AS/NZS ISO 19101.1:2015
ISO 19101-1:2014

AS/NZS ISO 19101.1:2015

Australian/New Zealand Standard™

Geographic information—Reference model

Part 1: Fundamentals

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee IT-004, Geographical Information/Geomatics. It was approved on behalf of the Council of Standards Australia on 12 December 2014 and on behalf of the Council of Standards New Zealand on 20 January 2015.
This Standard was published on 13 February 2015.

The following are represented on Committee IT-004:

ANZLIC—The Spatial Information Council
Australian Antarctic Division
Australian Bureau of Meteorology
Australian Bureau of Statistics
Australian Hydrographic Office
CSIRO
Curtin University of Technology
Department of Communications (Australia)
Department of Defence (Australia)
Geoscience Australia (Australia)
Land Information New Zealand
New Zealand Geospatial Office
Science New Zealand
Spatial Industries Business Association

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS ISO 19101.1:2014.

Australian/New Zealand Standard™

Geographic information—Reference model

Part 1: Fundamentals

Originated as part of AS/NZS ISO 19101:2003.
Revised in part and redesignated as AS/NZS ISO 19101.1:2015.

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

ISBN 978 1 74342 972 3

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee IT-004 Geographical Information/Geomatics, to supersede AS/NZS ISO 19101.1:2003, *Geographic information—Reference model*.

The objective of this Standard is to specify, and provide geographic information system, developers with, the schema required for describing geographic information and services.

This Standard is identical with, and has been reproduced from ISO 19101-1:2014, *Geographic information—Reference model*, Part 1: *Fundamentals*.

As this Standard is reproduced from an International Standard, the following applies:

(a) In the source text 'this part of ISO 19101' should read 'this Australian/New Zealand Standard'.

(b) A full point substitutes for a comma when referring to a decimal marker.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A 'normative' annex is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

CONTENTS

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.

NOTES

AUSTRALIAN/NEW ZEALAND STANDARD

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)