | CI_Organisation [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| positionName | CharacterString [0..1] | position of the individual in an organisation |

**CI_OnLineFunctionCode**

Definition: function performed by the resource

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| browseGraphic | literal | browse graphic provided |
| browsing | literal | online browsing provided |
| completeMetadata | literal | complete metadata provided |
| download | literal | online instructions for transferring data from one storage device or system to another |
| emailService | literal | online email service provided |
| fileAccess | literal | online file access provided |
| information | literal | online information about the resource |
| offlineAccess | literal | online instructions for requesting the resource from the provider |
| order | literal | online order process for obtaining the resource |
| search | literal | online search interface for seeking out information about the resource |
| upload | literal | online resource upload capability provided |

**CI_OnlineResource**

Definition: information about on-line sources from which the resource, specification, or community profile name and extended metadata elements can be obtained

StereoType: «DataType»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| applicationProfile | CharacterString [0..1] | name of an application profile that can be used with the online resource |
| description | CharacterString [0..1] | detailed text description of what the online resource is/does |
| function | CI_OnLineFunctionCode [0..1] | code for function performed by the online resource |
| linkage | CharacterString | 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 |
| name | CharacterString [0..1] | name of the online resource |
| protocol | CharacterString [0..1] | connection protocol to be used e.g. http, ftp, file,http get KVP, http POST, etc... |
| protocolRequest | CharacterString [0..1] | protocol used by the accessed resource(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> |

**CI_Organisation**

| | |
|---|---|
| Definition: | information about the party if the party is an organisation |
| Subclass Of: | CI_Party |
| StereoType: | |
| Constraint: | count (name + logo) > 0 (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| individual | CI_Individual [0..*] | an individual in the named organisation |

| Attribute | Value type and multiplicity | Definition |
| --- | --- | --- |
| logo | MD_BrowseGraphic [0..*] | Graphic identifying organization |

**CI_Party**

Definition: information about the individual and/or organisation of the party

StereoType: «abstract»

| Role name | Target class and multiplicity | Definition |
| --- | --- | --- |
| | CI_Responsibility [] | |

| Attribute | Value type and multiplicity | Definition |
| --- | --- | --- |
| contactInfo | CI_Contact [0..*] | contact information for the party |
| name | CharacterString [0..1] | name of the party (individual or organization) |

**CI_PresentationFormCode**

Definition: mode in which the data is represented

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| audioDigital | literal | digital audio recording |
| audioHardcopy | literal | audio recording delivered by analog media, such as a magnetic tape |
| diagramDigital | literal | information represented graphically by charts such as pie chart, bar chart, and other type of diagrams and recorded in digital format |
| diagramHardcopy | literal | 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 |
| documentDigital | literal | digital representation of a primarily textual item (can contain illustrations also) |
| documentHardcopy | literal | representation of a primarily textual item (can contain illustrations also) on paper, photographic material, or other media |
| imageDigital | literal | 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 |
| imageHardcopy | literal | 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 |
| mapDigital | literal | map represented in raster or vector form |
| mapHardcopy | literal | map printed on paper, photographic material, or other media for use directly by the human user |
| modelDigital | literal | multi-dimensional digital representation of a feature, process, etc. |
| modelHardcopy | literal | 3-dimensional, physical model |
| multimediaDigital | literal | information representation using simultaneously various digital modes for text, sound, image |
| multimediaHardcopy | literal | information representation using simultaneously various analog modes for text, sound, image |
| physicalObject | literal | a physical object. Eg. Rock or mineral sample, microscope slide |
| profileDigital | literal | vertical cross-section in digital form |
| profileHardcopy | literal | vertical cross-section printed on paper, etc. |

**CI_Responsibility**

Definition: information about the party and their role

StereoType: None

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| party | CI_Party [1..*] | information about the party |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| extent | EX_Extent [0..*] | spatial or temporal extent of the role |
| role | CI_RoleCode | function performed by the responsible party |

**CI_RoleCode**

Definition: function performed by the responsible party

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| author | literal | party who authored the resource |
| coAuthor | literal | party who jointly authors the resource |
| collaborator | literal | party who assists with the generation of the resource other than the principal investigator |
| contributor | literal | party contributing to the resource |
| custodian | literal | party that accepts accountability and responsibility for the resource and ensures appropriate care and maintenance of the resource |
| distributor | literal | party who distributes the resource |
| editor | literal | party who reviewed or modified the resource to improve the content |
| funder | literal | party providing monetary support for the resource |
| mediator | literal | a class of entity that mediates access to the resource and for whom the resource is intended or useful |
| originator | literal | party who created the resource |
| owner | literal | party that owns the resource |
| pointOfContact | literal | party who can be contacted for acquiring knowledge about or acquisition of the resource |
| principalInvestigator | literal | key party responsible for gathering information and conducting research |
| processor | literal | party who has processed the data in a manner such that the resource has been modified |
| publisher | literal | party who published the resource |
| resourceProvider | literal | party that supplies the resource |
| rightsHolder | literal | party owning or managing rights over the resource |
| sponsor | literal | party who speaks for the resource |
| stakeholder | literal | party who has an interest in the resource or the use of the resource |
| user | literal | party who uses the resource |

**CI_Series**

| | |
|---|---|
| Definition: | information about the series, or aggregate resource, to which a resource belongs |
| StereoType: | «DataType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| issueIdentification | CharacterString [0..1] | information identifying the issue of the series |
| name | CharacterString [0..1] | name of the series, or aggregate resource, of which the resource is a part |
| page | CharacterString [0..1] | details on which pages of the publication the article was published |

**CI_Telephone**

| | |
|---|---|
| Definition: | telephone numbers for contacting the responsible individual or organisation |
| StereoType: | «DataType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| number | CharacterString | telephone number by which individuals can contact responsible organisation or individual |
| numberType | CI_TelephoneTypeCode [0..1] | type of telephone responsible organisation or individual |

**CI_TelephoneTypeCode**

| | |
|---|---|
| Definition: | type of telephone |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| facsimile | literal | telephone provides facsimile service |
| sms | literal | telephone provides sms service |
| voice | literal | telephone provides voice service |

# Constraint information

The following classes are defined in ISO 19115-1 Edition 1

**MD_ClassificationCode**

| | |
|---|---|
| Definition: | name of the handling restrictions on the resource |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| confidential | literal | available for someone who can be entrusted with information |
| forOfficialUseOnly | literal | unclassified information that may be exempt from mandatory release to the public |
| limitedDistribution | literal | desimination limited by designating body |
| protected | literal | compromise of the information could cause damage |
| restricted | literal | not for general disclosure |
| secret | literal | kept or meant to be kept private, unknown, or hidden from all but a select group of people |
| sensitiveButUnclassified | literal | although unclassified, requires strict controls over its distribution |
| topSecret | literal | of the highest secrecy |
| unclassified | literal | available for general disclosure |

**MD_Constraints**

| | |
|---|---|
| Definition: | restrictions on the access and use of a resource or metadata |
| StereoType: | None |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | MD_Identification [] | |
| | MD_Metadata [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| constraintApplicationScope | MD_Scope [0..1] | Spatial and temporal extent of the application of the constraint restrictions |
| graphic | MD_BrowseGraphic [0..*] | graphic /symbol indicating the constraint |
| reference | CI_Citation [0..*] | citation/URL for the limitation or constraint, eg. copyright statement, license agreement, etc |
| releasability | MD_Releasability [0..1] | information concerning the parties to whom the resource can or cannot be released |
| responsibleParty | CI_Responsibility [0..*] | party responsible for the resource constraints |
| useLimitation | CharacterString [0..*] | limitation affecting the fitness for use of the resource or metadata. Example, "not to be used for navigation" |

**MD_LegalConstraints**

| | |
|---|---|
| Definition: | restrictions and legal prerequisites for accessing and using the resource or metadata |
| Subclass Of: | MD_Constraints |
| StereoType: | None |
| Constraint: | otherConstraints: only documented if accessConstraints or useConstraints = "otherRestrictions" (Invariant): |
| Constraint: | If MD_LegalConstraints used then count of (accessConstraints + useConstraints + otherConstraints + useLimitation + releasability ) > 0 (Invariant): |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| accessConstraints | MD_RestrictionCode [0..*] | access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata |
| otherConstraints | CharacterString [0..*] | other restrictions and legal prerequisites for accessing and using the resource or metadata |
| useConstraints | MD_RestrictionCode [0..*] | 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 |

**MD_Releasability**

| | |
|---|---|
| Definition: | information about resource release constraints |
| StereoType: | None |
| Constraint: | count (addressee + statement) > 0 (Invariant): |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| addressee | CI_Responsibility [0..*] | party to which the release statement applies |
| dissemination Constraints | MD_RestrictionCode [0..*] | component in determining releasability |
| statement | CharacterString [0..1] | release statement |

**MD_RestrictionCode**

| | |
|---|---|
| Definition: | limitation(s) placed upon the access or use of the data |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| confidential | literal | not available to the public contains information that could be prejudicial to a commercial, industrial, or national interest |
| copyright | literal | 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 |
| in-confidence | literal | with trust |
| intellectualPropertyRights | literal | rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity |
| licence | literal | formal permission to do something |
| licenceDistributor | literal | formal permission required for a person or an entity to commercialize or distribute the resource |
| licenceEndUser | literal | 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 |
| licenceUnrestricted | literal | formal permission not required to use the resource |
| otherRestrictions | literal | limitation not listed |
| patent | literal | government has granted exclusive right to make, sell, use or license an invention or discovery |
| patentPending | literal | produced or sold information awaiting a patent |
| private | literal | protects rights of individual or organisations from observation, intrusion, or attention of others |
| restricted | literal | withheld from general circulation or disclosure |
| sensitiveButUnclassified | literal | although unclassified, requires strict controls over its distribution. |
| statutory | literal | prescribed by law |
| trademark | literal | a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer |
| unrestricted | literal | no constraints exist |

**MD_SecurityConstraints**

| | |
|---|---|
| Definition: | handling restrictions imposed on the resource or metadata for national security or similar security concerns |
| Subclass Of: | MD_Constraints |
| StereoType: | None |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| classification | MD_ClassificationCode | name of the handling restrictions on the resource or metadata |
| classificationSystem | CharacterString [0..1] | name of the classification system |
| handlingDescription | CharacterString [0..1] | additional information about the restrictions on handling the resource or metadata |
| userNote | CharacterString [0..1] | explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the resource or metadata |

# Identification information

The following classes are defined in ISO 19115-1 Edition 1

**DS_AssociationTypeCode**

| | |
|---|---|
| Definition: | justification for the correlation of two resources |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| collectiveTitle | literal | common title with holdings note NOTE: title identifies elements of a series collectively, combined with information about what volumes are available at the source cited |
| crossReference | literal | reference from one resource to another |
| dependency | literal | associate through a dependency |
| isComposedOf | literal | reference to resources that are parts of this data set |
| largerWorkCitation | literal | reference to a master resource of which this one is a part |
| partOfSeamlessDatabase | literal | part of same structured set of data held in a computer |
| revisionOf | literal | resource is a revision of associated resource |
| series | literal | associated through a common heritage such as produced to a common product specification |
| stereoMate | literal | part of a set of imagery that when used together, provides three-dimensional images |

**DS_InitiativeTypeCode**

| | |
|---|---|
| Definition: | type of aggregation activity in which resources are related |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| campaign | literal | series of organized planned actions |
| collection | literal | accumulation of resources assembled for a specific purpose |
| exercise | literal | specific performance of a function or group of functions |
| experiment | literal | process designed to find if something is effective or valid |
| investigation | literal | search or systematic inquiry |
| mission | literal | specific operation of a data collection system |
| operation | literal | action that is part of a series of actions |
| platform | literal | vehicle or other support base that holds a sensor |
| process | literal | method of doing something involving a number of steps |
| program | literal | specific planned activity |
| project | literal | organized undertaking, research, or development |
| sensor | literal | device or piece of equipment which detects or records |
| study | literal | examination or investigation |
| task | literal | piece of work |
| trial | literal | process of testing to discover or demonstrate something |

**MD_AssociatedResource**

| | |
|---|---|
| Definition: | associated resource information |
| Subclass Of: | GP_AssociatedResource |
| StereoType: | None |
| Constraint: | count of (name + metadataReference) > 0 (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | MD_Identification [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| associationType | DS_AssociationTypeCode | type of relation between the resources |
| initiativeType | DS_InitiativeTypeCode [0..1] | type of initiative under which the associated resource was produced |
| metadataReference | CI_Citation [0..1] | reference to the metadata of the associated resource |
| name | CI_Citation [0..1] | citation information about the associated resource |

**MD_DataIdentification**

| | |
|---|---|
| Definition: | information required to identify a resource |
| Subclass Of: | MD_Identification |
| StereoType: | None |
| Constraint: | defaultLocale documented if resource includes textual information (Invariant): |
| Constraint: | defaultLocale.PT_Locale.characterEncoding default value is UTF-8 (Invariant): |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| defaultLocale | PT_Locale [0..1] | language and character set used within the resource |
| environmentDescription | CharacterString [0..1] | description of the resource in the producer's processing environment, including items such as the software, the computer operating system, file name, and the dataset size |
| otherLocale | PT_Locale [0..*] | alternate localised language(s) and character set (s) used within the resource |
| supplementalInformation | CharacterString [0..1] | any other descriptive information about the resource |

**MD_Identification**

| | |
|---|---|
| Definition: | basic information required to uniquely identify a resource or resources |
| Subclass Of: | GP_Identification |
| StereoType: | «abstract» |
| Constraint: | (MD_Metadata.metadataScope.MD_MetadataScope.resourceScope) = 'dataset' implies count (extent.geographicElement.EX_GeographicBoundingBox + extent.geographicElement.EX_GeographicDescription) >= 1<br><br>(Invariant): |
| Constraint: | (MD_Metadata.metadataScope.MD_Scope.resourceScope) = ('dataset' or 'series') implies topicCategory is mandatory (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| resourceMaintenance | MD_MaintenanceInformation [0..*] | information about the frequency of resource updates, and the scope of those updates |
| associatedResource | MD_AssociatedResource [0..*] | associated resource information |
| resourceSpecificUsage | MD_Usage [0..*] | basic information about specific application(s) for which the resource(s) has/have been or is being used by different users |
| | MD_Metadata [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| abstract | CharacterString | brief narrative summary of the content of the resource(s) |
| additionalDocumentation | CI_Citation [0..*] | other documentation associated with the resource EXAMPLE Related articles, publications, user guides, data dictionaries. |
| citation | CI_Citation | citation for the resource(s) |
| credit | CharacterString [0..*] | recognition of those who contributed to the resource(s) |
| extent | EX_Extent [0..*] | spatial and temporal extent of the resource |
| pointOfContact | CI_Responsibility [0..*] | identification of, and means of communication with, person(s) and organisation(s) associated with the resource(s) |
| processingLevel | MD_Identifier [0..1] | code that identifies the level of processing in the producers coding system of a resource eg. NOAA level 1B |
| purpose | CharacterString [0..1] | summary of the intentions with which the resource(s) was developed |
| spatialRepresentationType | MD_SpatialRepresentationTypeCode [0..*] | method used to spatially represent geographic information |
| spatialResolution | MD_Resolution [0..*] | 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 |
| status | MD_ProgressCode [0..*] | status of the resource(s) |
| temporalResolution | TM_Duration [0..*] | smallest resolvable temporal period in a resource |
| topicCategory | MD_TopicCategoryCode [0..*] | main theme(s) of the resource |

**MD_KeywordClass**

| | |
|---|---|
| Definition: | specification of a class to categorize keywords in a domain-specific vocabulary that has a binding to a formal ontology |
| StereoType: | None |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | MD_Keywords [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| className | CharacterString | character string to label the keyword category in natural language |
| conceptIdentifier | URI [0..1] | URI of concept in ontology specified by the ontology attribute; this concept is labeled by the className: CharacterString. |
| ontology | CI_Citation | a reference that binds the keyword class to a formal conceptualization of a knowledge domain for use in semantic processingNOTE: Keywords in the associated MD_Keywords keyword list must be within the scope of this ontology |

**MD_Keywords**

| | |
|---|---|
| Definition: | keywords, their type and reference source NOTE: When the resource described is a service, one instance of MD_Keyword shall refer to the service taxonomy defined in ISO 19119, 8.3) |
| StereoType: | None |
| Constraint: | When the resource described is a service, one instance of MD_Keyword shall refer to the service taxonomy defined in ISO 19119 (Invariant): |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | MD_Identification [] | |
| keywordClass | MD_Keywords [0..1] | 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 |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| keyword | CharacterString [1..*] | commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject |
| thesaurusName | CI_Citation [0..1] | name of the formally registered thesaurus or a similar authoritative source of keywords |
| type | MD_KeywordTypeCode [0..1] | subject matter used to group similar keywords |

**MD_KeywordTypeCode**

| | |
|---|---|
| Definition: | methods used to group similar keywords |
| Subclass Of: | TaxonomyKeywords |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| dataCentre | literal | keyword identifies a a repository or archive that manages and distributes data |
| discipline | literal | keyword identifies a branch of instruction or specialized learning |
| featureType | literal | keyword identifies a resource containing or about a collection of feature instances with common characteristics |
| instrument | literal | keyword identifies a device used to measure or compare physical properties |
| place | literal | keyword identifies a location |
| platform | literal | keyword identifies a structure upon which an instrument is mounted |
| process | literal | keyword identifies a series of actions or natural occurrences |
| product | literal | keyword identifies a type of product |
| project | literal | keyword identifies an endeavour undertaken to create or modify a product or service |
| service | literal | keyword identifies an activity carried out by one party for the benefit of another |
| stratum | literal | keyword identifies the layer(s) of any deposited substance or levels within an ordered system |
| subTopicCategory | literal | refinement of a topic category for the purpose of geographic data classification |
| taxon | literal | keyword identifies a taxonomy of the resource |
| temporal | literal | keyword identifies a time period related to the resource |
| theme | literal | keyword identifies a particular subject or topic |

**MD_ProgressCode**

| | |
|---|---|
| Definition: | status of the resource |
| StereoType: | «CodeList» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| accepted | literal | agreed to by sponsor |
| completed | literal | has been completed |
| deprecated | literal | resource superseded and will become obsolete, use only for historical purposes |
| final | literal | progress concluded and no changes will be accepted |
| historicalArchive | literal | stored in an offline storage facility |
| notAccepted | literal | rejected by sponsor |
| obsolete | literal | no longer relevant |
| onGoing | literal | continually being updated |
| pending | literal | committed to, but not yet addressed |
| planned | literal | fixed date has been established upon or by which the resource will be created or updated |
| proposed | literal | suggested that development needs to be undertaken |
| required | literal | needs to be generated or updated |
| retired | literal | item is no longer recommended for use. It has not been superseded by another item |
| superseded | literal | replaced by new |
| tentative | literal | provisional changes likely before resource becomes final or complete |
| underDevelopment | literal | currently in the process of being created |
| valid | literal | acceptable under specific conditions |
| withdrawn | literal | removed from consideration |

**MD_RepresentativeFraction**

| | |
|---|---|
| Definition: | derived from ISO 19103 Scale where MD_RepresentativeFraction.denominator = 1 / Scale.measure And Scale.targetUnits = Scale.sourceUnits |
| StereoType: | «DataType» |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| denominator | Integer | the number below the line in a vulgar fraction |

**MD_Resolution**

Definition: level of detail expressed as a scale factor, a distance or an angle

StereoType: «Union»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| angularDistance | Angle | Angular sampling measure |
| distance | Distance | horizontal ground sample distance |
| equivalentScale | MD_RepresentativeFraction | level of detail expressed as the scale of a comparable hardcopy map or chart |
| levelOfDetail | CharacterString | brief textual description of the spatial resolution of the resource |
| vertical | Distance | Vertical sampling distance |

**MD_SpatialRepresentationTypeCode**

Definition: method used to represent geographic information in the resource

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| grid | literal | grid data is used to represent geographic data |
| stereoModel | literal | three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images |
| textTable | literal | textual or tabular data is used to represent geographic data |
| tin | literal | triangulated irregular network |
| vector | literal | vector data is used to represent geographic data |
| video | literal | scene from a video recording |

**MD_Usage**

| | |
|---|---|
| Definition: | brief description of ways in which the resource(s) is/are currently or has been used |
| Subclass Of: | GP_Usage |
| StereoType: | None |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| additionalDocumentation | CI_Citation [0..*] | publications that describe usage of data |
| identifiedIssues | CI_Citation [0..1] | citation of a description of known issues associated with the resource along with proposed solutions if available |
| response | CharacterString [0..*] | response to the user-determined limitationsE.G.. 'this has been fixed in version x' |
| specificUsage | CharacterString | brief description of the resource and/or resource series usage |
| usageDateTime | TM_Primitive [0..*] | date and time of the first use or range of uses of the resource and/or resource series |
| userContactInfo | CI_Responsibility [0..*] | identification of and means of communicating with person(s) and organisation(s) using the resource(s) |
| userDeterminedLimitations | CharacterString [0..1] | applications, determined by the user for which the resource and/or resource series is not suitable |

**MD_TopicCategoryCode**

| | |
|---|---|
| Definition: | 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. |
| StereoType: | enumeration |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| farming | literal | rearing of animals and/or cultivation of plantsExamples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock |
| biota | literal | flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat |
| boundaries | literal | legal land descriptions Examples: political and administrative boundaries |
| climatologyMeteorologyAtmosphere | literal | processes and phenomena of the atmosphere Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation |
| economy | literal | 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 |
| elevation | literal | height above or below a vertical datumExamples: altitude, bathymetry, digital elevation models, slope, derived products |
| environment | literal | environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape |
| geoscientificInformation | literal | 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 |
| health | literal | health, health services, human ecology, and safety Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services |
| imageryBaseMapsEarthCover | literal | base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations |
| intelligenceMilitary | literal | military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection |
| inlandWaters | literal | inland water features, drainage systems and their characteristics Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts |

# Name types

The following classes are defined in ISO 19103 Edition 1

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| location | literal | positional information and services Examples: addresses, |

**GenericName**

| | |
|---|---|
| Definition: | Generic Name is the abstract class for all names in a NameSpace. Each instance of a GenericName is either a LocalName or a ScopedName. A LocalName references a local object directly accessible from the NameSpace. A ScopedName is a composite of a LocalName for locating another NameSpace and a GenericName valid in that NameSpace. |
| StereoType: | interface |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| scope | NameSpace [1] | |

**LocalName**

| | |
|---|---|
| Definition: | A LocalName references a local object directly accessible from the NameSpace. |
| Subclass Of: | GenericName |
| StereoType: | interface |

purification and distribution, sewage collection and disposal,

**MemberName**

| | |
|---|---|
| Definition: | A MemberName is a LocalName that references either an attribute slot in a record or recordType or an attribute, operation, or association role in an object instance or type description in some form of schema. |
| Subclass Of: | LocalName |
| StereoType: | interface |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| aName | CharacterString | The stored value "aName" is the returned value for the "aName()" operation. |
| attributeType | TypeName | The allowable type for this member. |

**NameSpace**

| | |
|---|---|
| Definition: | A Name Space is a domain in which "names" given by character strings (possibly under local constrains constraints enforced by the Name Space) can be mapped to objects via a getObejct operation. Examples include objects which form a Name Space for their attributes, operations and associations, or Schemas that form Name Spaces for their included data types or classes. Not all methods for NameSpaces need to be made publicly accessible. |
| StereoType: | interface |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| name | GenericName [0..*] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| acceptableClassList | TypeName | |
| isGlobal | Boolean | |

**ScopedName**

| | |
|---|---|
| Definition: | ScopedName is a composite of a LocalName for locating another NameSpace and a GenericName valid in that NameSpace. ScopedName contains a LocalName as head and a GenericName, which might be a LocalName or a ScopedName, as tail. |
| Subclass Of: | GenericName |
| StereoType: | interface |

**TypeName**

| | |
|---|---|
| Definition: | A TypeName is a LocalName that references either a recordType or object type in some form of schema. The stored value "aName" is the returned value for the "aName()" operation. This is the types name. |
| Subclass Of: | LocalName |
| StereoType: | interface |

| Attribute | Value type and multiplicity | Definition |
| --- | --- | --- |
| aName | CharacterString | The stored value "aName" is the returned value for the "aName()" operation. |

# Primitive types

The following classes are defined in ISO 19103 Edition 1

## Date and Time

**Date**

Definition:

StereoType: interface

| Attribute | Value type and multiplicity | Definition |
| --- | --- | --- |
| century | CharacterString | |
| day | CharacterString | |
| month | CharacterString | |
| year | CharacterString | |

**DateTime**

Definition:

Subclass Of: Date and Time

StereoType: interface

**Time**

Definition:

StereoType: interface

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| hour | CharacterString | |
| minute | CharacterString | |
| second | CharacterString | |
| timeZone | CharacterString | |

## Numerics

**Decimal**

| | |
|---|---|
| Definition: | The usually finite representation of a decimal number. It differs from the common binary Real implementation in that it can represent 1/10 (one-tenth) without error, while binary real representation can only represent powers of 1/2 (one-half) exactly. Since many currencies are decimal, these representations are preferred in dealing with such moneys. This is also true for mile markers, which are often given in decimals.<br><br>Can be thought of as an integer part followed by a fractional part given in multiples of powers of 1/10 (tenths). |
| Subclass Of: | Number |
| StereoType: | interface |

**Integer**

| | |
|---|---|
| Definition: | An exact integer value, with no fractional part. |
| Subclass Of: | Number |
| StereoType: | interface |

**Number**

| | |
|---|---|
| Definition: | The base type for all number data, giving the basic algebraic operations. Since all concrete types have finite representations, some part of this algebra for most types exhibit some inaccuracy. For example, Integers cannot divide very well, and reals and decimals cannot avoid certain types of inaccuracies that depend on their representation semantics. |
| StereoType: | interface |

**Real**

| | |
|---|---|
| Definition: | The common binary Real finite implementation using base 2. Since such reals can approximate any measure where absolute accuracy is not possible, this form of numeric is most often used for measures. In cases were absolute accuracy is needed, such as currencies, then a decimal representation may be preferred (assuming the currency is decimal, such as the US dollar, British pound, etc.). Where there are no subunits possible, Integer numbers may be preferred.<br><br>Can be thought of as an integer part followed by a fractional part given in multiples of powers of 1/2 (halves). |
| Subclass Of: | Number |
| StereoType: | interface |

**UnlimitedInteger**

| | |
|---|---|
| Definition: | — Infinite if and only if value is not specified {[ isInfinte = True ] = [ value = Null ]} — value is either infinite or non-negative {value <> Null implies value >= 0} |
| StereoType: | interface |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| isInfinite | Boolean | |
| value | Integer [0..1] | |

**Vector**

| | |
|---|---|
| Definition: | an ordered set of numbers called coordinates that represent a position in a coordinate system. The coordinates may be in a space of any number of dimensions, as for instance in an "nth degree" polynomial spline.<br><br>Example (123, 514, 150) |
| StereoType: | interface |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| coordinates | Number [1..*] | list of numbers representing the vector |
| dimension | Integer | dimension in Euclidian space |

## Text

**CharacterSetCode**

Definition:

StereoType: «CodeList»

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| ISO10646-1 | literal | |
| ISO10646-2 | literal | |
| ISO8859 | literal | |

**Character**

Definition: symbol from a standard character-set.

StereoType: interface

**CharacterString**

Definition: Characterstring is a family of datatypes which represent strings of symbols from standard character-sets.

Semantics of CharacterString is in accordance with ISO/IEC 11404:2007 clause 10.1.5.

StereoType: interface

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | CharacterString [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| characterSet | CharacterSetCode | character set of the string |
| maxLength | Integer | maximum length of all instances of CharacterString |
| size | Integer | number of characters in the string |
| value | Character [0..*] | |

**URI**

| | |
|---|---|
| Definition: | Uniform Resource Identifier (URI), is a compact string of characters used to identify or name a resource. |
| Subclass Of: | CharacterString |
| StereoType: | interface |

## Truth

**ContinuousTruth**

| | |
|---|---|
| Definition: | Any of the interpretations of truth as a continuous range of possible values, usually expressed as a measure. |
| Subclass Of: | Truth |
| StereoType: | interface |

**DiscreteTruth**

| | |
|---|---|
| Definition: | |
| Subclass Of: | Truth |
| StereoType: | interface |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | Boolean [] | Realization |
| | Logical [] | Realization |

**Probability**

| | |
|---|---|
| Definition: | Continuous truth as a probability. The value (between 0.0 and 1.0) is a measure of belief (in the single occurrence case), or a measure of the distribution of occurrences (in the set case). The fine details of the semantics is the scope of probability and statistics, and the reader is directed towards his text of choice. |
| Subclass Of: | ContinuousTruth |
| StereoType: | interface |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| value | Real | |

**Truth**

| | |
|---|---|
| Definition: | The root or truth classification trees. The only constant between the subclasses here is that 1.0 is TRUE, and 0.0 is FALSE. This makes Probability work nicely. Other algebraic tricks may be more appropriate to other version of "truth calculus", but for consistency sake, this value mapping should always be available. For example, the following semantic mappings to simple Booleans always work:<br><br>{truthValue() > 0} = possibly true {truthValue() = 0} = never true<br><br>{truthValue() < 1} = possibly false {truthValue() = 1} = never false<br><br>{truthValue() < 1}AND{truthValue() > 0} = uncertain |
| StereoType: | interface |

**Boolean**

| | |
|---|---|
| Definition: | boolean is the mathematical datatype associated with two-valued logic |
| StereoType: | enumeration |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | DiscreteTruth [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| true | literal | one of two possible values of Boolean denoting the primitive value of true |
| false | literal | one of two possible values of Boolean denoting the primitive value of false |

**Logical**

| | |
|---|---|
| Definition: | Handy for a weak sort of 3 valued logic, where truth or falsity is not attributable to all well-formed statements. |
| StereoType: | enumeration |

| Role name | Target class and multiplicity | Definition |
|---|---|---|
| | DiscreteTruth [] | |

| Attribute | Value type and multiplicity | Definition |
|---|---|---|
| TRUE | literal | |
| FALSE | literal | |
| MAYBE | literal | The interpretation of MAYBE is a point of semantic variation. One opinion would have it be interpreted as UNKNOWN, implying that certainty exist, but we just don't know what it is at the moment. This is not always appropriate. Even in such a black and white world, a logical when used as a static (class-wide) attribute, would be three valued: always true, always false, and sometimes. Thus, MAYBE can be interpreted as "maybe true, maybe not."<br><br>In such cases a probability statement might be more appropriate, just not always available.<br><br>Equivalent to STEP's and SQL's Unknown. |

# Appendix C: Revision History

| Date | Release | Editor | Primary clauses modified | Description |
|---|---|---|---|---|
| 2021-06-17 | 0.0.1 | Matthew Purss | all | initial version |
| 2021-07-08 | 0.0.1 | Matthew Purss | Clause 1 | initial scope text inserted from original POI draft standard |
| 2021-07-09 | 0.0.1 | Matthew Purss | Clause 4 | initial terms inserted from original POI draft standard (and reformatted to meet formal definition requirements) |

# Bibliography