INTERNATIONAL STANDARD

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Geographic information — Services

Information géographique — Services

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Contents

Page

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 second edition cancels and replaces the first edition (ISO 19119:2005), which has been technically revised. It also incorporates the Amendment ISO 19119:2005/Amd 1:2008.

Introduction

The widespread application of computers and use of geographic information systems (GIS) have led to the increased analysis of geographic data within multiple disciplines. Based on advances in information technology, society's reliance on such data are growing. Geographic datasets are increasingly being shared, exchanged, and used for purposes other than their producers' intended ones. GIS, remote sensing, automated mapping and facilities management (AM/FM), Spatial Data Infrastructure (SDI), traffic analysis, geopositioning systems, and other technologies for Geographic Information (GI) are entering a period of radical integration.

This International Standard provides a framework for platform neutral and platform specific specification of services that can enable users to access, process and manage geographic data from a variety of sources, potentially for various distributed computing platforms (DCPs).

— "a framework for platform neutral and platform specific specification of services" means that this International Standard provides requirements for how services shall be specified in such a way that one service can be specified independently of one or more underlying distributed computing platforms. The framework provides requirements for a further mapping to specific platforms in order to enable conformant platform specific specifications to ensure conforming and interoperable service implementations.

— "access, process and manage" means that geodata users can query remote databases and control remote processing resources and also take advantage of other distributed computing technologies, such as software delivered to the user's local environment from a remote environment for temporary use;

— "from a variety of sources" means that users will have access to data acquired in a variety of ways and stored in a wide variety of relational and non-relational databases;

— "across a generic computing interface" means that ISO 19119 interfaces provide reliable communication between otherwise disparate software resources that are equipped to use these interfaces;

— "within an open information technology environment" means that this International Standard enables geoprocessing to take place outside of the closed environment of monolithic GIS, remote sensing, and AM/FM systems that control and restrict database, user interface, network and data manipulation functions;

— services shall be categorised according to a service taxonomy based on architectural areas and may also be categorised according to a usage life cycle perspective, as well as according to domain specific and user defined service taxonomies, providing support for publication and discovery of services.

The difference between this version of this International Standard and the previous ISO 19119:2005 version is the following:

This International Standard has defined a set of requirements and related abstract tests for the specification of services according to enterprise, computational, information, engineering and technology viewpoints. This International Standard has defined a set of requirements for categorizing services according to service taxonomies. The service metadata has been moved to ISO 19115-1.

Service policies, service contracts including service level agreements (SLAs) are currently not specified as part of this International Standard, as these are considered most relevant for service deployment and service ownership, which is not currently a focus for this International Standard.

Geographic information — Services

1 Scope

This International Standard defines requirements for how platform neutral and platform specific specification of services shall be created, in order to allow for one service to be specified independently of one or more underlying distributed computing platforms.

This International Standard defines requirements for a further mapping from platform neutral to platform specific service specifications, in order to enable conformant and interoperable service implementations.

This International Standard addresses the Meta:Service foundation of the ISO geographic information reference model described in ISO 19101-1:2014, Clause 6 and Clause 8, respectively.

This International Standard defines how geographic services shall be categorised according to a service taxonomy based on architectural areas and allows also for services to be categorised according to a usage life cycle perspective, as well as according to domain specific and user defined service taxonomies, providing support for easier publication and discovery of services.

2 Conformance

2.1 Claiming conformance

Any product claiming conformance with the conformance classes in this International Standard shall pass all the associated requirements described in the abstract test suite given in Annex A.

2.2 General

This International Standard defines six conformance classes shown in Table 1 to Table 6, matching the six requirements classes described in Clause 7 to Clause 12. Any service claiming conformance to any requirements class in this International Standard shall pass all of the tests listed in the corresponding conformance class, which are described in detail in the abstract test suites in Annex A. Each test relates to one or more specific requirements, which are explicitly indicated in the description of the test.

2.3 Enterprise viewpoint

The enterprise viewpoint conformance class is shown in Table 1.

Table 1 — Enterprise viewpoint conformance class

Conformance class	**/conf/enterpriseviewpoint**
Requirements	/req/enterpriseviewpoint (Table 11)
Tests	All tests in A.2

2.4 Computational viewpoint

The computational viewpoint conformance class is shown in Table 2.

Table 2 — Computational viewpoint conformance class

Conformance class	**/conf/computationalviewpoint**
Dependency	/conf/enterpriseviewpoint
Requirements	/req/computationalviewpoint (Table 12)
Tests	All tests in A.3

2.5 Information viewpoint

The information viewpoint conformance class is shown in Table 3.

Table 3 — Information viewpoint conformance class

Conformance class	**/conf/informationviewpoint**
Dependency	/conf/uml (2.4)
Requirements	/req/informationviewpoint (Table 18)
Tests	All tests in A.4

2.6 Service taxonomies

The service taxonomy conformance class is shown in Table 4.

Table 4 — Service taxonomies conformance class

Conformance class	**/conf/servicetaxonomies**
Dependency	/conf/uml (2.4)
Requirements	/req/servicetaxonomies (Table 19)
Tests	All tests in A.5

2.7 Engineering viewpoint

The engineering viewpoint conformance class is shown in Table 5.

Table 5 — Engineering viewpoint conformance class

Conformance class	**/conf/engineeringviewpoint**
Dependency	/conf/uml (2.4)
Requirements	/req/engineeringviewpoint (Table 26)
Tests	All tests in A.6

2.8 Technology viewpoint

The technology viewpoint conformance class is shown in Table 6.

Table 6 — Technology viewpoint conformance class

Conformance class	**/conf/technologyviewpoint**
Dependency	/conf/uml (2.4)
Requirements	/req/technologyviewpoint (Table 27)
Tests	All tests in A.7

NOTE The definition of an abstract test suite appears in ISO 19105.

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.

ISO/IEC 10746-1, *Information technology — Open Distributed Processing — Reference model: Overview — Part 1*

ISO 19101-1:2014, *Geographic information — Reference model — Part 1: Fundamentals*

ISO 19103, *Geographic information — Conceptual schema language*

ISO 19115-1:2014, *Geographic information — Metadata — Part 1: Fundamentals*

[SoaML] *Service oriented architecture Modeling Language v 1.0.1*, May 2012, OMG standard[1)]

4 Terms and definitions and abbreviations

4.1 Terms and definitions

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

4.1.1
capability
real-world effect that a *service* (4.1.12) provider is able to provide to a service consumer

[SOURCE: SOA-RAF]

4.1.2
computational viewpoint
viewpoint (4.1.15) on an ODP system and its environment that enables distribution through functional decomposition of the system into objects which interact at *interfaces* (4.1.8)

[SOURCE: ISO/IEC 10746-3:2015, 4.1.1.3]

4.1.3
distribution transparency
property of hiding from a particular user the potential behaviour of some parts of a distributed system

Note 1 to entry: Distribution transparencies enable complexities associated with system distribution to be hidden from applications where they are irrelevant to their purpose.

[SOURCE: ISO/IEC 10746-2:2009, 11.1.1]

4.1.4
engineering viewpoint
viewpoint (4.1.15) on an ODP system and its environment that focuses on the mechanisms and functions required to support distributed interaction between objects in the system

[SOURCE: ISO/IEC 10746-3:2009, 4.1.1.4]

4.1.5
enterprise viewpoint
viewpoint (4.1.15) on an ODP system and its environment that focuses on the purpose, scope and policies for that system

[SOURCE: ISO/IEC 10746-3:2009, 4.1.1.1]

1) http://www.omg.org/spec/SoaML/1.0.1/

4.1.6
entity
something that has separate and distinct existence and objective or conceptual reality

4.1.7
information viewpoint
viewpoint (4.1.15) on an ODP system and its environment that focuses on the semantics of information and information processing

[SOURCE: ISO/IEC 10746-3:2009, 4.1.1.2]

4.1.8
interface
named set of *operations* (4.1.10) that characterize the behaviour of an *entity* (4.1.6)

Note 1 to entry: See 8.2 for a discussion of interface.

4.1.9
interoperability
capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units

[SOURCE: ISO/IEC 2382:2009, 2121317]

4.1.10
operation
specification of a transformation or query that an object may be called to execute

Note 1 to entry: An operation has a name and a list of parameters.

Note 2 to entry: See 8.2 for a discussion of operation.

4.1.11
real world effect
actual result of using a *service* (4.1.12), rather than merely the *capability* (4.1.1) offered by a service provider

Note 1 to entry: See 8.3 for a discussion of service.

[SOURCE: OASIS RAF, 3.2.3]

4.1.12
service
distinct part of the functionality that is provided by an *entity* (4.1.6) through *interfaces* (4.1.8)

4.1.13
service chain
sequence of *services* (4.1.12) where, for each adjacent pair of services, occurrence of the first action is necessary for the occurrence of the second action

4.1.14
technology viewpoint
viewpoint (4.1.15) on an ODP system and its environment that focuses on the choice of technology in that system

[SOURCE: ISO/IEC 10746-3:2009, 4.1.1.5]

4.1.15
viewpoint (on a system)
form of abstraction achieved using a selected set of architectural concepts and structuring rules, in order to focus on particular concerns within a system

[SOURCE: ISO/IEC 10746-2, 3.2.7]

4.1.16
workflow
automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules

4.2 Abbreviations

API	Application Programming Interface
BPEL	Business Process Execution Language
BPMN	Business Process Modelling Notation
CORBA	Common Object Request Broker Architecture
CSL	Conceptual schema language
DAG	Directed Acyclic Graph
DCP	Distributed Computing Platform
DEM	Digital Elevation Model
DTD	Document type definitions
EJB	Enterprise Java Beans
ERP	Enterprise Resource Planning
GIOP	General Inter-ORB Protocol
GFM	General feature model
HTI	Human Technology Interface
HTML	Hypertext Markup language
HTTP	Hypertext Transfer Protocol
IaaS	Infrastructure as a Service
IDL	Interface Definition Language
IIOP	Internet Inter-ORB Protocol
INSPIRE	Infrastructure for Spatial Information in Europe
IT	Information Technology
J2EE	Java 2 Enterprise Edition with EJB
JDBC	Java Data Base Connectivity
OASIS	Organization for the Advancement of Structured Information Standards

OCL	Object Constraint Language
ODBC	Open Database Connectivity
ODMG	Object Database Management Group
ODP	Open Distributed Processing (see RM-ODP)
OGC	Open Geospatial Consortium
OMG	Object Management Group
ORB	Object Request Broker
OWL	Web Ontology Language
PaaS	Platform as a Service
QoS	Quality of Service
QVT	Query/View/Transformation
REST	Representational state transfer
RDF	Resource Description Framework
RMI	Remote Method Invocation
RM-ODP	Reference Model of Open Distributed Processing (ISO/IEC 10746)
RPC	Remote Procedure Call
SaaS	Software as a Service
SDI	Spatial Data Infrastructure
SDAI	Standard Data Access Interface (ISO 10303-22)
SOA	Service Oriented Architecture
SoaML	Service oriented architecture Modelling Language (OMG)
SOAP	Simple Object Access Protocol
SOF	Service Organizer Folder
SPS	Spatial Planning Service
SQL	Structured Query Language
UML	Unified Modeling Language
URI	Uniform Resource Identifier
W3C	World Wide Web Consortium
WFS	Web Feature Service
WMS	Web Map Service
XML	Extensible Markup Language

XML RDF XML Resource Description Framework

XSLT XML Stylesheet Language Transformations

Concepts from schemas defined in some other International Standards are designated with names that start with bi-alpha codes as follows:

TM ISO 19108:2002 Temporal Schema, Temporal Objects

5 Notation

5.1 General

This International Standard describes how to describe a service. In addition to stating the rules for creating service descriptions, this International Standard provides guidance through examples.

5.2 Conformance class

Conformance to this International Standard is possible at a number of levels, specified by conformance classes (Clause 2). Each conformance class is summarized using the template shown as Table 7.

Table 7 — Conformance class template

Conformance class	**/conf/{classM}**
Dependency	[identifier for another conformance class]
Requirements	/req/{classA}
Tests	[reference to clause(s) containing tests]

All tests in a class shall be passed, so dependencies are on other conformance classes (see Resolution 570 of ISO/TC 211, N3262). Each conformance class tests conformance to a set of requirements packaged in a requirements class (Clause 7 and Clause 8).

5.3 Requirements class

Each normative statement (requirement or recommendation) in this International Standard forms part of a specific requirements class. In this International Standard, each requirements class is described in a discrete clause or subclause and summarized using the template shown as Table 8.

Table 8 — Requirements class template

Requirements class	**/req/{classM}**
Target type	[artefact or technology type]
Dependency	[identifier for another requirements class]
Requirement	/req/{classM}/{reqN}
Recommendation	/req/{classM}/{recO}
Requirement	/req/{classM}/{reqP}
Requirement /Recommendation	[repeat as necessary]

All requirements in a class shall be satisfied, so the requirements class is the unit of re-use and dependency. Hence, the value of a Dependency requirement is another requirements class.