OGC® DOCUMENT: 21-049
External identifier of this OGC® document: http://www.opengis.net/doc/IS/poi/1.0

Open Geospatial Consortium

OGC (OGC POINTS OF INTEREST)

STANDARD

DRAFT

Version: 1.0
Submission Date: 2029-03-30
Approval Date: 2029-03-30
Publication Date: 2022-07-27
Editor: Charles Heazel, Matthew Brian, John Purss

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I ABSTRACT

<Insert Abstract Text here>

II KEYWORDS

The following are keywords to be used by search engines and document catalogues.

ogcdoc, OGC document, API, openapi, html

III 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.

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IV SECURITY CONSIDERATIONS

No security considerations have been made for this document.

V SUBMITTING ORGANIZATIONS

The following organizations submitted this Document to the Open Geospatial Consortium (OGC):

- Organization One
- Organization Two

2

CONFORMANCE

2 CONFORMANCE

NOTE: this text was lifted from CityGML. It needs to be modified to address POI

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)

2.1. 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 concepts documented through ADEs.

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 ADE mechanism described in Section 10 Application Domain Extensions (ADE).

Extensions of the CityGML Conceptual Model conform with the ADE Conformance Class.

2.2. 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.

2.3. Conformance Classes

This standard identifies seventeen (17) conformance classes. One conformance class is defined for each package in the UML model. Each conformance class is defined by one requirements class. The tests in Annex A 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.

Of these seventeen conformance classes, only the Core conformance class is mandatory. All other conformance classes are optional. In the case where a conformance class has a dependency on another conformance class, that conformance class should also be implemented.

The CityGML Conceptual Model is defined by the CityGML 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.

1

SCOPE

1 SCOPE

This document describes a data model and XML[1] syntax 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[1], JSON and RDF[2].

Here is an example of a simple POI serialized in XML[1]:

```
<?xml version="1.0" encoding="UTF-8"  standalone="yes"?>
<poi id="http://www.rajsingh.org/pois/45343489">
<label term="primary">
<value>Boston</value>
</label>
<description term="source" href="http://en.wikipedia.org/wiki/Boston">
<value>Boston is the capital of and largest city in Massachusetts, and is one
of the oldest
  cities in the United States. The largest city in New England, Boston is
regarded as the
  unofficial "Capital of New England" for its economic and cultural impact on
the entire
  New England region. The city proper had a population of 617,594 according to
the 2010
  U.S. Census.
</value>
<author id="http://en.wikipedia.org" term="publisher" type="text/plain">
  <value>Wikipedia</value>
</author>
</description>
<category term="city" scheme="http://www.usgs.gov/placetypes">
<value>seat of a first-order administrative division</value>
</category>
<link term="canonical" href="http://www.rajsingh.org/pois/45343489.xml"
 type="text/xml" scheme="http://www.iana.org/assignments/link-relations/link-
relations.xml"/>
<link term="related" href="http://en.wikipedia.org/wiki/Boston"
```

[1] Are we going to bother with an XML Schema or move straight to JSON?

[2] Are we going to specify an RDF encoding?

```
 type="text/html" scheme="http://www.iana.org/assignments/link-relations/link-
relations.xml"/>
<link term="related" href="http://www.geonames.org/maps/google_42.358_-71.06.
html"
 type="text/html" scheme="http://www.iana.org/assignments/link-relations/link-
relations.xml"/>
<location>
<point term="centroid">
  <Point srsName="http://www.opengis.net/def/crs/EPSG/0/4326">
 <posList>42.358 -71.06</posList>
  </Point>
</point>
</location>
</poi>
```

Figure 1

Here is an example of a simple POI serialized in JSON[3]:

```
{
 "poi_id": {
  "value": "45343489",
  "href": "http://www.rajsingh.org/pois/45343489"
 },
 "label": {
     "type": "primary",
  "value": "Boston"
 },
 "description": {
     "type": "source",
  "value": "Boston is the capital of and largest city in Massachusetts, and
is one of the oldest cities in the United States. The largest city in New
England, Boston is regarded as the unofficial "Capital of New England" for its
economic and cultural impact on the entire New England region. The city proper
had a population of 617,594 according to the 2010 U.S. Census.",
  "href": "http://en.wikipedia.org/wiki/Boston",
  "author": "Wikipedia"
 },
 "category": {
  "type": "city",
  "value": "seat of a first-order administrative division",
  "href": "http://www.usgs.gov/placetypes"
 },
 "links": [
  {
   "href": "http://www.rajsingh.org/pois/45343489.json",
   "rel": "canonical",
   "type": "application/json",
   "title": "Canonical POI Reference",
   "hreflang": "en"
  },
  {
   "href": "http://en.wikipedia.org/wiki/Boston",
   "rel": "related",
   "type": "text/html",
   "title": "Wikipedia Reference",
   "hreflang": "en"
  },
  {
```

[3]What are we missing in this JSON schema representation?

```
    "href": "http://www.geonames.org/maps/google_42.358_-71.06.html",
    "rel": "related",
    "type": "text/html",
    "title": "Map of Boston",
    "hreflang": "en"
   }
  ],
  "location": {
   "geometry": {
       "type": "Point",
       "coordinates": [42.358, -71.06]
     },
  }
}
```


Figure 2

3

NORMATIVE REFERENCES

3 NORMATIVE REFERENCES

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

T. Berners-Lee, R. Fielding, L. Masinter: RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*. Internet Engineering Task Force (2005). https://raw.githubusercontent.com/relaton/relaton-data-ietf/master/data/reference.RFC.3986.xml

ISO: ISO 19103, *Geographic information — Conceptual schema language*. International Organization for Standardization, Geneva https://www.iso.org/standard/56734.html

ISO: ISO 19107, *Geographic information — Spatial schema*. International Organization for Standardization, Geneva https://www.iso.org/standard/66175.html

ISO: ISO 19108, *Geographic information — Temporal schema*. International Organization for Standardization, Geneva https://www.iso.org/standard/26013.html

ISO: ISO 19109, *Geographic information — Rules for application schema*. International Organization for Standardization, Geneva https://www.iso.org/standard/59193.html

ISO: ISO 19111, *Geographic information — Referencing by coordinates*. International Organization for Standardization, Geneva https://www.iso.org/standard/74039.html

Cliff Kottman and Carl Reed: OGC 08-126, *Topic 5 — Features*. Open Geospatial Consortium (2009). https://portal.ogc.org/files/?artifact_id=29536

OGC: The OpenGIS™ Abstract Specification Topic 8: Relationships Between Features, OGC document 99-108r2

OGC: The OpenGIS™ Abstract Specification Topic 10: Feature Collections, OGC document 99-110

4

TERMS AND DEFINITIONS

4 TERMS AND DEFINITIONS

No terms and definitions are listed in this document.

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 1: A *location* identifies a geographic *place*.

NOTE 2: *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 3: *Locations* can be a single point, a centroid, a minimum bounding rectangle, or a set of vectors.

NOTE 4: A *location* should be persistent over time and does not change.

NOTE 5: Multiple *POIs* may share the same *location*.

NOTE 6: When a *POI* physically moves it is understood to have acquired a new *location*.

[**SOURCE:** , Clause 3.1.3]

point 0-dimensional geometric primitive, representing a *position*

[**SOURCE:**]

point of interest

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

NOTE 7: A *POI* is typically identified by *name* rather than by an *address*.

NOTE 8: A *POI* is characterized by *type*, which may be used as a *reference point* or a target in a *location* based service request.

NOTE 9: A *POI* does not exclude the labeling, identification, and tracking of persons and other physical objects that have no permanent location.

Example : destination of a route; such as, Boston

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

[**SOURCE:**]

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.

codelist	A value domain including a code for each permissible value.
conceptual model	model that defines concepts of a universe of discourse

[**SOURCE:**]

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.

[**SOURCE:**]

Platform Independent Model:

a model that is independent of a specific platform

[**SOURCE:**]

Platform Specific Model:

a model of a system that is defined in terms of a specific platform

[**SOURCE:**]

5

CONVENTIONS

5 CONVENTIONS

5.1. Identifiers

The normative provisions in this document are denoted by the URI

http://www.opengis.net/spec/POI/1d.0

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

5.2. 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 Figure 3.

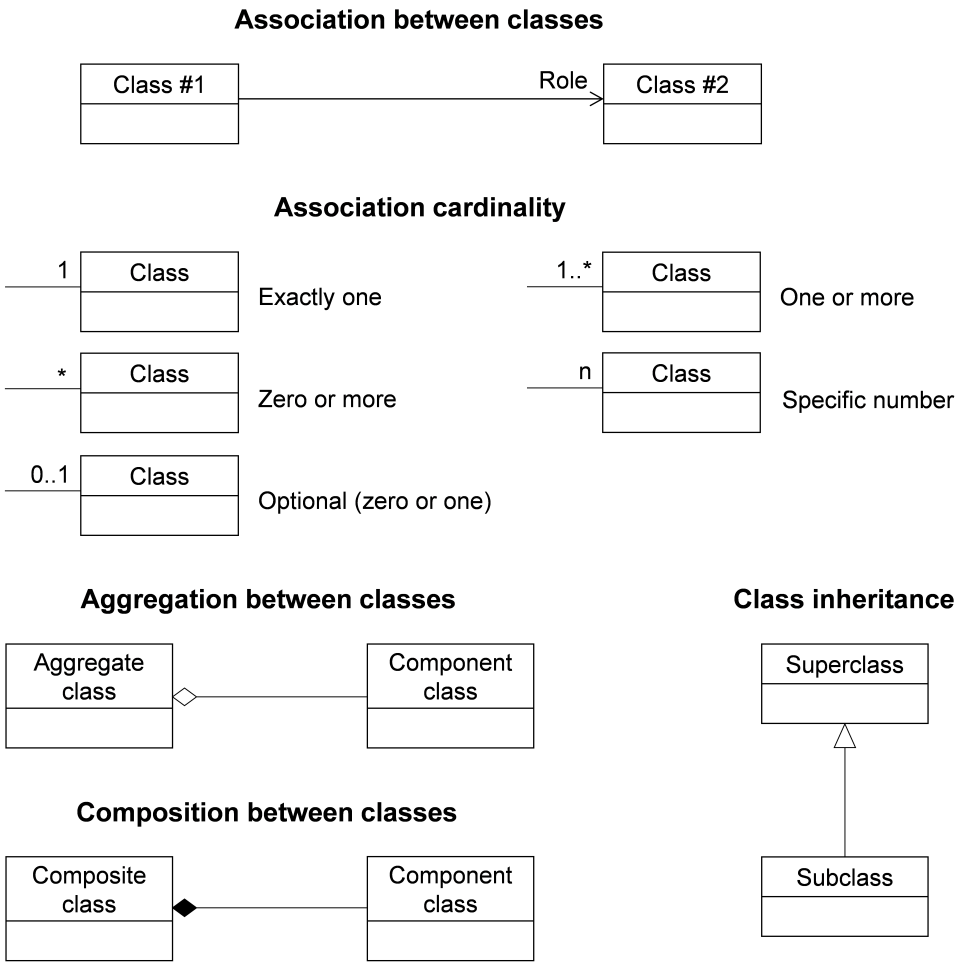


Figure 3 — UML notation (see ISO TS 19103, Geographic information - Conceptual schema language).

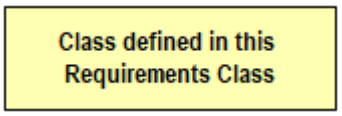
All associations between model elements in the POI Conceptual Model are uni-directional. Thus, associations in the model are navigable in only one direction. The direction of navigation is depicted by an arrowhead. In general, the context an element takes within the association is indicated by its role.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

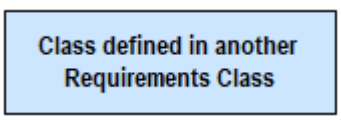
- «ApplicationSchema» denotes a conceptual schema for data required by one or more applications. In the POI Conceptual Model, every module is defined as a separate application schema to allow for modularization.
- «FeatureType» represents features that are similar and exhibit common characteristics. 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.
- «Version» denotes that the value of an association role that ends at a feature type is a specific version of the feature, not the feature in general.

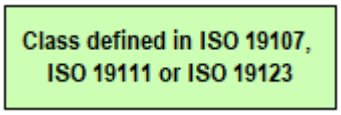
In order to enhance the readability of the POI UML diagrams, classes are depicted in different colors. The following coloring scheme is applied:



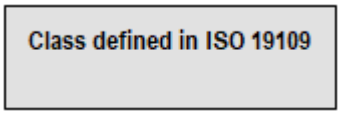
Classes painted in yellow belong to the Requirements Class which is subject of discussion in that clause of the standard in which the UML diagram is given. For example, in the context of [rc_core_section], which introduces the *CityGML Core* module, the yellow color is used to denote classes that are defined in the *CityGML Core* Requirements Class. Likewise, the yellow classes shown in the UML diagram in [rc_building-model_section] are associated with the *Building* Requirements Class that is subject of discussion in that chapter.



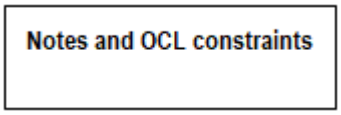
Classes painted in blue belong to a Requirements Class different to that associated with the yellow color. In order to explicitly denote to which Requirements Class these classes belong, their class names are preceded by the UML package name of that Requirements Class. For example, in the context of the *Building* Requirements Class, classes from the *CityGML Core* and the *Construction* Requirements Classes are painted in blue and their class names are preceded by *Core* and *Construction*, respectively.



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 Figure 4 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.

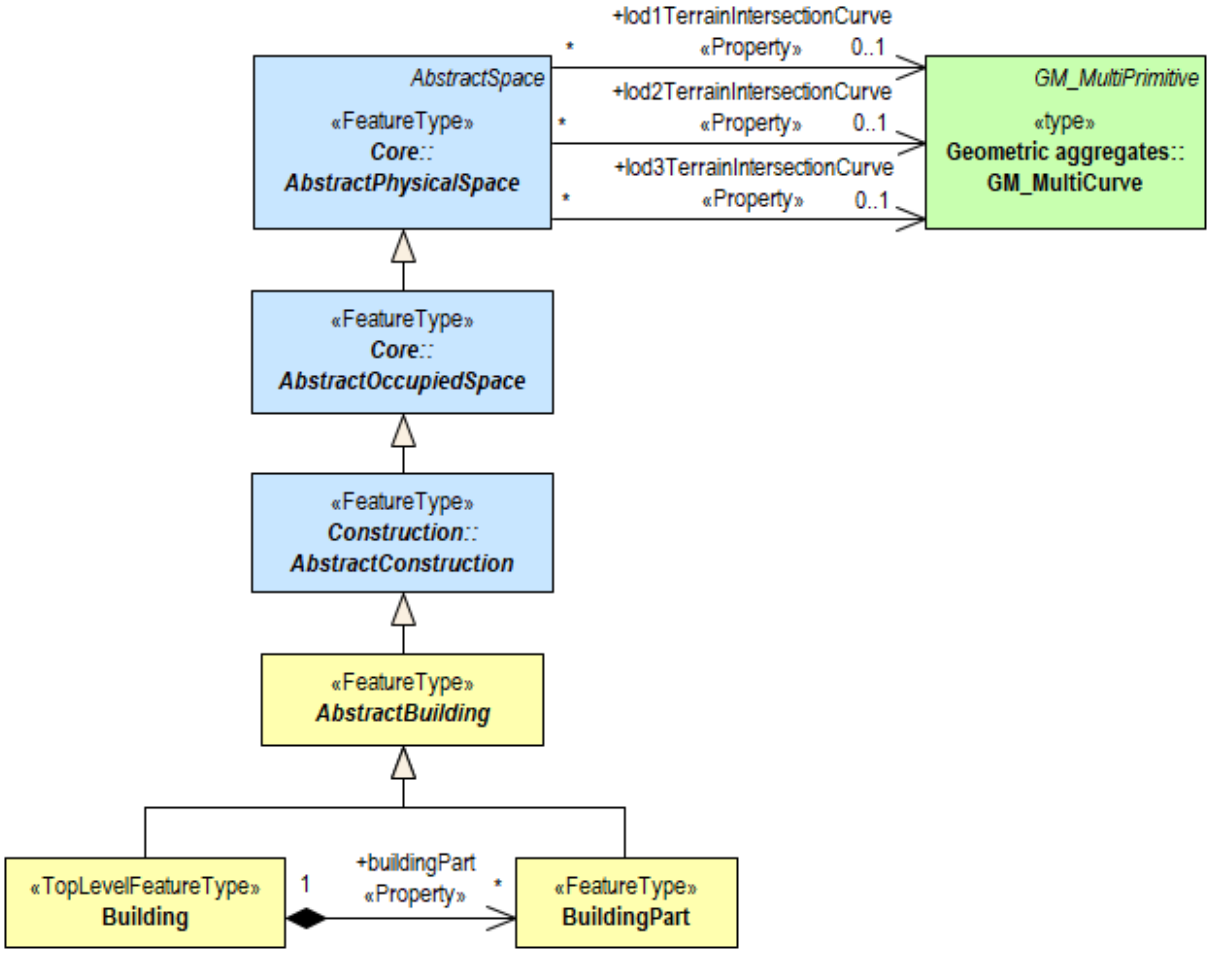


Figure 4 — Example UML diagram demonstrating the UML notation and coloring scheme used throughout the CityGML Standard.

6

POI

6 POI

6.1. Class 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.

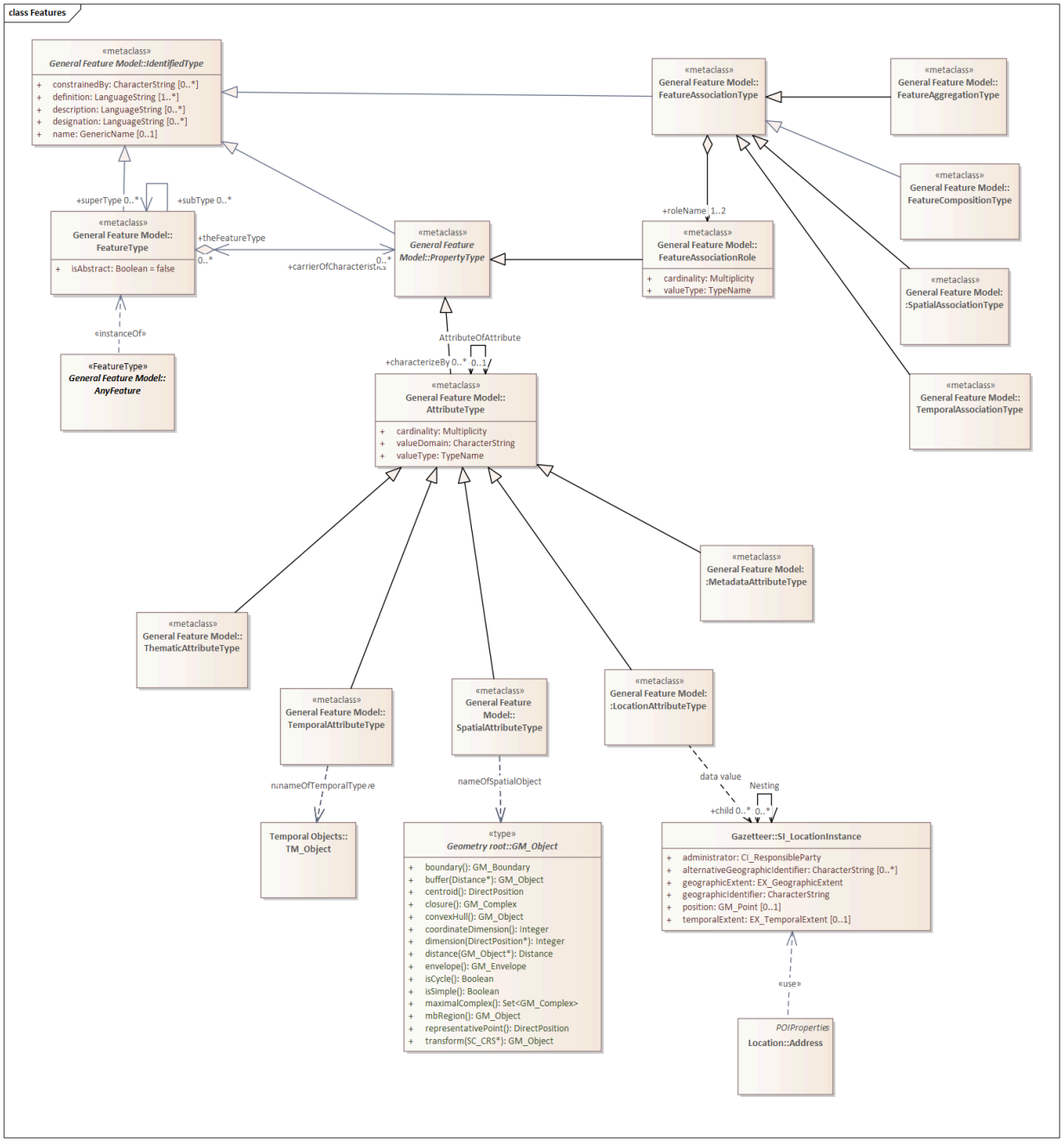


Figure 5 — Feature Model

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

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

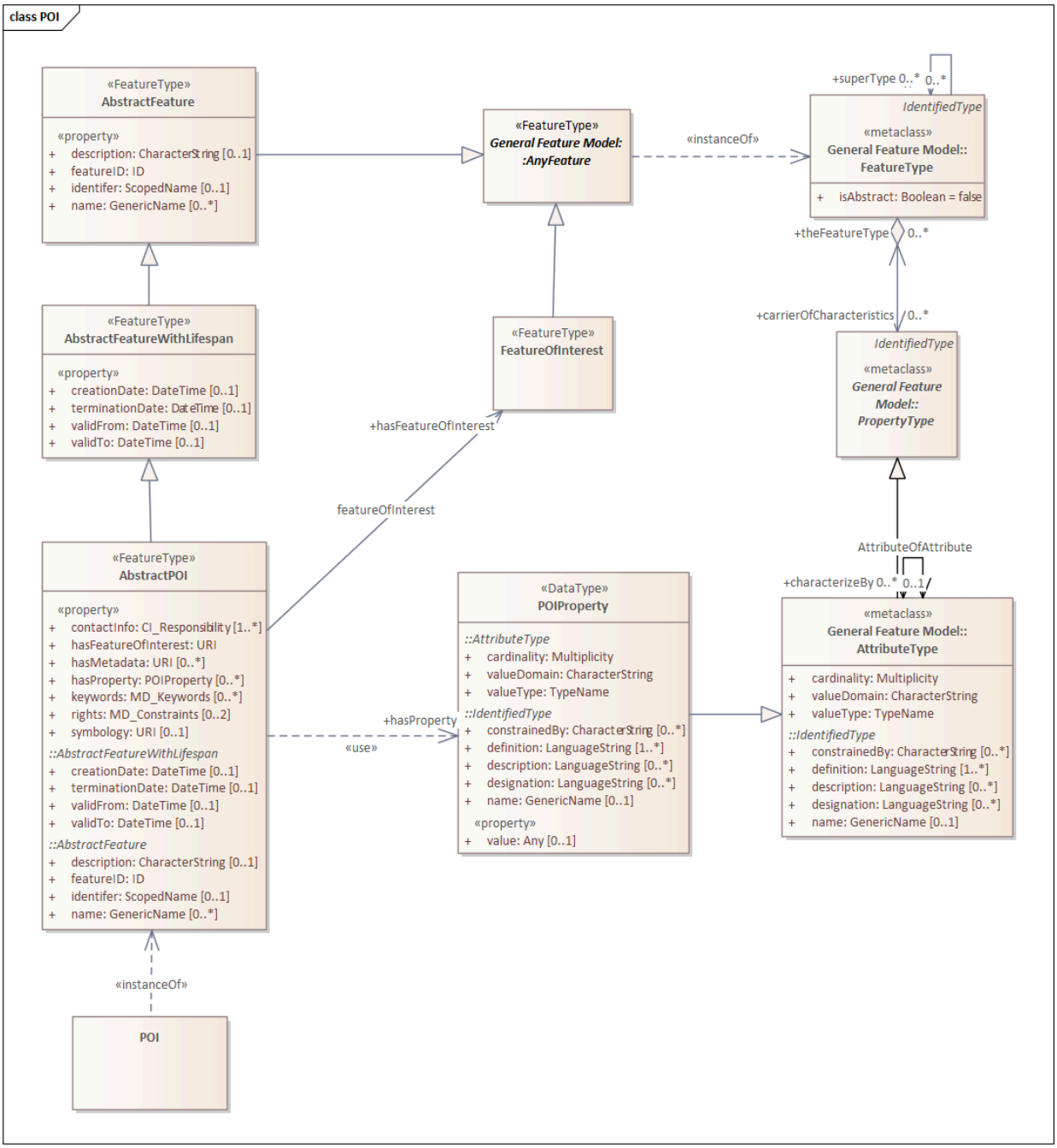


Figure 6 — POI UML Model

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 copied 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.

6.2. 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.

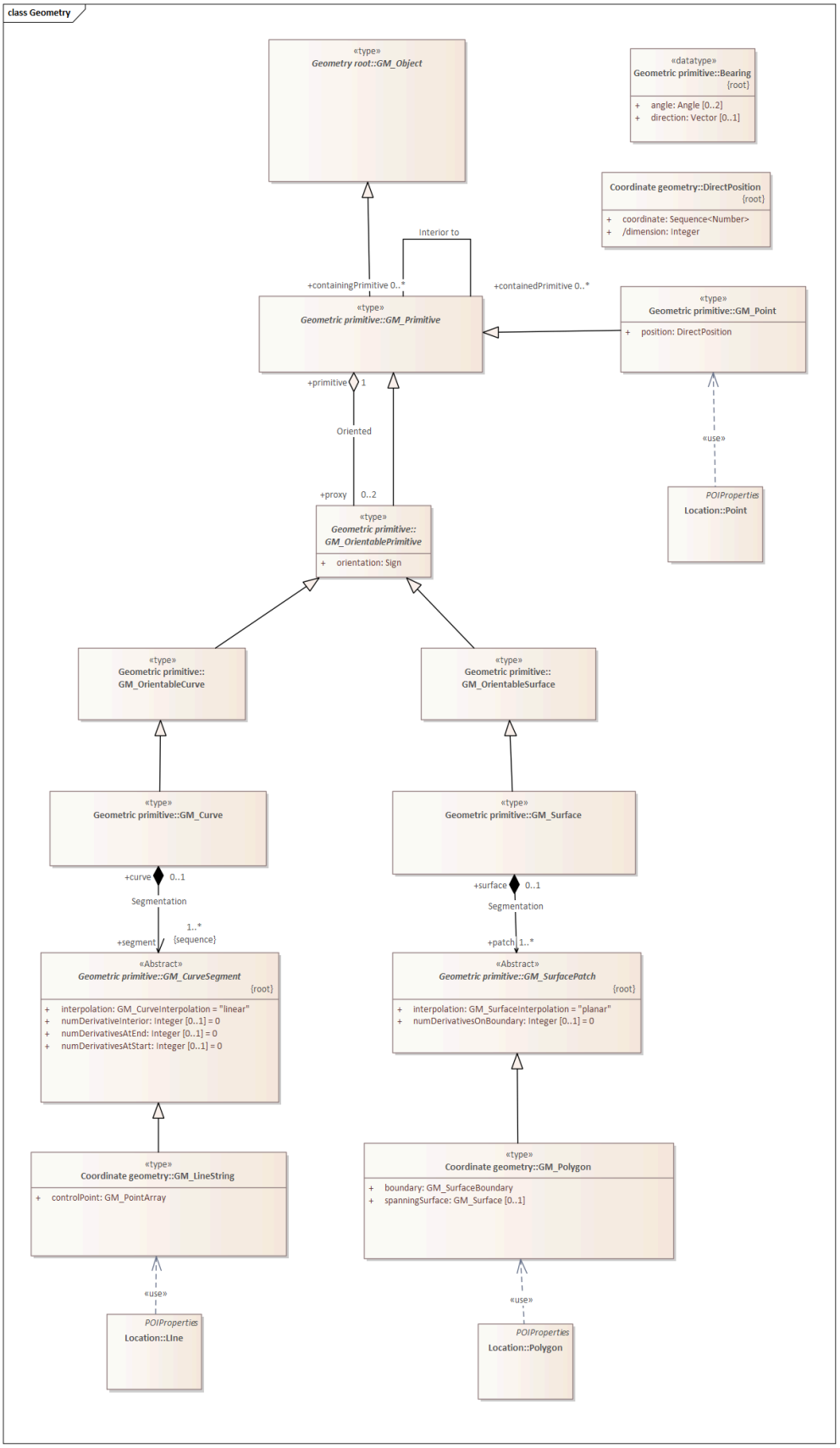


Figure 7 — Geometry Model

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.

6.3. 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.

Table 1

AbstractFeature

Definition:	AbstractFeature is the abstract superclass of all feature types within the PoI Model.
Subclass of:	<<←section,>>
Stereotype:	«FeatureType»

ROLE NAME	TARGET CLASS AND MULTIPLICITY	DEFINITION

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».

Table 2

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:	<<←section,>>
Stereotype:	«FeatureType»

ROLE NAME	TARGET CLASS AND MULTIPLICITY	DEFINITION

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».

Table 3

AbstractPOI

Definition:	A POI is defined as having the following conceptual properties: · a globally unique ID · labels · descriptions · location · tags/keywords/categories · links to related information · time · authors · rights · metadata While a POI may be near meaningless without a label and location, from a computational perspective there are use cases in which any of these properties should be optional. Therefore, the only mandatory characteristic of a POI is that it have a globally unique identification property in the format of a URI.
Subclass of:	<<←section,>>
Stereotype:	«FeatureType»

ROLE NAME	TARGET CLASS AND MULTIPLICITY	DEFINITION
hasProperty	POIProperty []	
hasFeature OfInterest	FeatureOfInterest []	

ATTRIBUTE	VALUE TYPE AND MULTIPLICITY	DEFINITION
contactInfo «property»	CI_Responsibility [1..*]	
hasFeature OfInterest «property»	URI	
hasMetadata «property»	URI [0..*]	
hasProperty «property»	POIProperty [0..*]	
keywords «property»	MD_Keywords [0..*]	
rights «property»	MD_Constraints [0..2]	
symbology «property»	URI [0..1]	

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

Table 4

FeatureOfInterest

Definition:

Subclass of: <<section,>>

Stereotype: «FeatureType»

ROLE NAME	TARGET CLASS AND MULTIPLICITY	DEFINITION
describedBy	FeatureModel []	

ATTRIBUTE	VALUE TYPE AND MULTIPLICITY	DEFINITION

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

Table 5

POIProperty

Definition:

Subclass of: <<←section,>>

Stereotype: «DataType»

ROLE NAME	TARGET CLASS AND MULTIPLICITY	DEFINITION

ATTRIBUTE	VALUE TYPE AND MULTIPLICITY	DEFINITION
value «property»	Any [0..1]	

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

7

MEDIA TYPES FOR ANY DATA ENCODING(S)

7 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::21-049/./sections/clause_12_security_considerations.adoc[]

A

ANNEX A (INFORMATIVE) REVISION HISTORY

A ANNEX A (INFORMATIVE) REVISION HISTORY

Table A.1

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

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