INTERNATIONAL STANDARD

ISO 19115

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Geographic information — Metadata

Information géographique — Métadonnées

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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

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

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Introduction

A revival in the awareness of the importance of geography and how things relate spatially, combined with the advancement of electronic technology, have caused an expansion in the use of digital geographic information and geographic information systems worldwide. Increasingly, individuals from a wide range of disciplines outside of the geographic sciences and information technologies are capable of producing, enhancing, and modifying digital geographic information. As the number, complexity, and diversity of geographic datasets grow, a method for providing an understanding of all aspects of this data grows in importance.

Digital geographic data is an attempt to model and describe the real world for use in computer analysis and graphic display of information. Any description of reality is always an abstraction, always partial, and always just one of many possible "views". This "view" or model of the real world is not an exact duplication; some things are approximated, others are simplified, and some things are ignored. There is seldom perfect, complete, and correct data. To ensure that data is not misused, the assumptions and limitations affecting the creation of data must be fully documented. Metadata allows a producer to describe a dataset fully so that users can understand the assumptions and limitations and evaluate the dataset's applicability for their intended use.

Typically, geographic data is used by many people other than the producer. It is often produced by one individual or organization and used by another. Proper documentation will provide those unfamiliar with the data with a better understanding, and enable them to use it properly. As geographic data producers and users handle more and more data, proper documentation will provide them with a keener knowledge of their holdings and will allow them to better manage data production, storage, updating, and reuse.

The objective of this International Standard is to provide a structure for describing digital geographic data. This International Standard is intended to be used by information system analysts, program planners, and developers of geographic information systems, as well as others in order to understand the basic principles and the overall requirements for standardization of geographic information. This International Standard defines metadata elements, provides a schema and establishes a common set of metadata terminology, definitions, and extension procedures. When implemented by a data producer, this International Standard will:

1) Provide data producers with appropriate information to characterize their geographic data properly.

2) Facilitate the organization and management of metadata for geographic data.

3) Enable users to apply geographic data in the most efficient way by knowing its basic characteristics.

4) Facilitate data discovery, retrieval and reuse. Users will be better able to locate, access, evaluate, purchase and utilize geographic data.

5) Enable users to determine whether geographic data in a holding will be of use to them.

This International Standard defines general-purpose metadata, in the field of geographic information. More detailed metadata for geographic datatypes and geographic services are defined in other ISO 19100 series standards and user extensions.

Geographic information — Metadata

1 Scope

This International Standard defines the schema required for describing geographic information and services. It provides information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.

This International Standard is applicable to:

— the cataloguing of datasets, clearinghouse activities, and the full description of datasets;

— geographic datasets, dataset series, and individual geographic features and feature properties.

This International Standard defines:

— mandatory and conditional metadata sections, metadata entities, and metadata elements;

— the minimum set of metadata required to serve the full range of metadata applications (data discovery, determining data fitness for use, data access, data transfer, and use of digital data);

— optional metadata elements – to allow for a more extensive standard description of geographic data, if required;

— a method for extending metadata to fit specialized needs.

Though this International Standard is applicable to digital data, its principles can be extended to many other forms of geographic data such as maps, charts, and textual documents as well as non-geographic data.

NOTE Certain mandatory metadata elements may not apply to these other forms of data.

2 Conformance

2.1 Conformance requirements

Metadata shall be provided as specified in Clause 6 and Annexes A and B.

User-defined metadata shall be defined and provided as specified in Annex C.

Any metadata claiming conformance with this International Standard shall pass the requirements described in the abstract test suite presented in Annex D.

2.2 Metadata Profiles

Any profile conforming to this International Standard shall conform to the rules in Annex C, Clause C.6.

2.3 Obligation and condition

For the purposes of conformance testing using the abstract test suite in Annex D, metadata entities and elements shall be considered to be mandatory, conditional or optional as specified in the applicable profile.

3 Normative references

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

ISO 639 (all parts), *Code for the representation of names of languages*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

ISO 4217:2001, *Codes for the representation of currencies and funds*

ISO 8859 (parts 1 to 16), *Information technology — 8-bit single-byte coded graphic character sets*

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

ISO/IEC 10646-1, *Information technology — Universal Multiple-Octet Coded Character Set (UCS) — Part 1: Architecture and Basic Multilingual Plane*

ISO/IEC 11179 (all parts), *Information technology — Specification and standardization of data elements*

ISO 19106:—[1], *Geographic information — Profiles*

ISO 19107:—[1], *Geographic information — Spatial schema*

ISO 19108:2002, *Geographic information — Temporal schema*

ISO 19109:—[1], *Geographic information — Rules for application schema*

ISO 19110:—[1], *Geographic information — Methodology for feature cataloguing*

ISO 19111:2003, *Geographic information — Spatial referencing by coordinates*

ISO 19112:—[1], *Geographic information — Spatial referencing by geographic identifiers*

ISO 19113:2002, *Geographic information — Quality principles*

ISO 19114:—[1], *Geographic information — Quality evaluation procedures*

ISO 19117:—[1], *Geographic information — Portrayal*

ISO 19118:—[1], *Geographic information — Encoding*

1) To be published.

4 Terms and definitions

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

NOTE The terms and definitions used in conjunction with the UML models are addressed in Clause 5.

4.1
data type
specification of a value domain with operations allowed on values in this domain [ISO 19103]

EXAMPLE Integer, Real, Boolean, String, Date, and GM_Point.

NOTE A data type is identified by a term, e.g. Integer.

4.2
dataset
identifiable collection of data

NOTE A dataset may be a smaller grouping of data which, though limited by some constraint such as spatial extent or feature type, is located physically within a larger dataset. Theoretically, a dataset may be as small as a single feature or feature attribute contained within a larger dataset. A hardcopy map or chart may be considered a dataset.

4.3
dataset series
collection of datasets sharing the same product specification

4.4
grid
network composed of two or more sets of curves in which the member of each set intersect the members of the other sets in an algorithmic way [ISO 19123]

4.5
metadata
data about data

4.6
metadata element
discrete unit of metadata

NOTE 1 Metadata elements are unique within a metadata entity.

NOTE 2 Equivalent to an attribute in UML terminology.

4.7
metadata entity
set of metadata elements describing the same aspect of data

NOTE 1 May contain one or more metadata entities.

NOTE 2 Equivalent to a class in UML terminology.

4.8
metadata section
subset of metadata which consists of a collection of related metadata entities and metadata elements

NOTE Equivalent to a package in UML terminology.

4.9
model
abstraction of some aspects of a universe of discourse [ISO 19109]

4.10
resource
asset or means that fulfils a requirement

EXAMPLE Dataset, service, document, person or organization.

4.11
temporal reference system
reference system against which time is measured [ISO 19108]

5 Symbols and abbreviated terms

5.1 Abbreviations

DTD	Document Type Definition
IDL	Interface Definition Language
OCL	Object Constraint Language
SGML	Standard Generalized Markup Language
UML	Unified Modelling Language
XML	Extensible Markup Language

5.2 UML notations

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

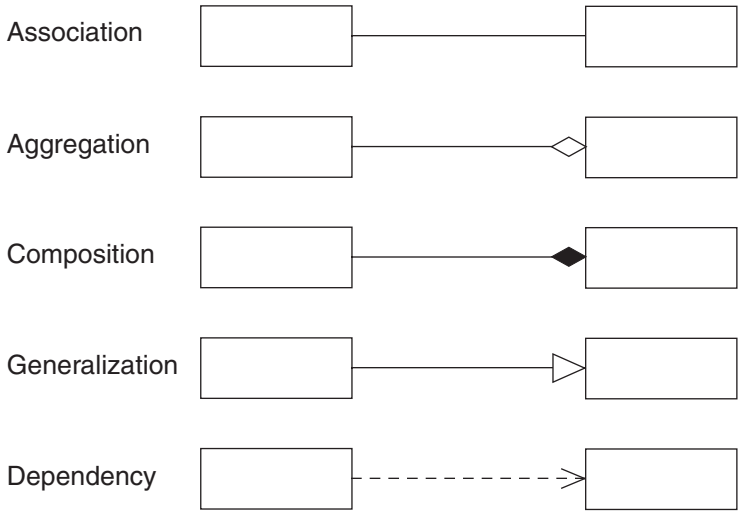

Figure 1 — UML notation

5.3 UML model relationships

5.3.1 Associations

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

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

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

5.3.2 Generalization

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

5.3.3 Instantiation/Dependency

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

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

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

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

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

5.3.4 Roles

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

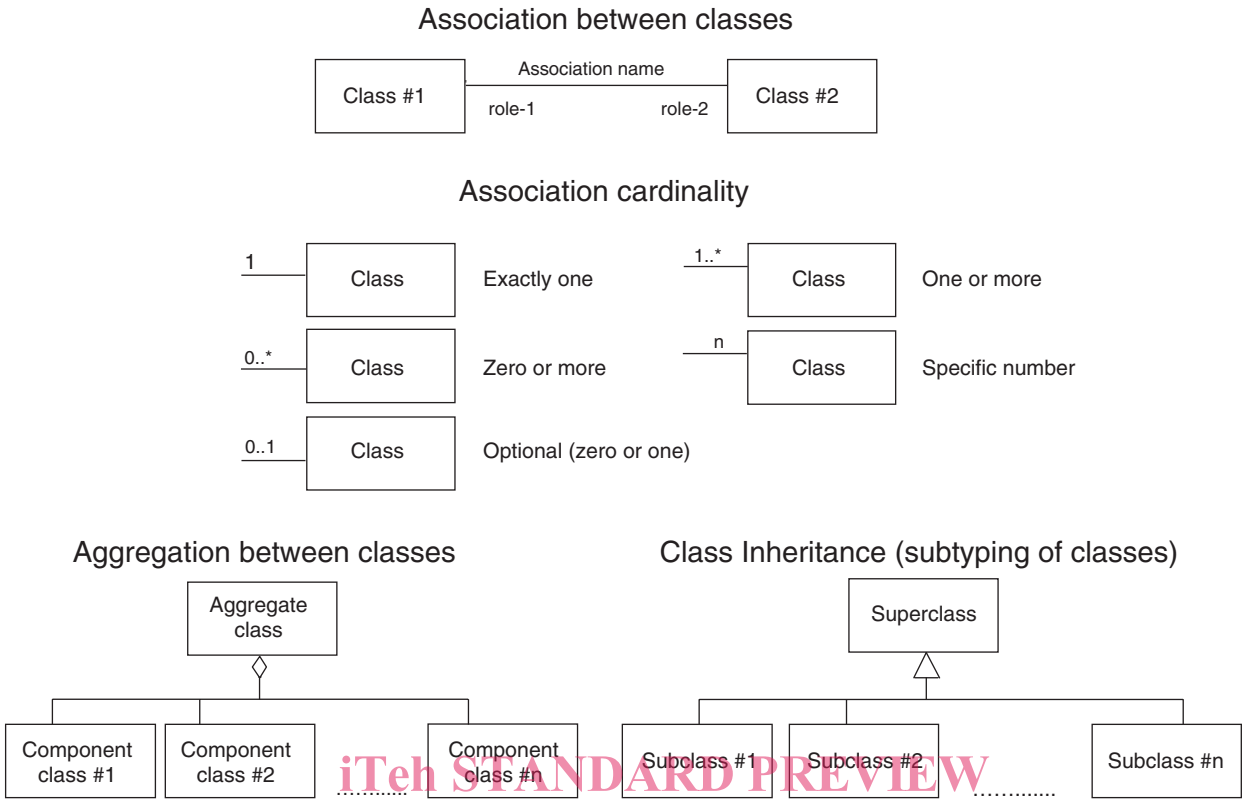

Figure 2 — UML roles

5.4 UML model stereotypes

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

In this International Standard the following stereotypes are used:

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

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

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

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

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

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

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

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

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

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

5.5 Package abbreviations

Two letter abbreviations are used to denote the package that contains a class. Those abbreviations precede class names, connected by a "_". The standard that those classes are located in is indicated in parentheses. A list of those abbreviations follows.

CC Changing Coordinates (ISO 19111)

CI Citation (ISO 19115)

CV Coverages (ISO 19123)

DQ Data quality (ISO 19115)

DS Dataset (ISO 19115)

EX Extent (ISO 19115)

FC Feature Catalogue (ISO 19110)

FE Feature (ISO 19109)

FT Feature Topology (ISO 19107)

GF General Feature (ISO 19109)

GM Geometry (ISO 19107)

GR Graph (ISO 19107)

LI Lineage (ISO 19115)

MD Metadata (ISO 19115)

PF Feature Portrayal (ISO 19117)

PS Positioning Services (ISO 19116)

RS Reference System (ISO 19115)

SC Spatial Coordinates (ISO 19111)