OGC (OGC Points of Interest)

NOTE	*Preface* 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*
- [ISO 19115] *ISO: ISO 19115-1:2014, Geographic Information — Metadata — Part 1: Fundamentals*
- [ISO 19507] *ISO: ISO 19507:2012, Information technology - Object Management Group Object Constraint Language (OCL)*

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.

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

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

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

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

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

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

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)..

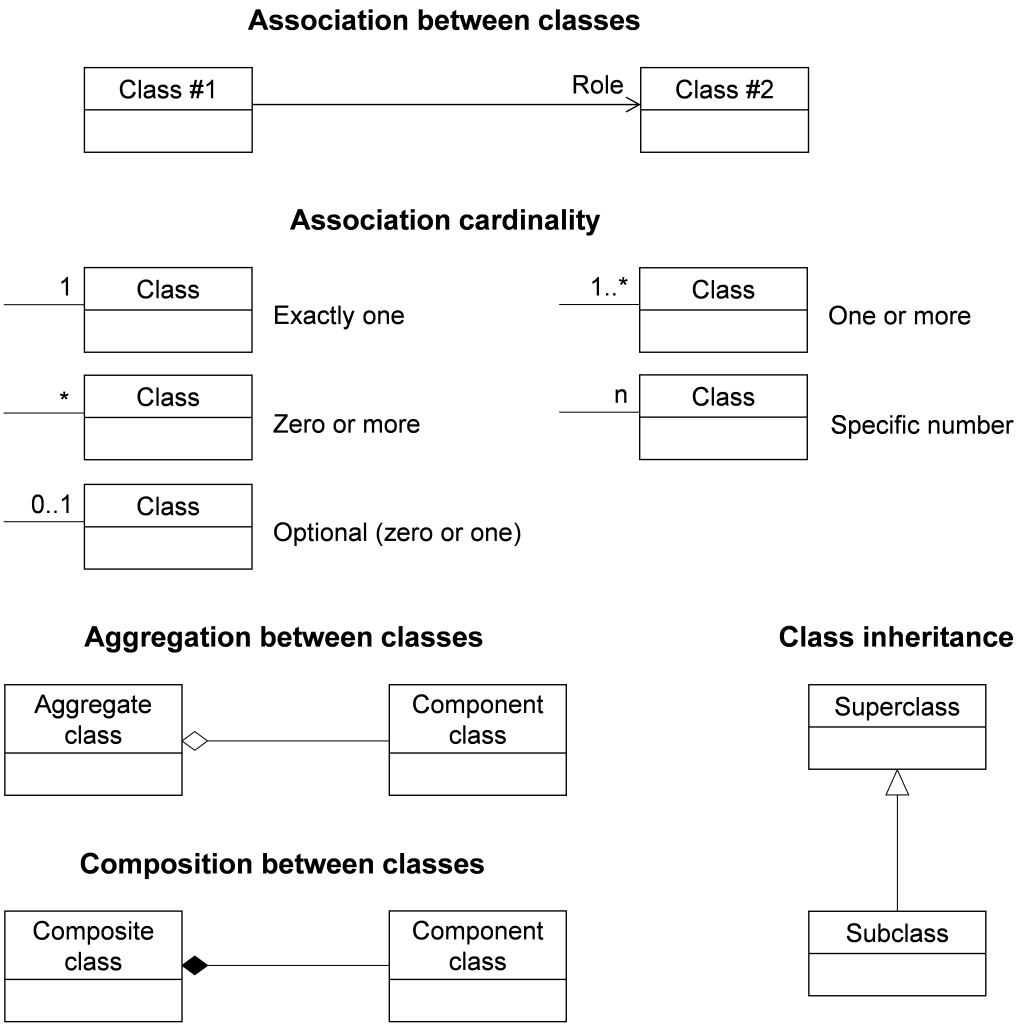


Figure 1. UML notation (see ISO TS 19103, Geographic information - Conceptual schema language).

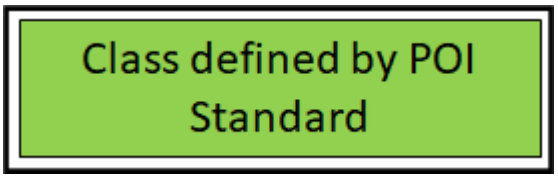
All associations between model elements in the POI Conceptual Model are uni-directional. Thus, associations in the model are navigable in only one direction. The direction of navigation is depicted by an arrowhead. In general, the context an element takes within the association is indicated by its role. 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:

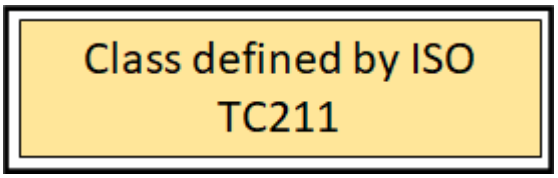
- «FeatureType» represents features that are similar and exhibit common characteristics. Features are abstractions of real-world phenomena and have an identity.
- «TopLevelFeatureType» denotes features that represent the main components of the conceptual model. Top-level features may be further semantically 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.

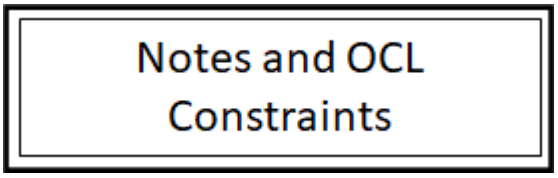
In order to enhance the readability of the POI UML diagrams, classes are depicted in different colors. The following coloring scheme is applied:



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.

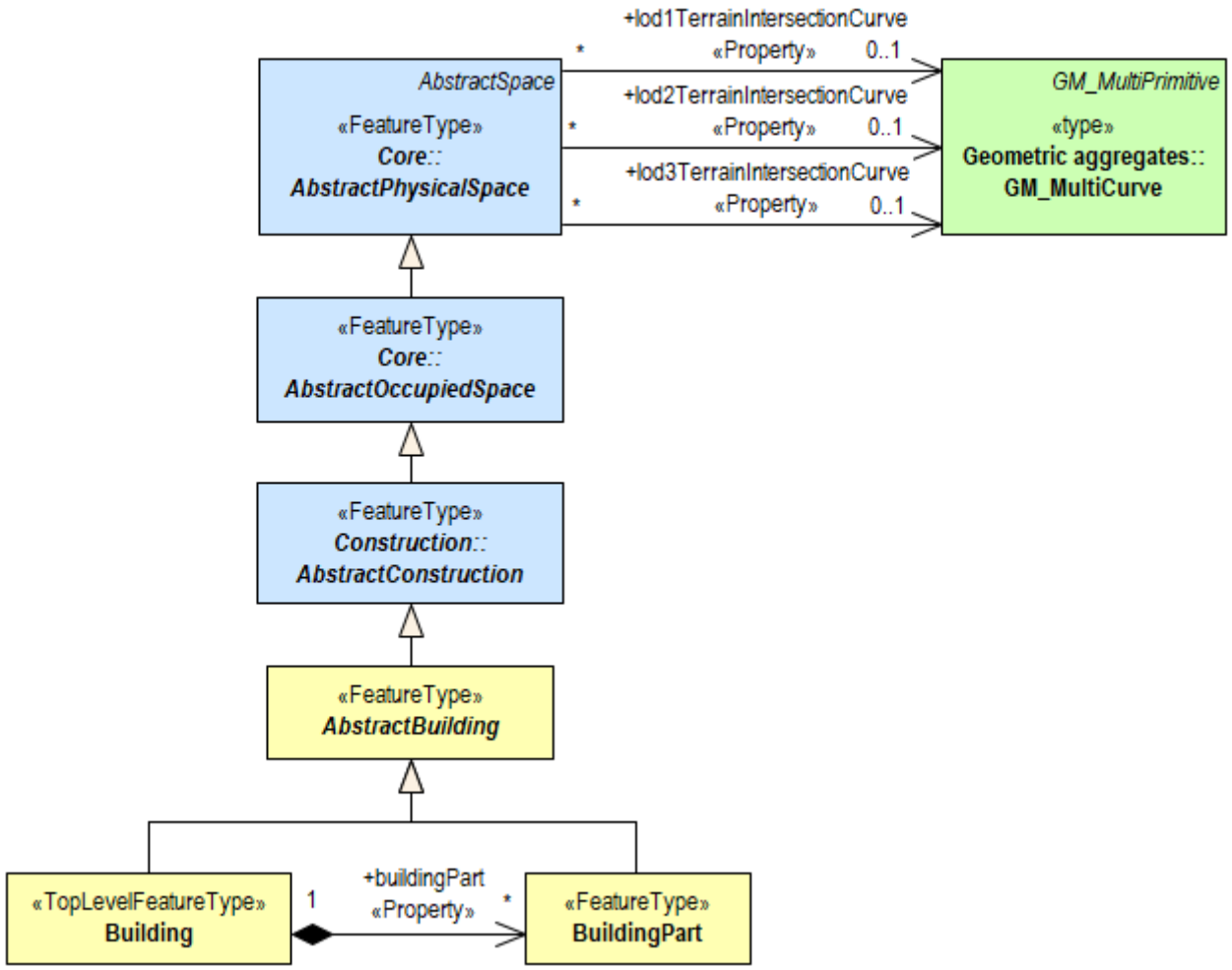


Figure 2. Example UML diagram demonstrating the UML notation and coloring scheme used throughout the POI Standard.

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.

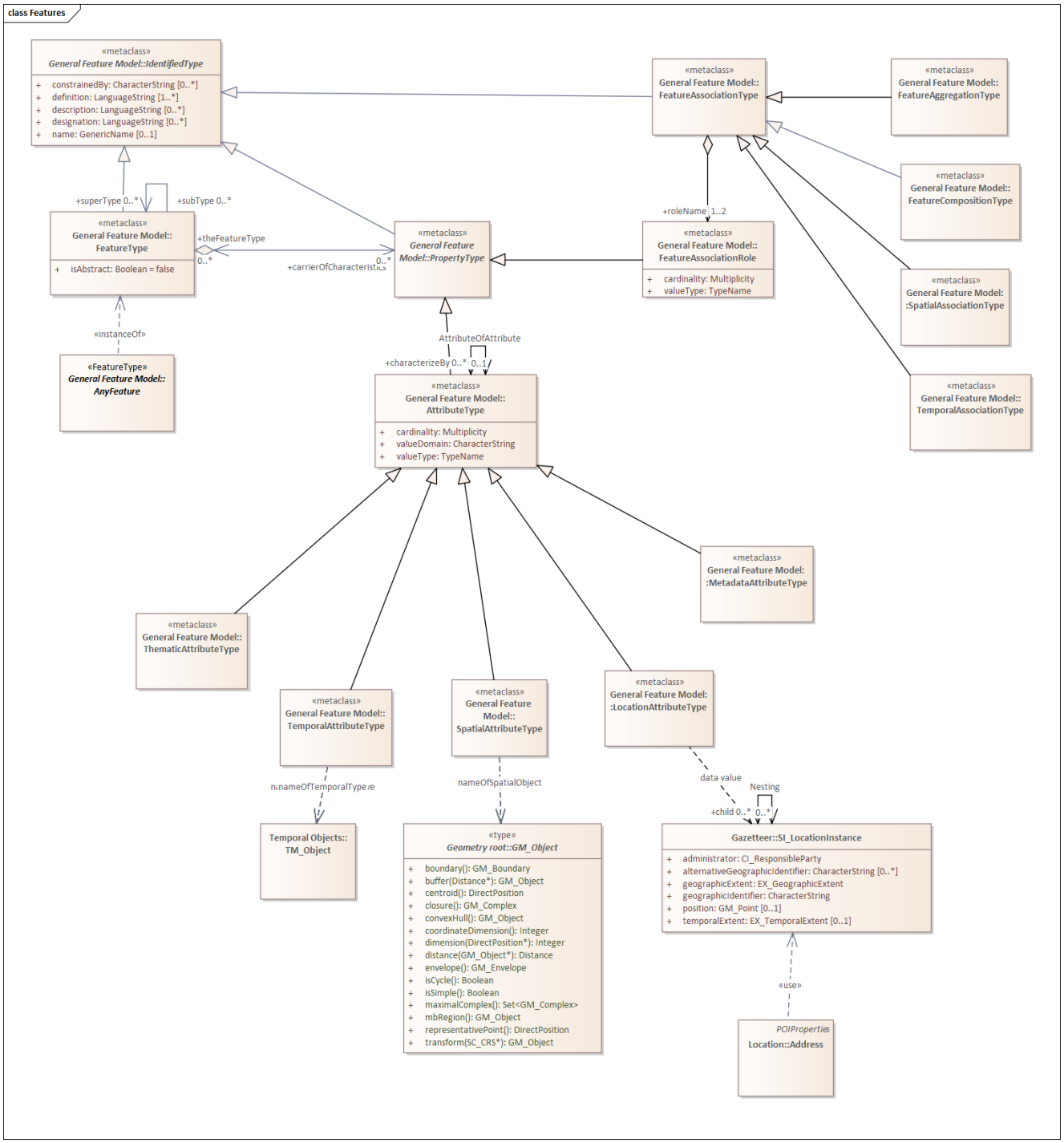


Figure 3. Feature Model

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.

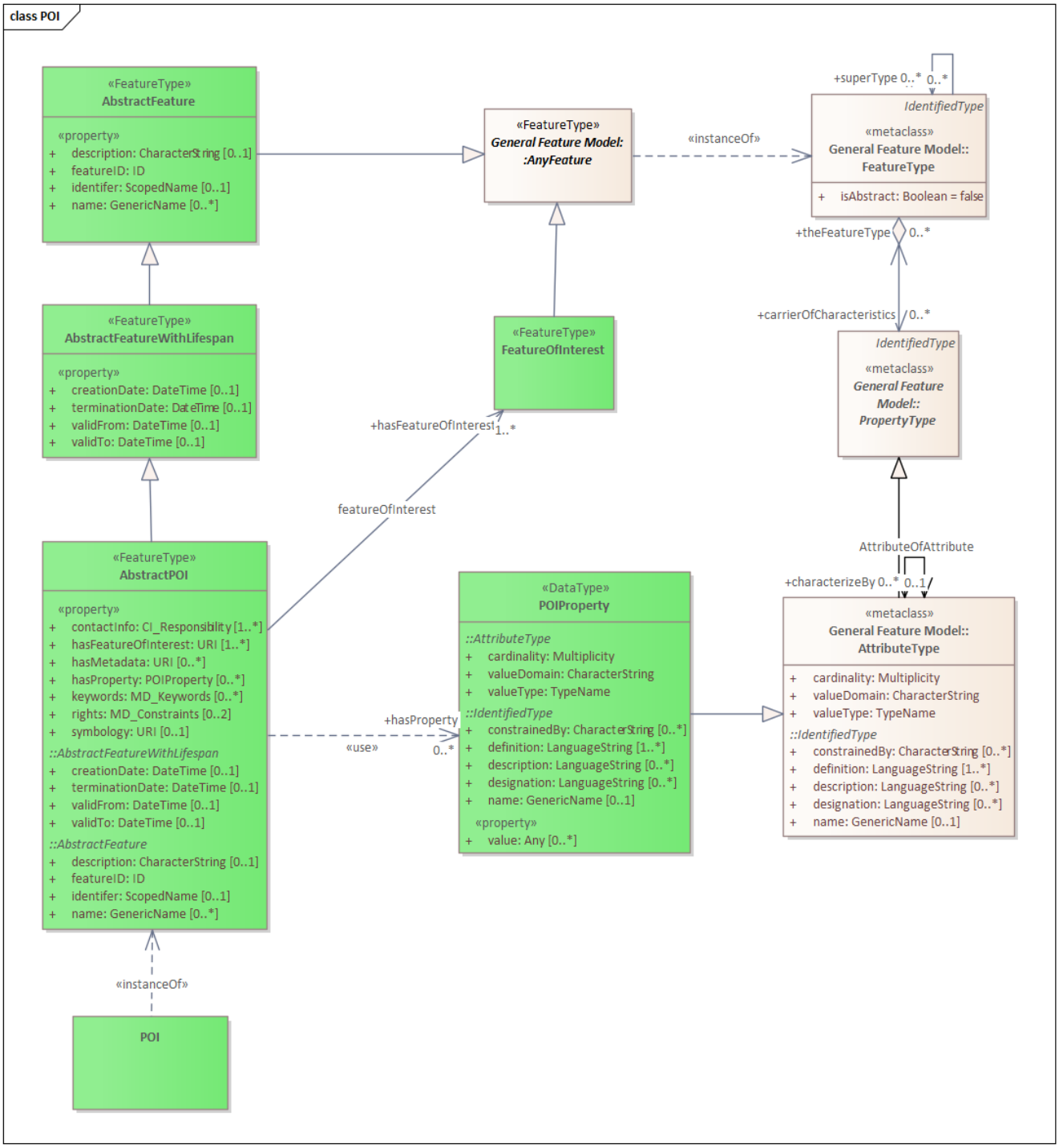


Figure 4. POI UML Model

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.

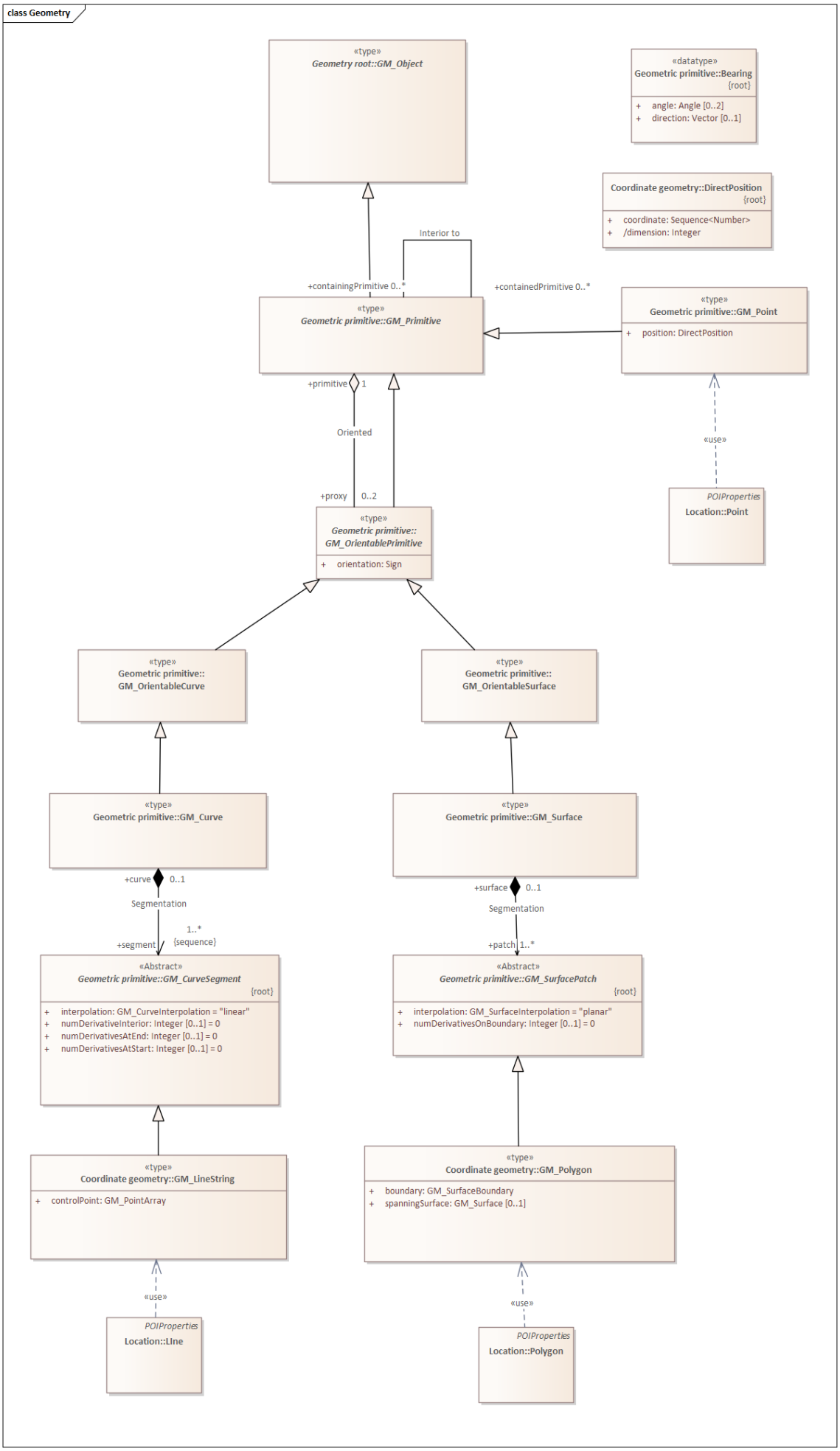


Figure 5. Geometry Model

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.

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

The following classes are defined in (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. + 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 characteristic of a feature 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. 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 NOTE: A feature may occur as a type or an instance. Feature type or feature instance should be used when only one is meant. 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 [1..1]	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 [1..1]	reference date for the cited resource
dateType	CI_DateTypeCode [1..1]	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:	None
Constraint:	count (name + positionName) > 0 (Invariant):

Role name	Target class and multiplicity	Definition
	CI_Organisation [1..1]	

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 [1..1]	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:	None
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 [1..1]	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 [1..1]	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 [1..1]	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 [1..1]	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 (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 [1..1]	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 [1..1]	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 [1..1]	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 [1..1]	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_KeywordClass [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 [1..1]	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 [1..1]	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 19103:2015)

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..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 [1..1]	The stored value "aName" is the returned value for the "aName()" operation.
attributeType	TypeName [1..1]	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 [1..1]	
isGlobal	Boolean [1..1]	

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 [1..1]	The stored value "aName" is the returned value for the "aName()" operation.

Primitive types

The following classes are defined in (ISO 19103:2015)

Date and Time

Date

Definition:

StereoType: interface

Attribute	Value type and multiplicity	Definition
century	CharacterString [1..1]	
day	CharacterString [1..1]	
month	CharacterString [1..1]	
year	CharacterString [1..1]	

DateTime

Definition:

Subclass Of: Date and Time

StereoType: interface

Time

Definition:

StereoType: interface

Attribute	Value type and multiplicity	Definition
hour	CharacterString [1..1]	
minute	CharacterString [1..1]	
second	CharacterString [1..1]	
timeZone	CharacterString [1..1]	

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. 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. 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 [1..1]	
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. Example (123, 514, 150)
StereoType:	interface

Attribute	Value type and multiplicity	Definition
coordinates	Number [1..*]	list of numbers representing the vector
dimension	Integer [1..1]	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 [1..1]	character set of the string
maxLength	Integer [1..1]	maximum length of all instances of CharacterString
size	Integer [1..1]	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 [1..1]	

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:

{truthValue() > 0} = possibly true {truthValue() = 0} = never true

{truthValue() < 1} = possibly false {truthValue() = 1} = never false

{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." In such cases a probability statement might be more appropriate, just not always available. 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