

This is a preview of "ISO/TS 19150-1:2012". [Click here to purchase the full version from the ANSI store.](#)

First edition  
2012-11-15

---

---

# Geographic information — Ontology — Part 1: Framework

*Information géographique — Ontologie —  
Partie 1: Cadre de travail*



Reference number  
ISO/TS 19150-1:2012(E)

© ISO 2012



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO/TS 19150-1:2012". [Click here to purchase the full version from the ANSI store.](#)

## Contents

|   | Page      |
|---|-----------|
| <b>Foreword</b> .....   | <b>iv</b> |
| <b>Introduction</b> .....   | <b>v</b>  |
| <b>1 Scope</b> .....  | <b>1</b>  |
| <b>2 Conformance</b> .....  | <b>1</b>  |
| <b>3 Normative references</b> .....                                     | <b>1</b>  |
| <b>4 Terms and definitions</b> .....                                    | <b>1</b>  |
| <b>5 Symbols and abbreviated terms</b> .....                            | <b>3</b>  |
| <b>6 Ontology in geographic information</b> .....                       | <b>4</b>  |
| 6.1 Introduction.....   | 4         |
| 6.2 Values of ontologies.....   | 4         |
| 6.3 Issues of relevance.....  | 5         |
| <b>7 Framework</b> .....  | <b>5</b>  |
| 7.1 Overview of the framework.....                                      | 5         |
| 7.2 Rules for developing ontologies in the Web Ontology Language.....   | 7         |
| 7.3 Semantic operators.....   | 7         |
| 7.4 Service ontology.....   | 7         |
| 7.5 Domain ontology registry.....                                       | 9         |
| 7.6 Service ontology registry.....                                      | 9         |
| 7.7 Harmonized ontologies.....  | 9         |
| 7.8 Framework package dependencies.....                                 | 9         |
| <b>Annex A (normative) Abstract test suite</b> .....                    | <b>10</b> |
| <b>Annex B (informative) Background information on ontologies</b> ..... | <b>16</b> |
| <b>Annex C (informative) Ontology matching</b> .....                    | <b>27</b> |
| <b>Bibliography</b> .....   | <b>29</b> |

## 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 normative 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 19150-1 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

ISO/TS 19150 consists of the following parts, under the general title *Geographic information — Ontology*:

- *Part 1: Framework*
- *Part 2: Rules for developing ontologies in the Web Ontology Language (OWL)<sup>1)</sup>*

The following parts are under development:

- *Part 3: Semantic operators*
- *Part 4: Service ontology*
- *Part 5: Domain ontology registry*
- *Part 6: Service ontology registry*

---

1) To be published.

This is a preview of "ISO/TS 19150-1:2012". [Click here to purchase the full version from the ANSI store.](#)

## Introduction

For more than two decades (since the World Wide Web was established) the web has been a network of data with proper syntax (structure) but without any meaning (semantics) to the machine. The Semantic Web has introduced the Web of data. The Semantic Web became an extension of the already existing web of data, by adding machine-processable data (with embedded semantics) as opposed to just documents. It can be seen as a tremendous worldwide open database that people can query from their own perspective, understanding, or abstraction of real world phenomena or events and get accurate, detailed, and appropriate answers. This approach involves reasoning capabilities based on ontologies. Following this path the notion of "Linked Data" has been introduced for data of various kinds, coming from different sources, to be connected together on the Web by the way of HTTP URIs. As a consequence, the Semantic Web and Linked Data bring new opportunities for the geographic information realm to lay out a new generation of standards in order to benefit from these in achieving semantic interoperability of geographic information.

Ontology consists of a formal representation of phenomena of a universe of discourse with an underlying vocabulary including definitions and axioms that make the intended meaning explicit and describe phenomena and their interrelationships. It supports the representation of concepts that supports the interpretation of data and reasoning to concur to semantic interoperability. Data from different disciplines including geographic information can be integrated and contribute to addressing from specific (e.g. oil spill) to global problems (e.g. climate change).

This Technical Specification defines a high level framework that structures the standards specifically addressing the semantics of geographic information through ontologies. The proposed other parts of the framework include:

ISO 19150-2, *Geographic information — Ontology — Part 2: Rules for developing ontologies in the Web Ontology Language (OWL)*, defines rules and guidelines for the development of ontologies in OWL-DL, including a mapping between UML class diagram elements and OWL-DL and rules for describing application schemas in OWL-DL.

ISO 19150-3, *Geographic information — Ontology — Part 3: Semantic operators*, defines semantic proximity operators between concepts that complement geometric and temporal operators.

ISO 19150-4, *Geographic information — Ontology — Part 4: Service ontology*, identifies the framework for service ontology and defines the description of Web services for geographic information in an ontology language.

ISO 19150-5, *Geographic information — Ontology — Part 5: Domain ontology registry*, defines an international registry of geographic information domain ontologies and its maintenance.

ISO 19150-6, *Geographic information — Ontology — Part 6: Service ontology registry*, defines an international registry of geographic information service ontologies and its maintenance.

These parts are completed with the ISO/TC 211 Harmonized ontologies that consist of a set of OWL-DL ontologies that translate and complement the ISO/TC 211 Harmonized models developed in UML.

This Technical Specification is intended to be used primarily by standards developers in geographic information. It can also benefit information system analysts, program planners and developers of ISO geographic information standards. It will improve understanding of the basic principles of semantic interoperability and their consistent application to geographic information.