

Geographic information — Terminology

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National foreword

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This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the international organization responsible for its conversion to an international standard. A review of this publication will be initiated not later than 3 years after its publication by the international organization so that a decision can be taken on its status. Notification of the start of the review period will be made in an announcement in the appropriate issue of Update Standards.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into an international Standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent to the Secretary of the responsible BSI Technical Committee at British Standards House, 389 Chiswick High Road, London W4 4AL.

The UK participation in its preparation was entrusted to Technical Committee IST/36, Geographic information.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Contents

Page

Foreword	iv
Introduction.....	v
1 Scope.....	1
2 Conformance	1
3 Normative references.....	1
4 Terms and definitions	1
5 Abbreviated terms.....	4
6 Criteria for the selection of concepts.....	4
7 Structure of the terminological record.....	4
7.1 Record content	4
7.2 Mandatory data fields	5
7.3 Term equivalents	5
Annex A (normative) Maintenance of the Terminology Repository	6
A.1 Introduction	6
A.2 Terminology Repository	6
A.3 Terminology status review process	7
Annex B (normative) Terms and Definitions from ISO/TC 211 International Standards and Technical Specifications	11
Annex C (normative) Principles for definition writing	95
C.1 Basic principles	95
C.2 Developing definitions	95
Bibliography.....	97
Alphabetical index.....	99

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 19104 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Introduction

This Technical Specification, along with a repository of geographic information system (GIS) terminology in the form of a terminological database, is expected to be a central reference for the shared language between participants and users alike. It defines the criteria for including concepts in the vocabulary, specifies the terminological data to be recorded, and, within the electronically processable repository, introduces an initial set of concepts with definitions that will be subject to ongoing maintenance.

This Technical Specification describes the structure of entries and the types of terminological data that are to be recorded. In addition, it includes principles for definition writing as outlined in ISO 10241 and ISO 704. The structure of a terminological record is given in Clause 7.

Geographic information — Terminology

1 Scope

This Technical Specification is applicable to international communication in the field of geographic information.

This Technical Specification provides the guidelines for collection and maintenance of terminology in the field of geographic information. It establishes criteria for selection of concepts to be included in other standards concerning geographic information, which are developed by ISO/TC 211, specifies the structure of the terminological record, and describes the principles for definition writing.

This Technical Specification also lays down the guidelines for maintenance of a Terminology Repository (see Annex A).

2 Conformance

Any product that claims conformance with this Technical Specification shall comply with the requirements described in the normative clauses and annexes.

Where a new term has been created for an existing concept, or an existing term has been incorrectly applied, the candidate document shall not be in conformance. Concepts and their definitions may be included with the candidate terms until conformance is demonstrated.

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 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

ISO 704, *Terminology work — Principles and methods*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 10241, *International terminology standards — Preparation and layout*

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

4 Terms and definitions

The core list of terms and definitions from the ISO/TC 211 geographic information International Standards and Technical Specifications is given in Annex B.

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

4.1

abbreviation

designation formed by omitting words or letters from a longer form and designating the same **concept**

[ISO 1087-1:2000]

4.2

admitted term

term rated according to the scale of the term acceptability rating as a synonym for a **preferred term**

[ISO 1087-1:2000]

4.3

concept

unit of knowledge created by a unique combination of characteristics

[ISO 1087-1:2000]

NOTE Concepts are not necessarily bound to particular languages. They are, however, influenced by the social or cultural background which often leads to different categorizations.

4.4

concept harmonization

activity leading to the establishment of a correspondence between two or more closely related or overlapping **concepts** having professional, technical, scientific, social, economic, linguistic, cultural or other differences, in order to eliminate or reduce minor differences between them

[ISO 860:2007]

NOTE The purpose of concept harmonization is to improve communication.

4.5

concept system

set of **concepts** structured according to the relations among them

[ISO 1087-1:2000]

4.6

definition

representation of a **concept** by a descriptive statement which serves to differentiate it from related concepts

[ISO 1087-1:2000]

4.7

deprecated term

term rated according to the scale of the term acceptability rating as undesired

[ISO 1087-1:2000]

4.8

designation

designator

representation of a **concept** by a sign which denotes it

NOTE In terminology work, three types of designations are distinguished: symbols, appellations and **terms**.

[ISO 1087-1:2000]

4.9

extension

totality of **objects** to which a **concept** corresponds

[ISO 1087-1:2000]

4.10

language

system of signs for communications, usually consisting of vocabulary and rules

[ISO 5127-1]

NOTE In this Technical Specification, language refers to natural language or special languages but not to programming languages or artificial languages unless specifically identified.

4.11

language identifier

information in a terminological entry which indicates the name of a **language**

[ISO 1087-1:2000]

4.12

obsolete term

term which is no longer in common use

[ISO 1087-1:2000]

4.13

preferred term

term rated according to the scale of the term acceptability rating as the primary term for a given **concept**

[ISO 1087-1]

4.14

subordinate concept

narrower concept

concept which is either a specific concept or a partitive concept

[ISO 1087-1:2000]

4.15

term

verbal **designation** of a general **concept** in a specific subject field

[ISO 1087-1]

NOTE A term may contain symbols and can have variants, e.g. different forms of spelling.

4.16

term equivalent

term in another **language** which designates the same **concept**

NOTE A term equivalent should be accompanied by a **definition** of the designated concept expressed in the same language as the term equivalent.

4.17

term instance classification

classification identifying the status of a **term**

4.18

terminological record

structured collection of terminological data relevant to one **concept**

4.19

terminological record identifier

unique, unambiguous, and linguistically neutral identifier assigned to a **terminological record**

4.20

terminology repository

data store or document in which **terms** and their associated **definitions** are stored or recorded

5 Abbreviated terms

CD	committee draft
DIS	draft International Standard
FDIS	final draft International Standard
GIS	geographic information system
IT	information technology
IUT	implementation under test
ODP	open distributed processing
PT	project team
TC	technical committee
TMG	terminology maintenance group
WD	working draft
WG	working group

6 Criteria for the selection of concepts

Any concept requiring a definition for the clarity of reading of any of the ISO/TC 211 geographic information International Standards or Technical Specifications shall be included in that document and within Annex B of this Technical Specification, subject to the following conditions:

- the term that represents the concept is not a trade name, name of research project, or colloquial term (local informal term to describe a formal term e.g. “guy” instead of “man”);
- the concept is not selected if its definition in general language dictionaries corresponds to its definition in the field of geographic information;
- only concepts with a single definition are included;
- the concept is central to understanding the standard and is not self-explanatory.

7 Structure of the terminological record

7.1 Record content

The terminological record may contain the following terminological data fields, in the order listed below:

- record number – a terminological record identifier;

- b) entry language identifier – the code representing natural language utilized for the terminological record based on ISO 639-2;
- c) preferred term;
- d) abbreviation – if preferred, the abbreviation shall precede the full form, otherwise an abbreviated form shall follow the full form;
- e) admitted term(s) – if these are national variants, they shall be followed by a code as defined in ISO 3166-1; the numeric 3-digit code is used for the IT interface (i.e. stored in the database), while the meaning of this code is presented in the human language used by the user (i.e. the human interface);
- f) definition – if taken from another normative document, a reference shall be added in square brackets after the definition; or, if referring to another concept in the vocabulary, that concept shall be named by its preferred term and presented in bold face characters; the principles for definition writing are given in ISO 704 (see Annex C);
- g) deprecated or obsolete terms (in alphabetical order);
- h) references to related entries;
- i) examples of term usage;
- j) notes – may be used to provide additional information (if a definition has been adapted from a source, this may be explained in a note);
- k) term instance status (for online repository only);
- l) beginning date of the instance (for online repository only) (see ISO 19108);
- m) ending date of the instance (for online repository only) (see ISO 19108).

Provision shall be made for specifying language identifiers and, if needed, country codes for equivalents in other languages.

7.2 Mandatory data fields

The following terminological data fields are mandatory for a terminological record. The rest of the data fields listed in 7.1 are optional.

- a) entry number;
- b) preferred term;
- c) definition;
- d) beginning date of the instance;
- e) term instance status (for online repository only).

7.3 Term equivalents

Term equivalents in national languages may be submitted by national bodies and class A liaisons to the Terminology Maintenance Group for consideration. Term equivalents shall be preceded by:

- a) the numeric 3 character country code as defined in ISO 3166-1, if needed;
- b) the language code as defined in ISO 639-2 (e.g. “fra” for French, “deu” for German);

Annex A (normative)

Maintenance of the Terminology Repository

A.1 Introduction

A Terminology Repository will be maintained by the TMG, see A.3.1. Maintenance mechanisms have been developed that will

- enable proposed terms (and their associated definitions) to be added to, or amended in, the Terminology Repository as required, and
- facilitate the assessment and harmonization of proposed terms prior to their parent draft standards becoming final.

A.2 Terminology Repository

A.2.1 Overview

A Terminology Repository shall be maintained for ISO geographic information standards.

The Terminology Repository shall take the form of an online computer database.

Online read-only access will be available to all ISO/TC 211 members. Write and update access will be available to WG convenors, PT leaders and editors. Public access to terms and definition that appear in published ISO/TC 211 International Standards shall be made available. All terms (existing and proposed) defined in ISO geographic information standards and drafts shall be included in the Terminology Repository.

A.2.2 Terminology entry and update

The relevant WG convenor or PT leader will be responsible for electronically submitting all terms and definitions from a new ISO geographic information standard WD, CD, DIS or FDIS to the Repository. The person responsible for entering the term shall also be responsible for entering the status of the term and any related useful terms from outside ISO/TC 211.

All concepts, terms and definitions submitted to the Terminology Repository shall satisfy the criteria for the selection of concepts as specified in Clause 6.

All terminological records shall be structured as specified in Clause 7.

At the time of entry to the Repository, terms shall be classified as being Candidate, regardless of whether the same term is classified as being Draft or Harmonized elsewhere in the Repository.

A.2.3 Attribution and classification of terms

Every term in the Terminology Repository shall be accompanied by its parent document's ISO standard number (for example, ISO 19107) where applicable, the document type (for example, WD or CD) and the date of entry. A term may also have a status type indicating that it is to be deleted or requires harmonization. Specific fields will be included in each Terminology Repository record to accommodate this information.

Each term in the Terminology Repository shall be assigned one of the following six status types.

- Candidate – newly entered term, or a term that is associated with multiple definitions and/or concepts.

- Draft – term that appears in a single draft ISO geographic information standard and that conforms to the “one term, one definition, one concept” principle.
- Harmonized – term that appears in multiple ISO geographic information draft standards but for which the “one term, one definition, one concept” principle has been negotiated by the relevant working groups.
- Normative – term that has already been published in an International Standard or Technical Specification and does not conflict with the terms and definitions in the ISO geographic information standards.
- Normative/Conflict – term that has been published in more than one International Standard or Technical Specification with different definitions in different standards.
- Deleted – term that has been identified for deletion from the repository.

These status types will be assigned to a code list to be referred to as “term instance classification” as illustrated in Table A.1.

Table A.1 — Term instance status

Instance status code	Status type
001	Candidate
002	Draft
003	Harmonized
004	Normative
005	Normative/Conflict
006	Deleted

Progression of a term from Candidate to Draft to Harmonized status will depend on either

- an assessment by the TMG, or
- harmonization consultations between affected working groups.

Draft or Harmonized status indicates that significant stability has been achieved as regards the term and its definition. Progression to Normative status can only occur when the term, with its associated definition, is published in an International Standard or Technical Specification.

A.2.4 Authority of the Terminology Repository

The Terminology Repository and its associated maintenance processes are not a substitute for normal ISO practices in relation to standards development. The Repository provides a summary for existing and proposed ISO/TC 211 terminology and helps facilitate harmonization where necessary. The Candidate, Draft and Harmonized status types have no official meaning or authority beyond the Terminology Repository.

A.3 Terminology status review process

A.3.1 Terminology Maintenance Group (TMG)

Assessment of Candidate terms shall be the responsibility of the TMG.

The TMG shall comprise:

- a convenor;
- at least two members from each ISO/TC 211 working group (preferably representing different national bodies); ideally there should be more than one language represented;

- additional members as necessary to ensure the representation of at least two languages, the inclusion of terminology expertise and the engagement of national bodies and liaisons.

Membership of the TMG shall be for a two-year term or for the balance of a two-year term in the case of a working group that is established part-way through a term. Each term shall commence on 1st January of even-numbered years (2002, 2004, etc.). Members of the TMG will be eligible for reappointment for further terms.

In the event of a working group being dissolved (for example, as a result of all its work items being completed), the representatives from the working group shall remain members of the TMG until all related terminology issues have been resolved. They will then withdraw.

In the event of all working groups being dissolved, the chair of ISO/TC 211, upon the completion of all related terminology work, shall suspend the TMG until such time as new work items are introduced.

A.3.2 Responsibilities

The Chair of ISO/TC 211 shall be responsible for ensuring the existence of the TMG and for nominating the convenor.

Each ISO/TC 211 working group leader shall be responsible for nominating representatives to the TMG and for advising the convenor of the availability of relevant new documents.

The convenor shall be responsible for the operation of the TMG.

The convenor shall be responsible for advising members of the TMG regarding the availability of new documents and for ensuring the update of the status of terms.

A.3.3 Assessment by TMG

A.3.3.1 Objective

The TMG shall review Candidate terms within two months of receipt. The objective of the review shall be to ensure that Candidate terms conform to the “one term, one definition, one concept” criterion (i.e. a one-to-one correspondence between a term and a concept, and a one-to-one association between a definition and a concept) and do not conflict with existing terminology. Candidate terms that satisfy the criterion shall be nominated as Draft terms pending their publication in an International Standard or Technical Specification. Candidate terms that do not satisfy the criterion shall retain their Candidate status and be referred for harmonization. The TMG will work online whenever possible and, when necessary, convene meetings in accordance with the ISO directives.

NOTE In instances where a Candidate term/definition conflicts with an existing Draft term/definition, the existing term/definition shall retain its status pending harmonization deliberations.

A.3.3.2 Candidate terms

The review process shall consider each Candidate term individually and shall proceed as follows.

- a) Perform Concept, Structure and Circularity Tests;
 - 1) Determine if the criteria for the selection of concepts in Clause 6 have been satisfied.
 - 2) Determine if the terminological record is currently structured in the parent document according to Clause 7.
 - 3) Determine if the definition can be understood and is non-circular.
 - 4) Refer terms from working drafts that fail to satisfy the above requirements back to the appropriate working group for correction. Terms from committee drafts or later that fail to satisfy the above requirements will be referred back through appropriate national body comments.

b) Perform the “One Concept, One Definition” Test;

- 1) Determine if there are other records for the same concept in the Repository originating from other standards or earlier drafts of the standard in question. If yes, extract all definition records for the concept from the Repository. If no, classify the concept as having satisfied the “One Concept, One Definition” criterion but requiring “One Term, One Concept” testing.
- 2) If a record for the same concept, originating from an earlier draft of the same standard, has been extracted from the Repository, determine if the definitions are identical. If yes, classify the earlier record for removal from the Repository. If no, retain the concept's Candidate status and document the need for harmonization with other standards that have adopted the definition in the earlier draft.
- 3) If other records for the same concept, originating from other draft standards, have been extracted from the Repository, determine if all definitions are identical to those of the Candidate term. If yes, reclassify the Candidate concept as Draft. If no, retain the concept's Candidate status and document the need for harmonization.
- 4) If other records for the same concept, originating from published International Standards or Technical Specifications, have been extracted from the Repository, determine if all definitions are identical to those of the Candidate concept. If yes, the concept is already Normative. Ensure that cross-referencing is correct. If no, retain the concept's Candidate status and document the need for harmonization.

c) Perform the “One Term, One Concept” Test;

Each Candidate term that has not previously appeared in other standards or earlier drafts of the standard in question will be subjected to a “One Term, One Concept” test by members of the TMG. The members shall individually examine the Terminology Repository to determine whether the concept described by the definition is already adequately described by another term. Consultation with relevant working groups will be required. If an alternative term exists, retain the term's Candidate status and classify it as requiring harmonization. Do not change the status of the alternative term. If no alternative term is identified, classify the term as being Draft.

A.3.3.3 Normative terms

A working draft or committee draft may include normative terms that have been adopted from other International Standards. The TMG shall review these terms to ensure that they harmonize with ISO 19100 series concepts and terminology. The TMG shall refer any problems to the appropriate working group or editing committee (in the latter case through national body comments).

A.3.3.4 Deleted terms

The test for deleted terms is to be performed if the terminology from an earlier draft of the standard has been entered into the Terminology Repository.

- For each item in the earlier draft, check if an identical Candidate term occurs in the current draft.
- If a Candidate term does not exist in the current draft, check if the term appears in other standards.
- If a Candidate term does not exist in the current draft and the term does not appear in other standards, classify the term and its definition as deleted in the Terminology Repository.

Terms that have been specifically nominated for deletion shall be classified accordingly in the Terminology Repository. ISO/TC 211 shall be formally advised of the intention to delete the terms. Deletion shall take place following a plenary meeting of ISO/TC 211.

A.3.4 Harmonization

Candidate terms that require harmonization shall be directly referred to the appropriate working groups. In addition, where the source document is at CD or DIS, the convenor of the TMG shall identify terminology harmonization issues in comments formally forwarded to the TC secretariat.

It is expected that harmonization issues will mostly occur in working drafts and early committee drafts. The TMG will facilitate discussions between the interested parties (generally via e-mail) to achieve a resolution of the issues. Should resolution not be possible within the period allowed for consideration and comment, the TMG convenor will call a meeting at the next ISO/TC 211 plenary to resolve the issues.

A.3.5 Revision of terminology status

In instances where there is consensus in relation to the harmonization of the term, the term shall be reclassified as Harmonized pending publication in an ISO standard.

In instances where there is consensus as regards the retention or deletion of a term nominated for deletion, the term shall be retained or classified as deleted in the Terminology Repository as appropriate.

Any terms for which consensus cannot be achieved during the consultation process will retain their Candidate status and will be considered further by the relevant ISO/TC 211 working groups. The TMG will facilitate this process. The TMG will not make decisions about the definitions to be adopted for concepts but may make recommendations to the working groups.

A.3.6 Additional terms

There will be instances where it will be desirable to include terms from documents other than ISO/TC 211 sponsored standards. In such cases, the following will apply.

- The nomination of additional terms will only be accepted from ISO/TC 211 members and liaisons.
- The inclusion of any proposed term, definition and concept shall be driven by a clear business need. Unnecessary proliferation of terminology will be discouraged.
- Every proposal shall be submitted to the TMG in English. The proposal shall include the term, its definition, a description of the associated concept, and the relationship to existing ISO/TC 211 terms and/or concepts. A description of the business driver shall also be included.
- The TMG will issue an ISO/TC 211 document containing details of the proposal. This will be circulated to members for comment through the ISO/TC 211 Secretariat. The period for submitting comments will be one month. Comment resolution processes will subsequently be implemented.
- The decision to accept or reject the proposed record will be taken by resolution of ISO/TC 211 at the next Plenary meeting.

Annex B (normative)

Terms and definitions from ISO/TC 211 International Standards and Technical Specifications

This list of terms has been compiled from International Standards and Technical Specifications developed by ISO/TC 211 and other sources. Its purpose is to encourage consistency in the use and interpretation of geospatial terms. It is freely available for use by all interested people and organizations.

NOTE In notes and examples below, references to International Standards and Technical Specifications refer to the source document.

B.1

abbreviation

designation (B.132) formed by omitting words or letters from a longer form and designating the same **concept** (B.60)

[ISO 1087-1:2000]

B.2

abstract test case

generalized test for a particular requirement

NOTE An abstract test case is a formal basis for deriving **executable test cases** (B.171). One or more test purposes are encapsulated in the abstract test case. An abstract test case is independent of both the **implementation** (B.244) and the **values** (B.515). It should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome [i.e. **sequence** (B.425) of test **events** (B.170)].

[ISO 19105:2000]

B.3

abstract test method

method (B.312) for testing **implementation** (B.244) independent of any particular test procedure

[ISO 19105:2000]

B.4

abstract test module

set (B.433) of related **abstract test cases** (B.2)

NOTE Abstract test modules may be nested in a hierarchical way.

[ISO 19105:2000]

B.5

ATS

abstract test suite

abstract test module (B.4) specifying all the requirements to be satisfied for **conformance** (B.67)

NOTE Abstract test suites are described in a **conformance clause** (B.69).

[ISO 19105:2000]

B.6 **acceptance testing**

⟨user⟩ process of determining whether an **implementation** (B.244) satisfies acceptance criteria and enables the **user** (B.512) to determine whether to accept the implementation

NOTE 1 This includes the planning and execution of several kinds of tests (e.g. functional, volume, performance tests) that demonstrate that the implementation satisfies the user requirements.

NOTE 2 This is not a part of **conformance testing** (B.73).

[ISO 19105:2000]

B.7 **accuracy**

closeness of agreement between a test result and the accepted reference **value** (B.515)

NOTE A test result can be observations or **measurements** (B.301).

[ISO 3534-1:1993]

B.8 **active object**

object (B.326) that is capable of independent actions, and therefore of initiating interactions between itself and other objects without immediate prior external stimulation

NOTE 1 See **passive object** (B.341)

NOTE 2 An active object can represent a **user** (B.512) or an active **service** (B.427) that depends on internal (and therefore not visible) triggers to start actions. Active and passive **states** (B.452) can exist for the same object, and such a service can transition between these two states depending on invocation of an activation or deactivation **operation** (B.332) protocol.

[ISO 19132:2007]

B.9 **actor**

⟨UML⟩ coherent **set** (B.433) of roles that users of use cases play when interacting with these use cases

NOTE An actor may be considered to play a separate role with regard to each use case with which it communicates.

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.10 **admitted term**

term (B.475) rated according to the scale of the term acceptability rating as a synonym for a **preferred term** (B.369)

[ISO 1087-1:2000]

B.11 **affine coordinate system**

coordinate system (B.90) in Euclidean space with straight axes that are not necessarily mutually perpendicular

[ISO 19111:2007]

B.12

aggregation

⟨UML⟩ special form of **association** (B.16) that specifies a whole-part **relationship** (B.395) between the aggregate (whole) and a **component** (B.50) part

NOTE See **composition** (B.54).

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.13

annotation

any marking on illustrative material for the purpose of **clarification** (B.39)

NOTE Numbers, letters, symbols, and signs are examples of annotation.

[ISO 19117:2005]

B.14

application

manipulation and processing of **data** (B.103) in support of **user** (B.512) requirements

[ISO 19101:2002]

B.15

application schema

conceptual schema (B.65) for **data** (B.103) required by one or more **applications** (B.14)

[ISO 19101:2002]

B.16

association

⟨UML⟩ semantic **relationship** (B.395) between two or more **classifiers** (B.41) that specifies connections among their **instances** (B.254)

NOTE A binary association is an association among exactly two classifiers (including the possibility of an association from a classifier to itself).

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.17

attitude

orientation of a body, described by the angles between the axes of that body's **coordinate system** (B.90) and the axes of an external coordinate system

NOTE In positioning **services** (B.427), this is usually the orientation of the user's platform, such as an aircraft, boat, or automobile.

[ISO 19116:2004]

B.18 **attribute**

⟨UML⟩ **feature** (B.179) within a **classifier** (B.41) that describes a **range** (B.381) of **values** (B.515) that **instances** (B.254) of the classifier may hold

NOTE 1 An attribute is semantically equivalent to a **composition** (B.54) **association** (B.16); however, the intent and usage is normally different.

NOTE 2 “Feature” used in this **definition** (B.126) is the UML meaning of the **term** (B.475) and is not meant as defined in 4.1 of this Technical Specification.

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.19 **attribute**

⟨XML⟩ name-value pair contained in an **element** (B.153)

NOTE In this document, an attribute is an XML attribute unless otherwise specified. The syntax of an XML attribute is “Attribute::= Name = AttValue”. An attribute typically acts as an XML element modifier (e.g. <Road gml:id = “r1” />; here gml:id is an attribute).

[ISO 19136:2007]

B.20 **bag**

finite, unordered collection of related **items** (B.269) [**objects** (B.326) or **values** (B.515)] that may be repeated

NOTE Logically, a bag is a **set** (B.433) of pairs <item, count>.

[ISO 19107:2003]

B.21 **band**

range (B.381) of wavelengths of electromagnetic radiation that produce a single **response** (B.403) by a sensing device

[ISO/TS 19101-2:2008]

B.22 **base representation**

⟨moving features⟩ representation, using a local origin and local ordinate **vectors** (B.517), of a **geometric object** (B.219) at a given reference time

NOTE 1 A rigid geometric object may undergo translation or rotation, but remains congruent with its base representation.

NOTE 2 The local origin and ordinate vectors establish an **engineering coordinate reference system** (B.164) (ISO 19111), also called a local frame or a local Euclidean **coordinate system** (B.90).

[ISO 19141:2008]

B.23

base standard

ISO **geographic information** (B.211) standard or other **information** (B.250) technology standard issued as a source from which a **profile** (B.374) may be constructed

[ISO 19106:2004]

B.24

basic service

service (B.427) providing a basic **function** (B.194) to other services or **applications** (B.14) in a functional manner

NOTE 1 See **interoperate** (B.264)

NOTE 2 Basic services lack any persistent, user-specific **state** (B.452) **information** (B.250) between invocations and are not meant for direct access by **users** (B.512). Because they act in a functional manner, they are readily replaceable at runtime by other services using the same **interfaces** (B.260).

[ISO 19132:2007]

B.25

basic test

initial **capability test** (B.33) intended to identify clear cases of **non-conformance** (B.324)

[ISO 19105:2000]

B.26

behaviour

⟨UML⟩ observable effects of an **operation** (B.333) or **event** (B.170), including its results

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.27

boundary

set (B.433) that represents the limit of an entity

NOTE Boundary is most commonly used in the context of geometry, where the set is a collection of **points** (B.352) or a collection of **objects** (B.326) that represent those points. In other arenas, the **term** (B.475) is used metaphorically to describe the transition between an entity and the rest of its **domain** (B.149) of discourse.

[ISO 19107:2003]

B.28

buffer

geometric object (B.219) that contains all **direct positions** (B.138) whose distance from a specified geometric **object** (B.326) is less than or equal to a given distance

[ISO 19107:2003]

B.29

calendar

discrete **temporal reference system** (B.473) that provides a basis for defining **temporal position** (B.472) to a resolution of one **day** (B.125)

[ISO 19108:2002]

B.30

calendar era

sequence (B.425) of **periods** (B.345) of one of the **types** (B.503) used in a **calendar** (B.29), counted from a specified **event** (B.170)

[ISO 19108:2002]

B.31

calibration

process of quantitatively defining a system's **responses** (B.403) to known, controlled signal inputs

[ISO/TS 19101-2:2008]

B.32

candidate route

any **route** (B.409) that satisfies all **constraints** (B.76) of the **routing** (B.412) **request** (B.399) with the possible exception of optimality of the **cost function** (B.95)

NOTE **Navigation** (B.319) is the process of finding the candidate route that optimizes a chosen cost function.

[ISO 19133:2005]

B.33

capability test

test designed to determine whether an IUT conforms to a particular characteristic of an International Standard as described in the test purpose

[ISO 19105:2000]

B.34

cardinality

⟨UML⟩ number of **elements** (B.153) in a **set** (B.433)

NOTE Contrast: **multiplicity** (B.317).

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.35

Cartesian coordinate system

coordinate system (B.90) which gives the **position** (B.365) of **points** (B.352) relative to n mutually perpendicular axes

NOTE n is 1, 2 or 3 for the purposes of this International Standard.

[ISO 19111:2007]

B.36

character

member of a **set** (B.433) of **elements** (B.153) that is used for the representation, organization, or control of **data** (B.103)

[ISO/IEC 2382-1:1993]

B.37

child element

⟨XML⟩ immediate descendant **element** (B.153) of an element

[ISO 19136:2007]

B.38

circular sequence

sequence (B.425) which has no logical beginning and is therefore equivalent to any circular shift of itself; hence, the last **item** (B.269) in the sequence is considered to precede the first item in the sequence

[ISO 19107:2003]

B.39

clarification

non-substantive change to a **register** (B.390) **item** (B.269)

NOTE A non-substantive change does not change the semantics or technical meaning of the item. Clarification does not result in a change to the **registration** (B.393) status of the register item.

[ISO 19135:2005]

B.40

class

⟨UML⟩ description of a **set** (B.433) of **objects** (B.326) that share the same **attributes** (B.18), **operations** (B.333), **methods** (B.312), **relationships** (B.395), and semantics

NOTE A class may use a set of **interfaces** (B.261) to specify collections of operations it provides to its environment.

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.41

classifier

⟨UML⟩ mechanism that describes behavioural and structural **feature** (B.179)

NOTE Classifiers include **interfaces** (B.261), **classes** (B.40), datatypes, and **components** (B.50).

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.42

client

software **component** (B.50) that can invoke an **operation** (B.332) from a **server** (B.426)

[ISO 19128:2005]

B.43

closure

union of the **interior** (B.262) and **boundary** (B.27) of a **topological** (B.489) or **geometric object** (B.219)

[ISO 19107:2003]

B.44
cluster

collection of **targets** (B.465), potentially heterogeneous (each satisfying a different query criteria), whose **locations** (B.291) fall within a small **neighbourhood** (B.321)

[ISO 19132:2007]

B.45
coboundary

set (B.433) of **topological primitives** (B.490) of higher **topological dimension** (B.487) associated with a particular **topological object** (B.489), such that this topological object is in each of their boundaries

NOTE If a **node** (B.323) is on the **boundary** (B.27) of an **edge** (B.151), that edge is on the coboundary of that node. Any orientation parameter associated to one of these relations would also be associated to the other. So that if the node is the **end node** (B.162) of the edge [defined as the end of the positive **directed edge** (B.139)], then the positive orientation of the node [defined as the positive **directed node** (B.141)] would have the edge on its coboundary (see ISO 19107:2003, Figure 35).

[ISO 19107:2003]

B.46
code

representation of a label according to a specified scheme

[ISO 19118:2005]

B.47
codelist

value domain (B.516) including a **code** (B.46) for each permissible **value** (B.515)

[ISO 19136:2007]

B.48
codespace

rule or authority for a **code** (B.46), name, **term** (B.475) or category

EXAMPLE Examples of codespaces include dictionaries, authorities, **codelists** (B.47), etc.

[ISO 19136:2007]

B.49
complex feature

feature (B.179) composed of other features

[ISO 19109:2005]

B.50
component

⟨UML⟩ modular, deployable, and replaceable part of a system that encapsulates **implementation** (B.244) and exposes a **set** (B.433) of **interfaces** (B.261)

NOTE A component represents a physical piece of implementation of a system, including software **code** (B.46) (source, binary or executable) or equivalents such as scripts or command files.

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.51

composite curve

sequence (B.425) of **curves** (B.99) such that each curve (except the first) starts at the **end point** (B.163) of the previous curve in the sequence

NOTE A composite curve, as a **set** (B.433) of **direct positions** (B.138), has all the properties of a curve.

[ISO 19107:2003]

B.52

composite solid

connected (B.74) **set** (B.433) of **solids** (B.438) adjoining one another along shared **boundary** (B.27) **surfaces** (B.460)

NOTE A composite solid, as a set of **direct positions** (B.138), has all the properties of a solid.

[ISO 19107:2003]

B.53

composite surface

connected (B.74) **set** (B.433) of **surfaces** (B.460) adjoining one another along shared **boundary** (B.27) **curves** (B.99)

NOTE A composite surface, as a set of **direct positions** (B.138), has all the properties of a surface.

[ISO 19107:2003]

B.54

composition

⟨UML⟩ form of **aggregation** (B.12) which requires that a part **instance** (B.254) be included in at most one composite at a time, and that the composite **object** (B.326) be responsible for the creation and destruction of the parts

NOTE Parts with non-fixed **multiplicity** (B.317) may be created after the composite itself, but, once created, they live and die with it (i.e. they share lifetimes). Such parts can also be explicitly removed before the death of the composite. Composition may be recursive. Synonym: composite aggregation.

[ISO/TS 19103:2005 – adapted from ISO/IEC 19501]

B.55

compound coordinate reference system

coordinate reference system (B.88) using at least two independent coordinate reference systems

NOTE Coordinate reference systems are independent of each other if **coordinate** (B.84) **values** (B.515) in one cannot be converted or transformed into coordinate values in the other.

[ISO 19111:2007]

B.56

computational geometry

manipulation of, and calculations with, geometric representations for the **implementation** (B.244) of geometric **operations** (B.332)

EXAMPLE Computational geometry operations include testing for geometric inclusion or intersection, the calculation of **convex hulls** (B.82) or **buffer** (B.28) zones, or the finding of shortest distances between **geometric objects** (B.219).

[ISO 19107:2003]

B.57

computational topology

topological **concepts** (B.60), structures and algebra that aid, enhance or define **operations** (B.332) on **topological objects** (B.489) usually performed in **computational geometry** (B.56)

[ISO 19107:2003]

B.58

computational viewpoint

viewpoint (B.526) on a system and its environment that enables distribution through functional decomposition of the system into **objects** (B.326) which interact at **interfaces** (B.260)

[ISO 19119:2005]

B.59

concatenated operation

coordinate operation (B.87) consisting of sequential **application** (B.14) of multiple coordinate operations

[ISO 19111:2007]

B.60

concept

unit (B.507) of knowledge created by a unique combination of characteristics

NOTE Concepts are not necessarily bound to particular **languages** (B.275). They are, however, influenced by the social or cultural background which often leads to different categorizations.

[ISO 1087-1:2000]

B.61

concept harmonization

activity leading to the establishment of a correspondence between two or more closely related or overlapping **concepts** (B.60) having professional, technical, scientific, social, economic, linguistic, cultural or other differences, in order to eliminate or reduce minor differences between them

NOTE The purpose of concept harmonization is to improve communication.

[ISO 860:2007]

B.62

concept system

set (B.433) of **concepts** (B.60) structured according to the relations among them

[ISO 1087-1:2000]

B.63

conceptual formalism

set (B.433) of modelling **concepts** (B.60) used to describe a **conceptual model** (B.64)

EXAMPLE UML meta model, EXPRESS meta model.

NOTE One conceptual formalism can be expressed in several **conceptual schema languages** (B.66).

[ISO 19101:2002]

B.64

conceptual model

model (B.314) that defines **concepts** (B.60) of a **universe of discourse** (B.511)

[ISO 19101:2002]

B.65

conceptual schema

formal description of a **conceptual model** (B.64)

[ISO 19101:2002]

B.66

conceptual schema language

formal **language** (B.275) based on a **conceptual formalism** (B.63) for the purpose of representing **conceptual schemas** (B.65)

EXAMPLE UML, EXPRESS, IDEF1X

NOTE A conceptual schema language may be lexical or graphical. Several conceptual schema languages can be based on the same conceptual formalism.

[ISO 19101:2002]

B.67

conformance

fulfilment of specified requirements

[ISO 19105:2000]

B.68

conformance assessment process

process for assessing the **conformance** (B.67) of an **implementation** (B.244) to an International Standard

[ISO 19105:2000]

B.69

conformance clause

clause defining what is necessary in order to meet the requirements of the International Standard

[ISO 19105:2000]

B.70

conformance implementation

implementation (B.244) that satisfies the requirements

[ISO 19105:2000]

B.71

conformance quality level

threshold **value** (B.515) or **set** (B.433) of threshold values for **data quality results** (B.115) used to determine how well a **dataset** (B.122) meets the criteria set forth in its **product specification** (B.373) or **user** (B.512) requirements

[ISO 19114:2003]

B.72

conformance test report

summary of the **conformance** (B.67) to the International Standard as well as all the details of the testing that supports the given overall summary

[ISO 19105:2000]

B.73

conformance testing

testing of a product to determine the extent to which the product is a conforming **implementation** (B.244)

[ISO 19105:2000]

B.74

connected

property of a **geometric object** (B.219) implying that any two **direct positions** (B.138) on the **object** (B.326) can be placed on a **curve** (B.99) that remains totally within the object

NOTE A **topological object** (B.489) is connected if and only if all its **geometric realizations** (B.221) are connected. This is not included as a **definition** (B.126) because it follows from a theorem of topology.

[ISO 19107:2003]

B.75

connected node

node (B.323) that starts or ends one or more **edges** (B.151)

[ISO 19107:2003]

B.76

constraint

restriction on how a **link** (B.287) or **turn** (B.502) may be traversed by a **vehicle** (B.519), such as **vehicle classification** (B.520), physical or temporal constraint

[ISO 19133:2005]

B.77

constraint

⟨UML⟩ semantic condition or restriction

NOTE **Domains** (B.149) are used to define the domain **set** (B.433) and **range** (B.382) set of **attributes** (B.18), operators and **functions** (B.194).

[ISO/TC 19103:2005 – adapted from ISO/IEC 19501]

B.78
continuous change

change in an **attribute** (B.18) whose **type** (B.503) has a **distance measure** (B.147) such that its **value** (B.515) can be assumed to take on intermediate values between two known **measurements** (B.301)

NOTE The interpolation of continuous change is usually done by taking into consideration **constraints** (B.76) on the “curve” joining the two data **points** (B.352) (time1, value1) and (time2, value2), looking at the value as a **function** (B.194) of time. For example, if the continuous change is for the **motion** (B.316) of a **vehicle** (B.519), then the constraints of physics and of the paths appropriate for that vehicle must be taken into consideration.

[ISO 19132:2007]

B.79
continuous coverage

coverage (B.97) that returns different **values** (B.515) for the same **feature attribute** (B.181) at different **direct positions** (B.138) within a single **spatial object** (B.442), temporal **object** (B.326), or **spatiotemporal object** (B.447) in its **domain** (B.149)

NOTE Although the domain of a continuous coverage is ordinarily bounded in terms of its spatial and/or temporal extent, it can be subdivided into an infinite number of direct positions.

[ISO 19123:2005]

B.80
control body

group of technical experts that makes decisions regarding the content of a **register** (B.390)

[ISO 19135:2005]

B.81
conversion rule

rule for converting **instances** (B.253) in the input **data** (B.103) structure to instances in the output data structure

[ISO 19118:2005]

B.82
convex hull

smallest **convex set** (B.83) containing a given **geometric object** (B.219)

NOTE “Smallest” is the **set** (B.433) theoretically smallest, not an indication of a **measurement** (B.301). The **definition** (B.126) can be rewritten as “the intersection of all convex sets that contain the geometric object”.

[ISO 19107:2003 – adapted from Dictionary of Computing, Fourth Edition, Oxford University Press, 1996]

B.83
convex set

geometric set (B.222) in which any **direct position** (B.138) on the straight-line **segment** (B.419) joining any two direct positions in the geometric set is also contained in the geometric set

[ISO 19107:2003 – adapted from Dictionary of Computing, Fourth Edition, Oxford University Press, 1996]

B.84
coordinate

one of a **sequence** (B.425) of n numbers designating the **position** (B.365) of a **point** (B.352) in n -dimensional space

NOTE In a **coordinate reference system** (B.88), the coordinate numbers are qualified by **units** (B.507).

[ISO 19111:2007]

B.85
coordinate conversion

coordinate operation (B.87) in which both **coordinate reference systems** (B.88) are based on the same **datum** (B.124)

EXAMPLE Conversion from an ellipsoidal coordinate reference system based on the WGS84 datum to a Cartesian coordinate reference system also based on the WGS84 datum, or change of **units** (B.507) such as from radians to degrees or feet to metres.

NOTE A coordinate conversion uses parameters which have specified **values** (B.515) that are not determined empirically.

[ISO 19111:2007]

B.86
coordinate dimension

number of **measurements** (B.301) or axes needed to describe a **position** (B.365) in a **coordinate system** (B.90)

[ISO 19107:2003]

B.87
coordinate operation

change of **coordinates** (B.84), based on a one-to-one **relationship** (B.395), from one **coordinate reference system** (B.88) to another

NOTE Supertype of **coordinate transformation** (B.91) and **coordinate conversion** (B.85).

[ISO 19111:2007]

B.88
coordinate reference system

coordinate system (B.90) that is related to an **object** (B.326) by a **datum** (B.124)

NOTE For **geodetic** (B.202) and **vertical datums** (B.525), the object will be the Earth.

[ISO 19111:2007]

B.89
coordinate set

collection of **coordinate tuples** (B.92) related to the same **coordinate reference system** (B.88)

[ISO 19111:2007]

B.90

coordinate system

set (B.433) of mathematical rules for specifying how **coordinates** (B.84) are to be assigned to **points** (B.352)

[ISO 19111:2007]

B.91

coordinate transformation

coordinate operation (B.87) in which the two **coordinate reference systems** (B.88) are based on different **datums** (B.124)

NOTE A coordinate transformation uses parameters which are derived empirically by a **set** (B.433) of **points** (B.352) with known **coordinates** (B.84) in both coordinate reference systems.

[ISO 19111:2007]

B.92

coordinate tuple

tuple (B.501) composed of a **sequence** (B.425) of **coordinates** (B.84)

NOTE The number of coordinates in the coordinate tuple equals the dimension of the **coordinate system** (B.90); the order of coordinates in the coordinate tuple is identical to the order of the axes of the coordinate system.

[ISO 19111:2007]

B.93

Coordinated Universal Time UTC

time scale maintained by the Bureau International des Poids et Mesures (International Bureau of Weights and Measures) and the International Earth Rotation Service (IERS) that forms the basis of a coordinated dissemination of standard frequencies and time

[ITU-R Rec.TF.686-1 (1997)]

B.94

correctness

correspondence with the **universe of discourse** (B.511)

[ISO/TS 19138:2006]

B.95

cost function

function (B.194) that associates a measure (cost) to a **route** (B.409)

NOTE The normal mechanism is to apply a cost to each part of a route, and to define the total route cost as the sum of the cost of the parts. This is necessary for the **operation** (B.332) of the most common **navigation** (B.319) algorithms. The **units** (B.507) of cost functions are not limited to monetary costs and values only, but include such measures as time, distance, and possibly others. The only requirement is that the function be additive and at least non-negative. This last criteria can be softened as long as no zero or less cost is associated with any loop in the **network** (B.322), as this will prevent the existence of a “minimal cost” route.

[ISO 19133:2005]

B.96

coupling

linkage of two or more software systems through **information** (B.250) transfer or messaging

NOTE 1 Compare with **integration** (B.259). While the **conceptual schema** (B.65) of the information transferred shall be agreed upon to some level, coupling **applications** (B.14) can be and are usually flexible in the **data** (B.103) representation of that information as long as the semantics content is correct and mappable to some canonical representation of the conceptual schema. The most common mapping technology used for XML messages is XSLT, and the transformation stylesheet can be supplied either by the **service broker** (B.428) or by the service provider. It is considered a best practice for a service provider to supply his functionality through several logically equivalent messaging APIs, each represented by a different URI linked to an XSLT transformation bridge, and implemented by the same internal **code** (B.46).

NOTE 2 Loose coupling and tight coupling are not at present well-defined **terms** (B.475) in the literature. Generally, “tight” coupling means that there is some sort of incurred dependency between requester and responder in the use of the **interface** (B.260), while “loose” means no such dependency. The nature of that dependency is not consistently defined between authors. In that light, “tight” coupling or “tight” integration are both bad practices, and have been viewed as such since the inception of the terms. Some literature refers to integration as “tight coupling”, but that is a less accurate description.

[ISO 19132:2007]

B.97

coverage

feature (B.179) that acts as a **function** (B.194) to return **values** (B.515) from its **range** (B.381) for any **direct position** (B.138) within its spatial, temporal or **spatiotemporal domain** (B.446)

EXAMPLE Examples include a **raster** (B.383) image, **polygon** (B.356) overlay or digital elevation matrix.

NOTE In other words, a coverage is a feature that has multiple values for each **attribute** (B.18) **type** (B.503), where each direct position within the geometric representation of the feature has a single value for each attribute type.

[ISO 19123:2005]

B.98

coverage geometry

configuration of the **domain** (B.149) of a **coverage** (B.97) described in **terms** (B.475) of **coordinates** (B.84)

[ISO 19123:2005]

B.99

curve

1-dimensional **geometric primitive** (B.220), representing the continuous image of a line

NOTE The **boundary** (B.27) of a curve is the **set** (B.433) of **points** (B.352) at either end of the curve. If the curve is a **cycle** (B.101), the two ends are identical, and the curve (if topologically closed) is considered not to have a boundary. The first point is called the **start point** (B.451), and the last is the **end point** (B.163). Connectivity of the curve is guaranteed by the “continuous image of a line” clause. A topological theorem states that a continuous image of a **connected** (B.74) set is connected.

[ISO 19107:2003]

B.100
curve segment

1-dimensional **geometric object** (B.219) used to represent a continuous **component** (B.50) of a **curve** (B.99) using homogeneous interpolation and **definition** (B.126) **methods** (B.312)

NOTE The **geometric set** (B.222) represented by a single curve segment is equivalent to a curve.

[ISO 19107:2003]

B.101
cycle

⟨geometry⟩ **spatial object** (B.442) without a **boundary** (B.27)

NOTE Cycles are used to describe boundary **components** (B.50) [see **shell** (B.434), **ring** (B.407)]. A cycle has no boundary because it closes on itself, but it is bounded (i.e. it does not have infinite extent). A circle or a sphere, for example, has no boundary, but is bounded.

[ISO 19107:2003]

B.102
cylindrical coordinate system

three-dimensional **coordinate system** (B.90) with two distance **coordinates** (B.84) and one angular coordinate

[ISO 19111:2007]

B.103
data

reinterpretable representation of **information** (B.250) in a formalized manner suitable for communication, interpretation, or processing

[ISO/IEC 2382-1:1993]

B.104
data element

unit (B.507) of **data** (B.103) that, in a certain context, is considered indivisible

[ISO 19118:2005]

B.105
data interchange

delivery, receipt and interpretation of **data** (B.103)

[ISO 19118:2005]

B.106
data level

level containing **data** (B.103) describing specific **instances** (B.253)

[ISO 19101:2002]