
Geographic information — Profiles

Information géographique — Profils

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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.

ISO 19106 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

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Introduction

The ISO geographic information standards define a variety of models for describing, managing, and processing of geospatial data. Some of these standards are creating elements, others are introducing structures and rules. Different user communities have different requirements for the extent they want to use or implement these elements and rules. Clearly identification and documentation of specific subsets of the ISO geographic information standards in a prescribed manner in conformance with these standards profiles are needed.

Some of the ISO geographic information standards are abstract and hence will not be implemented directly. To implement them, a specification must be created, which may consist of a choice from the options defined in one or more of the standards, or instances of the rules defined in one or more of the standards or a combination thereof. Not all of the components of the specification for an implementation of the ISO geographic information standards will be derived entirely from the ISO standards. This document focuses on the definition and creation of those components that are derived entirely from the ISO geographic information standards.

An ISO geographic information profile is a subset of one or several of the ISO geographic information standards. For example, there may be a profile from ISO 19115 developed to serve a particular application area such as cadastral mapping. The profile would consist of a choice of the metadata elements available in ISO 19115. ISO 19115 would serve as a base standard for the development of the profile. An example for a base standard only introducing a methodology is given by ISO 19110. It contains methods for creating feature and attribute definitions. A profile of ISO 19110 would not contain instances of feature definitions, since there are no instances in the base standard from which to choose. A profile of ISO 19110 would contain only a subset of the rules and methods found in that standard.

The management of specifications or components of specifications that do not meet the definition of a profile is outside the scope of this International Standard. Each national standardization body or standards-setting organization, such as DGIWG¹⁾ or IHO²⁾ can develop profiles for its own purposes. These organizations may follow this International Standard in creating such profiles, but those profiles do not become ISO geographic information profiles. If feature catalogues are considered, it is easy to see that there could be any number of catalogues developed using the ISO 19110 methodology. By applying the mechanisms of this International Standard to define a profile of ISO 19110 will guarantee that the resulting feature definitions contain the same components and are catalogued in a like manner, but it will not guarantee that the definitions of features and attributes within the catalogue are not conflicting. The catalogues will be consistent, but the definitions they contain will not. Each standards-setting organization or national body that develops a feature catalogue could define 'roads' or 'rivers' or 'administrative boundaries' differently. For this reason, specifications for implementing ISO geographic information standards, which are or contain specific instances of rules or methodologies and which are not derived entirely from the ISO geographic information standards, are treated differently from profiles. This document does not focus on those implementations that are not profiles.

Geographic information systems and software developers are expected to create implementations for specific purposes that make use of a limited set of concepts from the ISO geographic information standards. These sets of concepts will be implemented in a specific technical implementation environment, for example, one of the distributed computing platforms, such as CORBA, or the World Wide Web environment. Since the standardization of specific computing environments is outside the scope of ISO/TC 211, specifications that address the implementation of ISO geographic standards in those environments will not be considered as ISO geographic information profiles of ISO/TC 211, but as independent specifications.

1) DGIWG - Digital Geographic Information Working Group - Category A liaison organization to ISO/TC 211.

2) IHO - International Hydrographic Organization - Category A liaison organization to ISO/TC 211.

This International Standard does not address the creation of specifications for implementing ISO geographic standards in specific technical implementation environments.

ISO 19109 defines the rules for the development of an application schema, including how the elements of conceptual schemas defined in other ISO geographic information standards are combined in an application schema. ISO 19109 guides the creation of application schemas, which is outside the scope of ISO 19106. An application schema by definition is not a profile but may integrate subsets of standardized schemas that are profiles.

Two classes of conformance are defined in this International Standard (see Clause 2).

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Geographic information — Profiles

1 Scope

This International Standard is intended to define the concept of a profile of the ISO geographic information standards developed by ISO/TC 211 and to provide guidance for the creation of such profiles. Only those components of specifications that meet the definition of a profile contained herein can be established and managed through the mechanisms described in this International Standard. These profiles can be standardized internationally using the ISO standardization process. This document also provides guidance for establishing, managing, and standardizing at the national level (or in some other forum).

2 Conformance

Two classes of conformance are defined in this International Standard.

Conformance class 1 is satisfied when a profile is established as a pure subset of the ISO geographic information standards, possibly together with other ISO standards. Such a profile may be processed in accordance with the rules defined in this International Standard as an ISO geographic information standard in its own right.

Conformance class 2 allows profiles to include extensions within the context permitted in the base standard and permits the profiling of non-ISO geographic information standards as parts of profiles. When such a profile adds any information that is not covered in a base ISO geographic information standard or other ISO standard, then the profile will not be processed as an ISO geographic information standard but may be established under the authority of the standards organization, member body or liaison organization making the profile.

Any profile claiming conformance to this International Standard shall satisfy all the requirements found in the abstract test suite found in Annex A in accordance with the conformance class chosen.

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 amendments) applies.

ISO 19101:2002, *Geographic information — Reference model*

ISO 19105:2000, *Geographic information — Conformance and testing*

ISO/IEC TR 10000-1:1998, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 1: General principles and documentation framework*

ISO/IEC TR 10000-3:1998, *Information technology — Framework and taxonomy of International Standardized Profiles — Part 3: Principles and Taxonomy for Open System Environment Profiles*

ISO/IEC Directives, Part 2: Rules for the structure and drafting of International Standards

NOTE 1 ISO/IEC TR 10000-1:1998 describes the methodology for profiles used in ISO/IEC JTC 1. Much of this Technical Report is applicable to the work in ISO/TC 211 and sections of this document have been adapted to apply to the requirements of ISO/TC 211 under the context of the ISO/IEC Directives.

NOTE 2 ISO/IEC TR 10000-1:1998 has a special status in ISO and may be referenced normatively, even though it is a Technical Report.

4 Terms and definitions

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

4.1

abstract test suite

ATS

abstract test module specifying all the requirements to be satisfied for conformance

[ISO 19105]

4.2

base standard

ISO geographic information standard or other information technology standard that is used as a source from which a profile may be constructed

4.3

Implementation Conformance Statement

ICS

statement of specification options that have been implemented

[ISO 19105]

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4.4

open systems environment

OSE

comprehensive set of interfaces, services and supporting formats, plus user aspects, for interoperability and/or portability of applications, data, or people, as specified by information technology standards and profiles

[ISO/IEC TR 10000-1:1998]

4.5

profile

set of one or more base standards or subsets of base standards, and, where applicable, the identification of chosen clauses, classes, options and parameters of those base standards, that are necessary for accomplishing a particular function

[adapted from ISO/IEC TR 10000-1:1998]

NOTE A profile is derived from base standards so that by definition, conformance to a profile is conformance to the base standards from which it is derived.

5 Abbreviated term

ISP International Standardized Profile

NOTE ISP is an ISO/IEC JTC 1 abbreviation used here to refer to an ISP in ISO/IEC JTC 1.

6 Context of profiles

ISO is developing a series of geographic information standards, the ISO 19100 series, that address the entire field of geographic information. These International Standards may be used singularly or together to address the needs of specific applications. The ISO geographic information series of standards is flexible in allowing a large number of options that may be tailored to suit any application.

Flexible standards are important because they allow many different situations to be modelled. Essentially the ISO geographic information series of standards provides rules and the components that can be applied and assembled to address virtually any application related to geographic information. Most of the ISO geographic information standards define rules for modelling certain aspects of geographic information. Some of the standards define explicit components, such as metadata elements for geographic information. Others of the standards give support that provides consistency across the series of standards. Several of the standards define the way that these components or the results of the application of the rules can be assembled. ISO 19109 defines the rules for the development of an application schema, which may include reference to elements from other of the ISO 19100 series of standards.

A profile may consist of a choice from the clauses, classes, options and parameters of base standards, or other profiles. This International Standard describes the procedures for the development of profiles. Registration is outside the scope of this International Standard. Examples of profiles are given in Annex B.

Clause 7 describes the purpose of profiles. Clause 8 describes how profiles reference base standards. Clause 9 describes the content of a profile and Clause 10 describes conformance requirements. Clause 11 describes the method for identifying profiles. Clause 12 describes the structure of documentation for profiles. Clause 13 describes the procedures for the preparation and adoption of profiles. Annex A describes the abstract test suite for conformance to ISO 19106. Annex B presents examples of profiles, Annex C describes the conformance methodology.

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7 Purpose of profiles

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Profiles define combinations of elements derived from a set of one or more base standards for the following purposes:

- identifying those base standards, together with appropriate classes, conforming subsets, options and parameters, which are necessary to accomplish identified functions for purposes such as interoperability;
- providing a means to enhance the availability of consistent implementations of functionally defined groups of base standards, which are expected to be the major components of real application systems;
- promoting uniformity in the development of conformance tests for systems that implement the functionality of profiles.

A profile shall provide a clear identification of the specific user requirements that are satisfied by that profile.

8 How profiles reference base standards

8.1 Relationship to base standards

Some base standards provide options allowing for a variety of applications. Base standards may also be combined in various ways in different applications. Profiles promote integration of base standards by defining how to use a combination of base standards for a given functional environment.

Profiles shall not contradict base standards, but may make choices where options and ranges of values are available.

8.2 Use of references

8.2.1 Normative references

Profiles shall comply with the ISO/IEC Directives, Part 2, in their use of normative references.

To meet conformance class 1, a profile shall make normative references only to base standards and other profiles standardized internationally under this International Standard and ISPs or standards standardized under the rules of ISO/IEC JTC 1.

References may be made to ISO/IEC Technical Reports under the following conditions.

- No base standard addressing the requirement is available.
- The use is identified and a document explaining why the reference is needed is written and supplied with the proposed draft for a profile, justifying that use.
- ISO/TC 211 or other ISO/IEC body responsible for that Technical Report agrees that a normative reference is an appropriate use of that Technical Report.
- National Bodies approve the usage in the draft ballot.

[Adapted from ISO/IEC TR 10000-1:1998, 6.1.2]

To meet conformance class 2, a profile may also make normative references to material defined outside of ISO/TC 211 or ISO/IEC JTC 1; however, such a profile will not be processed as an ISO geographic information standard (see Clause 11).

8.2.2 Informative references

It may be useful to make informative references in a profile, and these informative references shall be listed in the bibliography.

In those cases where a required element of functionality that does not exist in an approved base standard needs to be described, the profile shall be drafted in such a way that it clearly identifies what required functionality is missing from the profile. In addition, the profile may make informative reference to examples of possible specifications which the user of the profile may choose to implement in conjunction with the profile to complete the desired function [adapted from ISO/IEC TR 10000-1:1998, 6.1.4 c].

Within a profile, references to national standards shall be placed within informative text, or in a separate informative annex. Reference shall be made to the body responsible for the distribution and maintenance of the standard.

Informative references may be made to provide background material helpful in understanding the profile.

NOTE These rules parallel those given in ISO/IEC TR 10000-1:1998.

Profiles developed at the national or industrial level, or developed in other international committees may make normative and informative reference to ISO-defined base standards and profiles that have been assigned ISO numbers. They may also make reference to national standards or industrial specifications in accordance with the rules defined by the body developing the profile.

9 Content of a profile

9.1 General principles of content of profiles

A profile makes explicit any relationships that may exist within a set of base standards used together (relationships which can be implicit in the definitions of the base standards themselves), and may also specify particular details of each base standard being used.

A profile may refer to other profiles in order to reference functions and interfaces defined by them, and thus limit its own direct reference to base standards. The registration of profiles allows them to be explicitly referenced (normatively or informatively) within other profiles. Profiles of ISO/TC 211 base standards at conformance class 1 will receive ISO standard numbers, which will serve as the registration for these standards (see Clause 11).

9.2 Characteristics of a profile

A profile

- a) may restrict the choice of options defined in base standards to the extent necessary to achieve the objective of the profile. A profile may retain base standard options as options of the profile;
- b) shall not specify any requirements that would contradict or result in non-conformance to the base standards to which it refers;
- c) may contain conformance requirements which are more specific and limited in scope than those of the base standard to which it refers.

Thus, by definition, conformance to a profile implies conformance to the set of base standards to which it refers. However, conformance to that set of base standards does not necessarily imply conformance to the profile [adapted from ISO/IEC TR 10000-1:1998].

9.3 Elements of a profile

9.3.1 A profile shall comprise the following elements: [Requirements a) to h) align with those given in ISO/IEC TR 10000-1:1998 for profiles.]

- a) a concise definition of the scope of the function which the profile supports and the user requirements which it will satisfy, that may be used as an executive summary of the profile;
- b) a description of the context in which a profile is applicable, giving, where relevant, a description of all interfaces;
- c) a statement of the community of interest to which it is addressed;
- d) normative references to a set of base standards or profiles, including precise identification of the actual texts of the base standards or profiles being used, together with identification of any approved amendments and technical corrigenda (corrections), conformance to which is identified as potentially having impact on achieving interoperability or portability using the profile;
- e) specifications of the applications of each referenced base standard or profile, stating the choice of classes or conformance subsets, and the selection of options, ranges of parameter values, for profiles;
- f) a statement defining the requirements to be observed by systems or data sets claiming conformance to the profile, including any remaining permitted options of the referenced base standards or profile;
- g) where relevant, a reference to the specification of conformance tests for the profile;

- h) informative reference to any amendments or technical corrigenda to the base standards referenced in the profile, which have been determined to not be relevant. Technical amendments or corrigenda to a referenced base standard that exist at the time that a profile is produced, and which are not relevant to the profile, should be referenced informatively to indicate that they are not relevant to the profile. Otherwise, the user of the profile would have to investigate the technical amendment or corrigenda to determine whether it was relevant.

9.3.2 Profiles of the ISO geographic information series of geographic information standards also require the following.

- a) A profile of conformance class 1 shall include the words “Profile of ...” in its scope and/or title. As these profiles will receive ISO standard numbers, the title will distinguish ISO geographic information profiles from the ISO series of geographic information base standards.
- b) A profile shall be developed within the framework defined by ISO 19101.
- c) The normative reference to the clauses and subclauses in the ISO series of geographic information standards shall be explicit; that is, references shall be to specific clauses that define elements of functionality, together with parameters that involve options within the elements. The text of sections of the standards shall not be quoted in the body of a profile with minor alterations to narrow their usage, as this creates a document that would be very hard to maintain if the base document were to change.

10 Conformance requirements of a profile

10.1 Conformance conditions

10.1.1 Conformance requirements may be

- a) mandatory requirements that shall be observed in all cases;
- b) optional requirements that may be selected to suit the implementation, provided that any requirements applicable to support the option are observed.

10.1.2 In addition, conformance requirements may be specified

- a) unconditionally, in that: these requirements or options apply without qualification;
- b) conditionally, in that the requirements shall be observed if the specified conditions apply, e.g. they are mandatory under certain specified conditions, are optional under other specified conditions, and outside the scope or not applicable under other specified conditions.

10.1.3 Furthermore, conformance requirements may be stated

- a) positively in that they state what shall be done;
- b) negatively in that they state what shall not be done.

To evaluate the conformance of a particular profile, it is necessary to have a statement of the capabilities which have been included in support of one or more specifications, specifically including the relevant optional capabilities and limits, so that the profile can be tested for conformance to the relevant requirements, and only to those requirements [adapted from ISO/IEC TR 10000-1:1998, 6.4].

10.2 Relationship to base standard conformance requirements

The conformance requirements of a profile shall relate to the conformance requirements in the base standards in the following ways [adapted from ISO/IEC TR 10000-1:1998, 6.5].

- a) Mandatory requirements in the base standard shall remain mandatory in the profile.
- b) Options in base standards may remain optional or may be changed within the profile to become
 - mandatory;
 - conditional, giving rise to different statuses dependent on some appropriate condition;
 - out-of-scope, if the option is not relevant to the scope of the profile, for example, functional elements which are unused in the context of the profile;
 - prohibited, if the use of the option is to be regarded as non-conformant behaviour within the context of the profile. This choice shall be used only when absolutely necessary, as the “out-of-scope” option may often be more appropriate.

11 Identification of profiles

This International Standard defines the procedures for the development of profiles within ISO/TC 211. Profiles need to be uniquely identified so that they can be referenced in other profiles and implementations.

Profiles of the ISO geographic information standards of conformance class 1 may be processed as standards through the ISO standardization process. As such, they will receive an ISO standard number which will serve as a unique identification. Maintenance for a profile that has been processed as a standard is the same as that for a standard. Profiles may also be developed with less formal status at either conformance class 1 or conformance class 2, at the international or at the national, industrial or private level. The identification of such profiles is left to the organization, standards body, or member body of the liaison organization establishing such a profile; however, ISO/TC 211 may maintain a list of such profiles that are of international interest.

The titles and scopes of profiles shall clearly indicate their status. It is recognized that titles should be relatively short and that only a limited amount of information can be included in a title. However, the scope statement for a profile shall identify the following:

- a) type of profile (profile of a single standard, multi-standard profile, profile of a profile);
- b) function performed by the profile;
- c) intended user community for the profile;
- d) type of documents (referenced standards, series of standards) from which the profile is derived.

NOTE A profile could be a profile of a single standard, and one would expect to see the referenced standard identified in the scope. However, a profile might be derived from many of the series of geographic information standards, where the sources would be referenced more generally by topic area. Normative references would, of course, be listed in the Normative References clause of the profile.

This International Standard specifies the structure of a profile and procedures for its development. Profiles of ISO geographic information standards, i.e. ISO/TC 211 base standards and relevant ISO/IEC JTC 1 information technology standards, at conformance class 1 may be submitted for acceptance as ISO geographic information profiles. These profiles will be processed as International Standards (see Clause 13). Profiles based on ISO geographic information standards, at either conformance class 1 or conformance class 2, may be also developed by other organizations under their own authority. These profiles will exist only under the authority of the external organization. ISO/TC 211 is responsible only for the standardization of profiles submitted for international standardization through ISO/TC 211.