SLOVENSKI STANDARD
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Geografske informacije - Referenčni model - 1. del: Osnove (ISO 19101-1:2014)

Geographic information - Reference model - Part 1: Fundamentals (ISO 19101-1:2014)

Geoinformation - Referenzmodell (ISO 19101-1:2014)

Information géographique - Modèle de réference - Partie 1: Principes (ISO 19101-1:2014)

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Geographic information - Reference model - Part 1: Fundamentals (ISO 19101-1:2014)

Information géographique - Modèle de référence - Partie 1: Principes de base (ISO 19101-1:2014)

Geoinformation - Referenzmodell - Grundsätze (ISO 19101-1:2014)

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 19101-1:2014) has been prepared by Technical Committee ISO/TC 211 "Geographic information/Geomatics" in collaboration with Technical Committee CEN/TC 287 “Geographic Information” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2015, and conflicting national standards shall be withdrawn at the latest by May 2015.

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Endorsement notice

The text of ISO 19101-1:2014 has been approved by CEN as EN ISO 19101-1:2014 without any modification.

INTERNATIONAL STANDARD

ISO 19101-1

First edition
2014-11-15

Geographic information — Reference model —

Part 1: Fundamentals

Information géographique — Modèle de référence —

Partie 1: Principes de base

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*.

This first edition of ISO 19101-1, together with ISO/TS 19101-2:2008, cancels and replaces ISO 19101:2002.

ISO 19101 consists of the following parts, under the general title *Geographic information — Reference model*:

— *Part 1: Fundamentals*

— *Part 2: Imagery* [Technical Specification]

Introduction

Beyond the needs within traditional applications of digital geographic information, users of information technology recognize that indexing by location is fundamental in the organization and the use of digital data. Nowadays, digital data from multiple sources of a wide variety are being referenced to locations and used in various applications. Such data are now extensively distributed and shared over the Web. In fact, the Web is an important source of knowledge in which geographic information plays a significant role. Standardization in the field of geographic information is therefore imperative to support and simplify the sharing and usage of geographic information of different sources, i.e. interoperability.

Standardization in geographic information is a complex task that addresses multiple aspects encompassing the definition of interoperability of geographic information, fundamental data types such as for spatial and temporal information, modelling rules, the semantics of real world phenomena, metadata, services, etc. As such, a reference model is required in order to achieve this task in an integrated and consistent manner. A reference model in geographic information consists of a comprehensive view providing an abstract description of the elements that might compose the field of geographic information and their interrelations. One of the primary goals of this reference model is to define and describe interoperability of geographic information, addressing system, syntactic, structural, and semantic levels. The definition of interoperability of geographic information will then serve as the underpinning for standardization in geographic information. It contributes to

— increase the understanding and usage of geographic information,

— increase the availability, access, integration, and sharing of geographic information,

— promote the efficient, effective, and economic use of digital geographic information and associated hardware and software systems, and

— enable a unified approach to addressing global ecological and humanitarian problems.

This part of ISO 19101 defines the ISO reference model dealing with geographic information. This reference model provides a guide to structuring geographic information standards in a way that it will enable the universal usage of digital geographic information. It sets out the fundamentals for standardization in geographic information including description, management, and services, and how they are interrelated to support interoperability within the geographic information realm and beyond to ensure interoperability with other information communities. As such, this part of ISO 19101 develops a vision for the standardization in geographic information from which it would be possible to integrate geographic information with other types of information and conversely.

The description of the reference model is supported by a conceptual framework. The conceptual framework is a mechanism to structure the scope of the standardization activity in geographic information according to the interoperability description. It identifies the various facets of standardization and the relationships that exist between them.

This reference model settles the role of semantics, how the new technologies such as the Web and many emerging ways of accessing it, and how the Semantic Web can support interoperability in the field of geographic information. It also provides an umbrella under which additional specific reference models on particular facets of geographic information standardization would be required.

The reference model is organized in five clauses. Clause 5 describes interoperability in the context of geographic information from a communication and an e-government perspective. Clause 6 identifies the foundations of the reference model and sets the scope (requirements) for the ISO geographic information standardization activities. Clause 7 identifies the requirement for the abstraction of the real world. The reference model for ISO standardization in geographic information is specified in Clause 8 along with its specific requirements. Finally, profiles related to ISO geographic information standards are introduced in the Clause 9.

This part of ISO 19101 is the first part of the reference model. Additional parts can be developed to address concerns, elements, and structures in distinct areas. As such, part 2 of the reference model addresses specific aspects on imagery.

To achieve these goals, standardization of geographic information in the ISO geographic information standards is based on the integration of the concepts of geographic information with those of information technology. The development of standards for geographic information has to consider the adoption or adaptation of generic information technology standards whenever possible. It is only when this cannot be done that the development of geographic information standards becomes required.

This part of ISO 19101 identifies a generic approach to structuring the ISO geographic information standards. This reference model uses concepts from the Open Distributed Processing – Reference Model (RM ODP) described in ISO/IEC 10746-1[17] and other relevant International Standards and Technical Reports. This part of ISO 19101 does not prescribe any specific products or techniques for implementing geographic information systems.

This part of ISO 19101 is intended to be used by information system analysts, program planners, and developers of geographic information standards that are related to ISO geographic information standards, as well as others in order to understand the basic principles of this series of standards and the overall requirements for standardization of geographic information.

This edition of the reference model differs from its previous edition by having a specific focus on the semantic aspects related to interoperability of geographic information by the way of ontologies and knowledge. As such, the definition of interoperability has been revisited in the context of communication. Three foundations for interoperability of geographic information are identified. Based on these foundations and the usual four levels of abstraction, a new conceptual framework is introduced to support the organization of the reference model. The architectural aspect of the previous reference model has been removed in this reference model and will be addressed more specifically in a revision of ISO 19119:2005. This version of the reference model has no backward compatibility impact on the ISO geographic information suite of standards.

Geographic information — Reference model —

Part 1: Fundamentals

1 Scope

This part of ISO 19101 defines the reference model for standardization in the field of geographic information. This reference model describes the notion of interoperability and sets forth the fundamentals by which this standardization takes place.

Although structured in the context of information technology and information technology standards, this part of ISO 19101 is independent of any application development method or technology implementation approach.

2 Conformance

General conformance and testing requirements for the ISO geographic information standards are described in ISO 19105.

Any standards and profiles claiming conformance to this part of ISO 19101 shall satisfy all the requirements described in the abstract test suites in Annex A.

Additional specific conformance requirements are described in individual ISO geographic information standards.

3 Normative references

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

Not applicable.

4 Terms, definitions, and abbreviated terms

4.1 Terms and definitions

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

4.1.1
application
manipulation and processing of data in support of user requirements

4.1.2
application schema
conceptual schema (4.1.6) for data required by one or more *applications* (4.1.1)

4.1.3
base standard
ISO *geographic information* (4.1.18) standard or other information technology standard that is used as a source from which a *profile* (4.1.27) might be constructed

[SOURCE: ISO 19106:2004, 4.2]

4.1.4
conceptual formalism
set of modelling concepts used to describe a *conceptual model* (4.1.5)

EXAMPLE 1 UML meta model.

EXAMPLE 2 EXPRESS[21] meta model.

Note 1 to entry: One conceptual formalism can be expressed in several *conceptual schema languages* (4.1.7).

4.1.5
conceptual model
model that defines concepts of a *universe of discourse* (4.1.38)

4.1.6
conceptual schema
formal description of a *conceptual model* (4.1.5)

4.1.7
conceptual schema language
formal language based on a *conceptual formalism* (4.1.4) for the purpose of representing *conceptual schemas* (4.1.6)

EXAMPLE 1 UML.

EXAMPLE 2 EXPRESS.

EXAMPLE 3 IDEF1X.

Note 1 to entry: A conceptual schema language can be lexical or graphical. Several conceptual schema languages can be based on the same conceptual formalism.

4.1.8
coverage
feature (4.1.11) that acts as a function to return values from its range for any direct position within its spatial, temporal, or spatiotemporal domain

EXAMPLE 1 *Raster* (4.1.30) image.

EXAMPLE 2 Polygon overlay.

EXAMPLE 3 Digital elevation matrix.

Note 1 to entry: In other words, a coverage is a feature that has multiple values for each attribute type, where each direct position within the geometric representation of the feature has a single value for each attribute type.

[SOURCE: ISO 19123:2005, 4.1.7]

4.1.9
dataset
identifiable collection of data

[SOURCE: ISO 19115-1:2014, 4.3]

4.1.10
e-government
digital interaction between a government and citizens, government and businesses, and between government agencies

4.1.11
feature
abstraction of real world phenomena

Note 1 to entry: A feature can occur as a type or an instance. Feature type or feature instance will be used when only one is meant.

4.1.12
feature attribute
characteristic of a *feature* (4.1.11)

EXAMPLE 1 A feature attribute named "colour" can have an attribute value "green" which belongs to the data type "text".

EXAMPLE 2 A feature attribute named "length" can have an attribute value "82,4" which belongs to the data type "real".

Note 1 to entry: A feature attribute has a name, a data type, and a value domain associated to it. A feature attribute for a *feature instance* (4.1.14) also has an attribute value taken from the value domain.

Note 2 to entry: In a *feature catalogue* (4.1.13), a feature attribute can include a value domain but does not specify attribute values for feature instances.

Note 3 to entry: In UML, attributes, associations, and operations are representation types and are not fundamental to the type of a characteristic nor to the type of feature. All three are equally capable of representing the same characteristic of a feature. Every implementation of a characteristic is allowed to use the representation type that is most appropriate and can use several different representations for a single characteristic if required. Feature associations and *feature operations* (4.1.15), therefore, are different types of feature attribute, the distinction between them being based on storage and access mechanisms rather than semantics.

4.1.13
feature catalogue
catalogue containing definitions and descriptions of the *feature types* (4.1.16), *feature attributes* (4.1.12), and feature relationships occurring in one or more sets of geographic data, together with any *feature operations* (4.1.15) that can be applied

4.1.14
feature instance
individual of a given *feature type* (4.1.16) having specified *feature attribute* (4.1.12) values

4.1.15
feature operation
operation that every instance of a *feature type* (4.1.16) can perform

EXAMPLE A feature operation upon a "dam" is to raise the dam. The results of this operation are to raise the height of the "dam" and the level of water in a "reservoir".

Note 1 to entry: Feature operations provide a basis for feature type definition.

[SOURCE: ISO 19110:2005, 4.5]

4.1.16
feature type
class of *features* (4.1.11) having common characteristics

[SOURCE: ISO 19156:2011, 4.7]

