

OGC (OGC Points of Interest)

Preface

NOTE

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.

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

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

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.

location

particular *place* or *position*

NOTE A *location* identifies a geographic *place*.

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

NOTE *Locations* can be a single point, a centroid, a minimum bounding rectangle, or a set of vectors.

NOTE A *location* should be persistent over time and does not change.

NOTE Multiple *POIs* may share the same *location*.

NOTE When a *POI* physically moves it is understood to have acquired a new *location*.

clause 3.1.3

point

0-dimensional geometric primitive, representing a *position*

[ISO 19107] ISO19107,clause xxxx - get definition clause

point of interest

alt:[POI]

location where one can find a *place*, product or service

NOTE	A <i>POI</i> is typically identified by <i>name</i> rather than by an <i>address</i> .
NOTE	A <i>POI</i> is characterized by <i>type</i> , which may be used as a <i>reference point</i> or a target in a <i>location</i> based service request.
NOTE	A <i>POI</i> does not exclude the labeling, identification, and tracking of persons and other physical objects that have no permanent location.

destination of a route; such as, Boston

position

data type that describes a *point* or *geometry* potentially occupied by an object or person

[ISO19133] ISO19133,clause xxxx - get definition clause

application schema

A set of conceptual schema for data required by one or more applications. An application schema contains selected parts of the base schemas presented in the ORM Information Viewpoint.

Designers of application schemas may extend or restrict the types defined in the base schemas to define appropriate types for an application domain. Application schemas are information models for a specific information community.

OGC Definitions Register at <http://www.opengis.net/def/glossary/term/ApplicationSchema>

codelist

A value domain including a code for each permissible value.

conceptual model

model that defines concepts of a universe of discourse

[ISO19101:2014] ISO 19101-1:2014,clause 4.1.5 - get definition clause

conceptual schema

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

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

Implementation Specification Specified on the OGC Document Types Register at <http://www.opengis.net/def/doc-type/is>

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

[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

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

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 \(see ISO TS 19103, Geographic information - Conceptual schema language\)](#)..

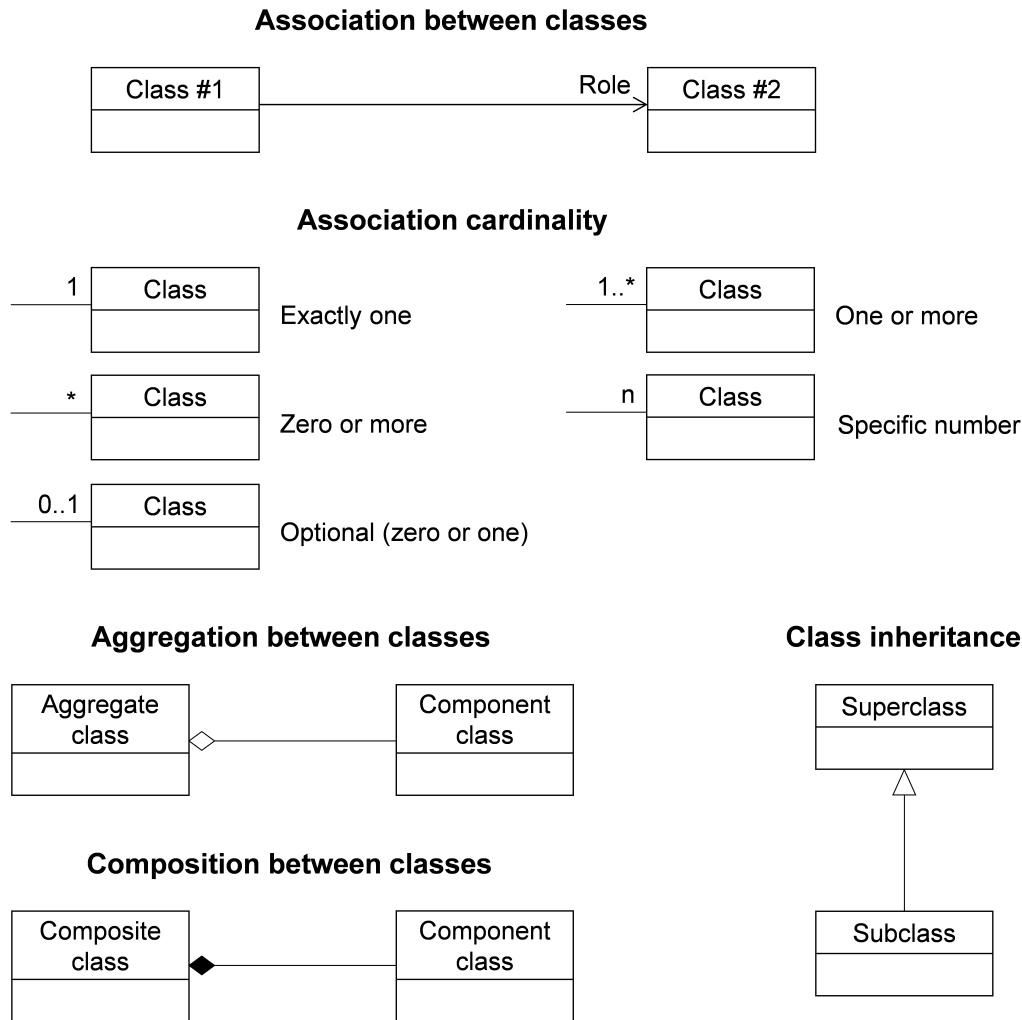


Figure 1. UML notation (see ISO TS 19103, *Geographic information - Conceptual schema language*).

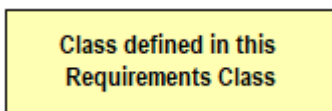
All associations between model elements in the POI Conceptual Model are uni-directional. Thus, associations in the model are navigable in only one direction. The direction of navigation is depicted by an arrowhead. In general, the context an element takes within the association is indicated by its role.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

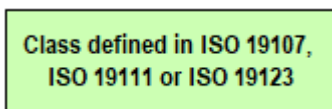
- «FeatureType» represents features that are similar and exhibit common characteristics. Features are abstractions of real-world phenomena and have an identity.
- «TopLevelFeatureType» denotes features that represent the main components of the conceptual model. Top-level features may be further semantically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

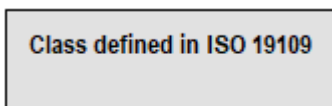
In order to enhance the readability of the POI UML diagrams, classes are depicted in different colors. The following coloring scheme is applied:



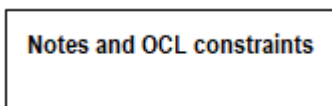
Classes painted in yellow belong to the POI Requirements Class.



Classes painted in green are defined in the ISO standards 19107, 19111, or 19123. Their class names are preceded by the UML package name, in which the classes are defined.



Classes painted in grey are defined in the ISO standard 19109. In the context of this standard, this only applies to the class *AnyFeature*. *AnyFeature* is an instance of the metaclass *FeatureType* and acts as super class of all classes in the CityGML UML model with the stereotype «FeatureType». A metaclass is a class whose instances are classes.



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 CityGML 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.

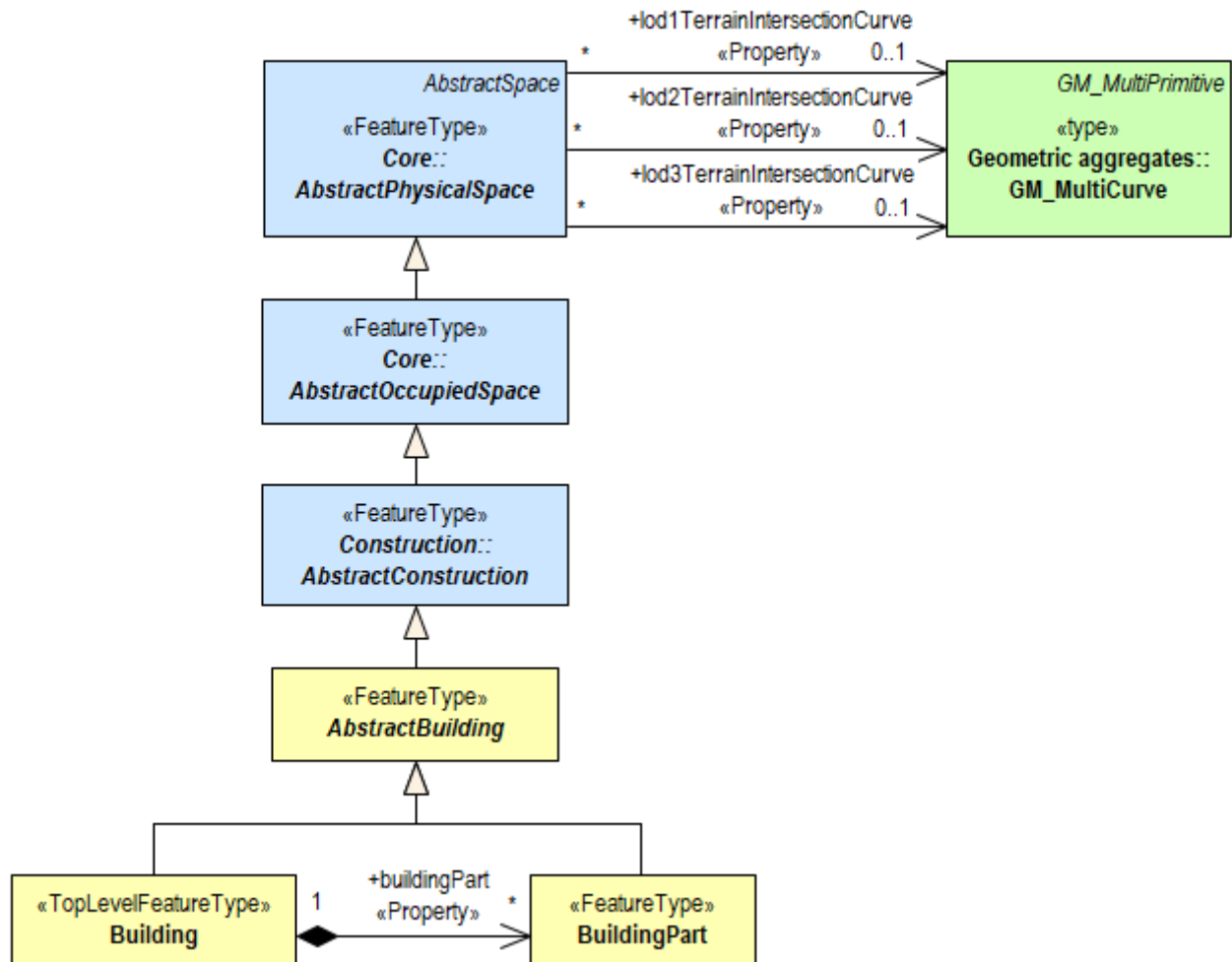


Figure 2. Example UML diagram demonstrating the UML notation and coloring scheme used throughout the CityGML Standard.

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](#).

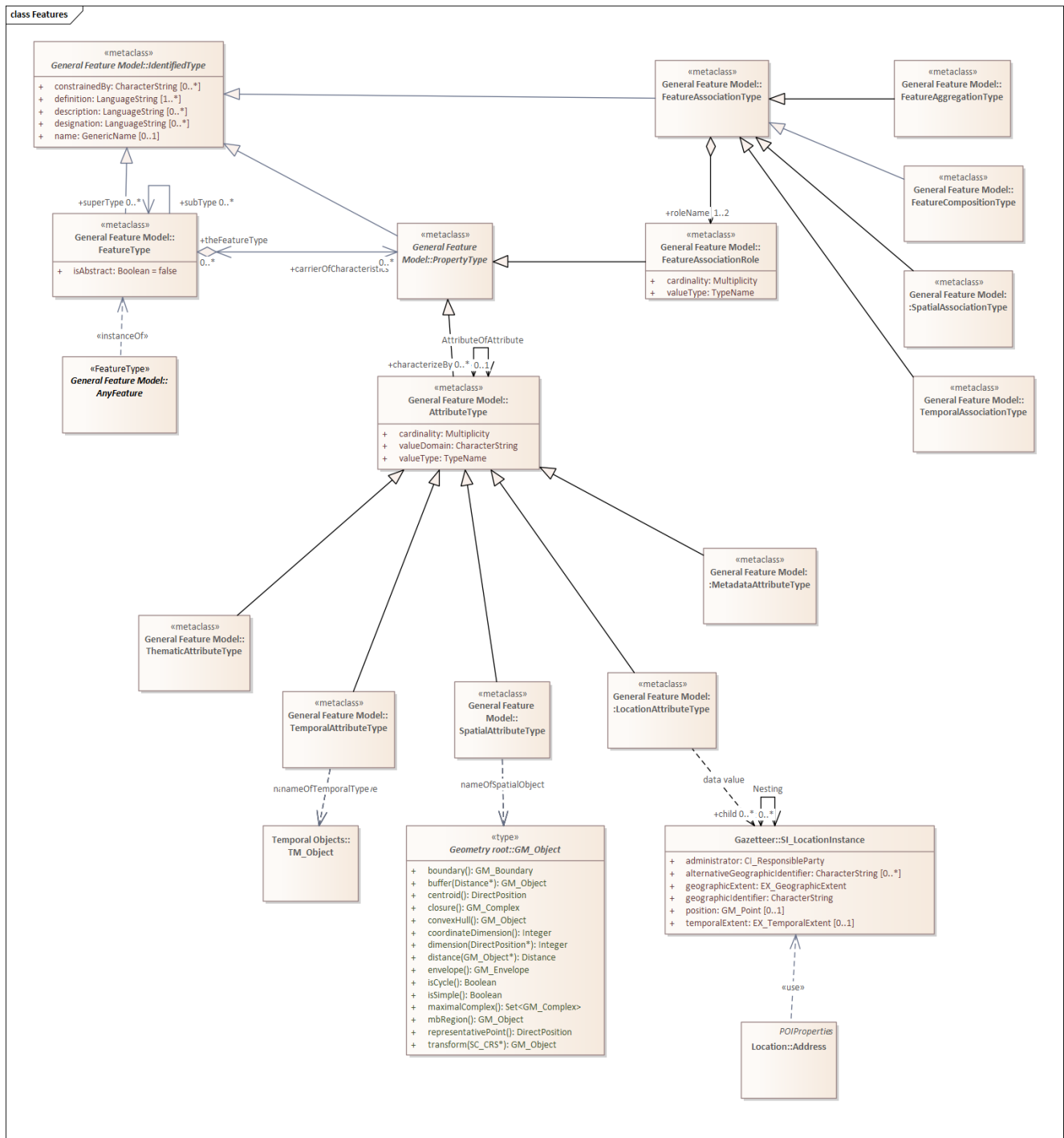


Figure 3. Feature Model

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 instantiated 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.

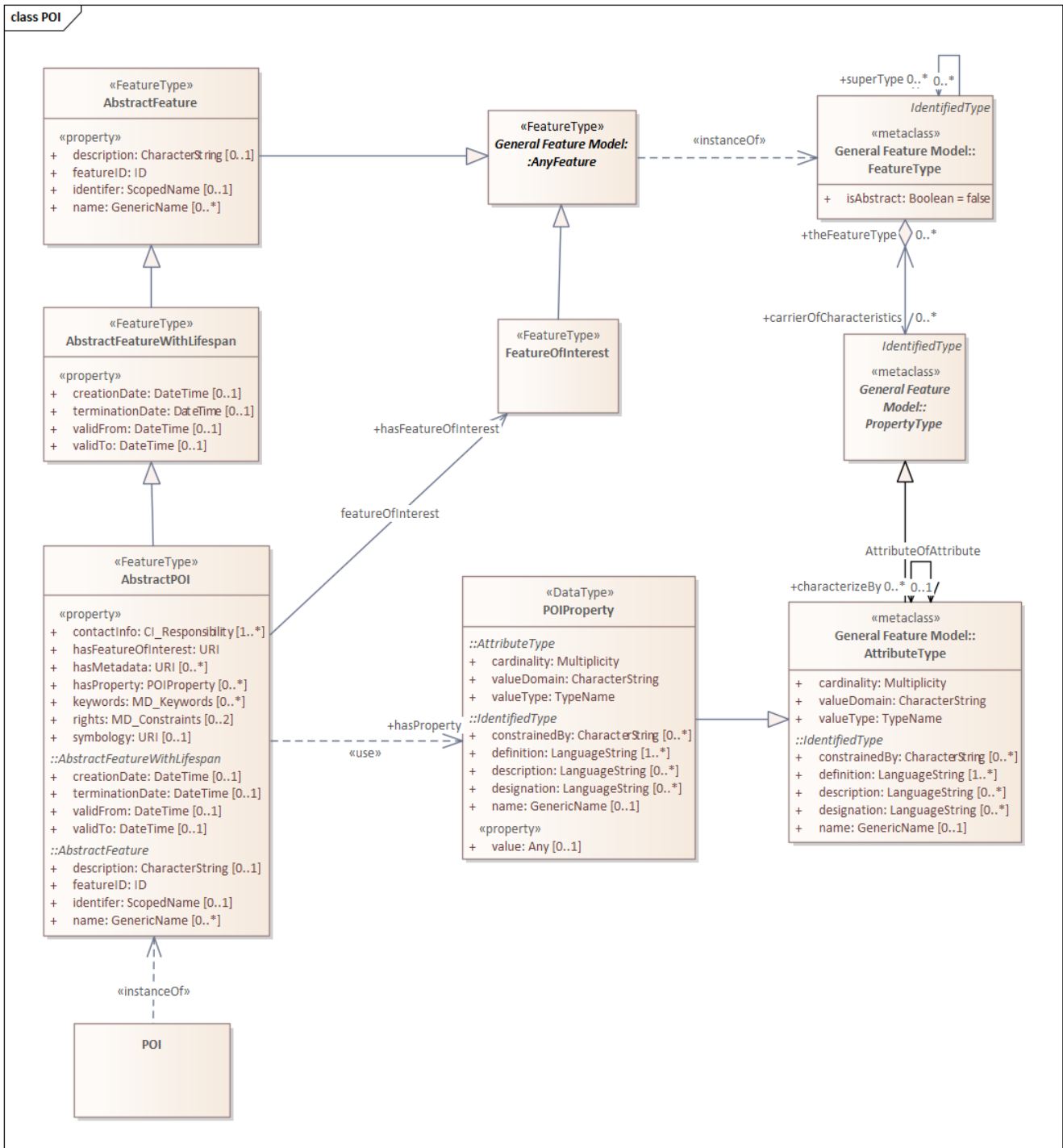


Figure 4. POI UML Model

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 synopsis 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 capable 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.

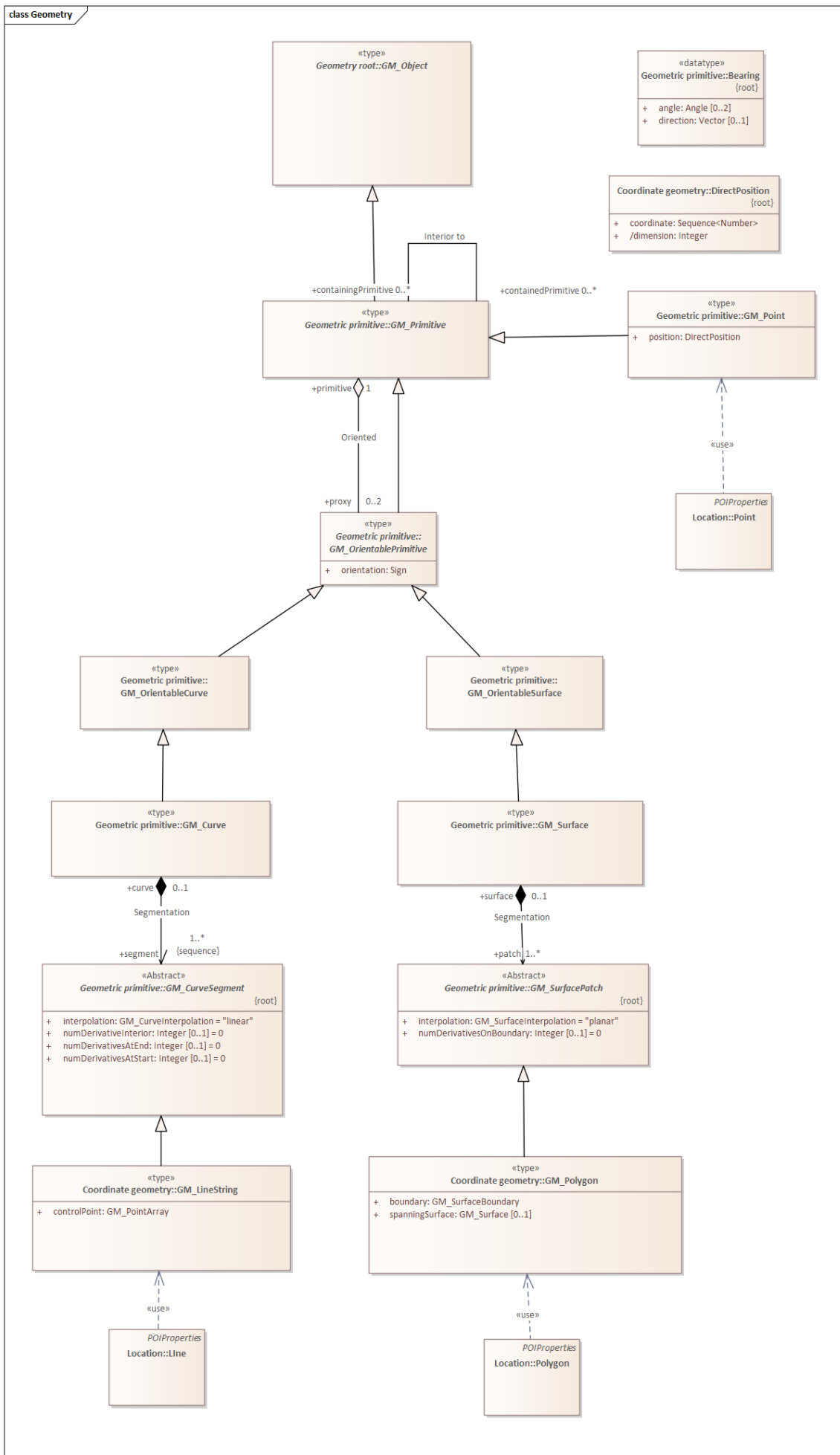


Figure 5. Geometry Model

The key classes described 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	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.

Note: Unless otherwise specified, all attributes and role names have the stereotype «Property».

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 ended to exist in the real world.

Note: Unless otherwise specified, all attributes and role names have the stereotype «Property».

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. It's 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 []	An association with representations of zero or 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 []	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 or 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.
Note: Unless otherwise specified, all attributes and role names have the stereotype «Property».		

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-symbolology

An encoding of the POI class SHALL include zero or one **symbolology** attributes.

Encodings of the **symbolology** 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»

Attribute	Value type and multiplicity	Definition
Note: Unless otherwise specified, all attributes and role names have the stereotype «Property».		

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.
Note: Unless otherwise specified, all attributes and role names have the stereotype «Property».		

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:	AnyFeature is an abstract class that is the generalization of all feature types. AnyFeature is an instance of the «metaclass» FeatureType [cf. ISO 19109].	
StereoType:	«FeatureType»	
Role name	Target class and multiplicity	Definition
	FeatureType [1..1]	

AttributeType		
Definition:	feature attribute characteristic of a feature [cf. ISO 19109].	
StereoType:	«Metaclass»	
Attribute	Value type and multiplicity	Definition
TBD	CI_Citation [0..*]	publications that describe usage of data

FeatureType		
Definition:	feature: abstraction of real world phenomena [cf. ISO 19109]. 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 instantiated as feature classes in an Application Schema	
StereoType:	«Metaclass»	
Attribute	Value type and multiplicity	Definition
TBD	CI_Citation [0..*]	publications that describe usage of data

Geometry

The following classes are defined in [\(ISO 19107: 2003\)](#)

GM_Object

Definition:	<p>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.</p>	
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< Dire ctPosition > [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: TBD

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
TBD	DirectPosition [1..1]	TBD

GM_Polygon

Definition: TBD.

Subclass Of: [GM_Primitive](#)

StereoType: «type»

Role name	Target class and multiplicity	Definition
	Point [1..1]	
TBD	GM_CompositePoint [0..*]	
Attribute	Value type and multiplicity	Definition
TBD	DirectPosition [1..1]	Definition TBD

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
browseGraphical	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_BrowseGraphi c [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
forOfficialUse Only	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: $\text{count}(\text{addressee} + \text{statement}) > 0$ (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	
	(Invariant):	
Constraint:	(MD_Metadata.metadataScope.MD_Scope.resourceScope) = ('dataset' or 'series') implies topicCategory is mandatory (Invariant):	
Role name	Target class and multiplicity	Definition
resourceMain tenance	MD_MaintenanceIn formation [0..*]	information about the frequency of resource updates, and the scope of those updates
associatedRes ource	MD_AssociatedReso urce [0..*]	associated resource information
resourceSpeci ficUsage	MD_Usage [0..*] MD_Metadata []	basic information about specific application(s) for which the resource(s) has/have been or is being used by different users

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 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 plants Examples: 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 datum Examples: 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	File type and multiplicity	Definition
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The following classes are defined in ISO 19103 Edition 1

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 constraints enforced by the Name Space) can be mapped to objects via a getObject 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
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name	GenericName [0..*]	
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Attribute	Value type and multiplicity	Definition
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acceptableClassList	TypeName	
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isGlobal	Boolean	
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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.
	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 where 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	
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	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:	<p>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:</p> <p>$\{\text{truthValue()} > 0\} = \text{possibly true}$ $\{\text{truthValue()} = 0\} = \text{never true}$</p> <p>$\{\text{truthValue()} < 1\} = \text{possibly false}$ $\{\text{truthValue()} = 1\} = \text{never false}$</p> <p>$\{\text{truthValue()} < 1\} \text{AND} \{\text{truthValue()} > 0\} = \text{uncertain}$</p>	
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	<p>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."</p> <p>In such cases a probability statement might be more appropriate, just not always available.</p> <p>Equivalent to STEP's and SQL's Unknown.</p>

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