
**Geographic information — Reference
model —**

**Part 2:
Imagery**

Information géographique — Modèle de référence —

Partie 2: Imagerie

ITeH Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 19101-2:2018](https://standards.iteh.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018)

<https://standards.iteh.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 19101-2:2018](https://standards.iteh.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018)

<https://standards.iteh.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms and symbols	6
4.1 Abbreviated terms.....	6
4.2 Symbols.....	9
5 Conformance	9
5.1 General.....	9
5.2 Enterprise conformance.....	9
5.3 Sensor conformance.....	9
5.4 Imagery data conformance.....	10
5.5 Imagery services conformance.....	10
5.6 Image processing system conformance.....	10
6 Notation	10
7 Enterprise viewpoint – Community objectives and policies	10
7.1 General.....	10
7.2 Geographic imagery community objective.....	10
7.3 Geographic imagery scenario.....	11
7.4 Geographic imagery policies.....	12
7.4.1 Introduction to policies.....	12
7.4.2 Policy development guidelines.....	12
7.4.3 Policies.....	12
8 Information Viewpoint — Knowledge-based decisions	13
8.1 Introduction to Information Viewpoint.....	13
8.1.1 Introduction to types of geographic imagery.....	13
8.1.2 Creating knowledge from imagery.....	15
8.1.3 General Feature Model.....	17
8.1.4 Topics relevant across data, information, and knowledge.....	18
8.2 Sensor data package.....	19
8.2.1 General.....	19
8.2.2 Sensors and platforms.....	19
8.2.3 Optical sensing.....	20
8.2.4 Microwave sensing.....	22
8.2.5 LIDAR sensor.....	25
8.2.6 Sonar sensor.....	27
8.2.7 Digital images from film.....	28
8.2.8 Scanned maps.....	28
8.2.9 Calibration, validation and metrology.....	29
8.2.10 Position and attitude determination.....	30
8.2.11 Image acquisition request.....	31
8.3 Geographic imagery information — Processed, located, gridded.....	31
8.3.1 General.....	31
8.3.2 IG_Scene.....	31
8.3.3 Derived imagery.....	35
8.3.4 Imagery metadata.....	38
8.3.5 Encoding rules for imagery.....	38
8.3.6 Imagery compression.....	40
8.4 Geographic imagery knowledge — Inference and interpretation.....	41
8.4.1 General.....	41

8.4.2	Knowledge from imagery	41
8.4.3	Image understanding and classification	41
8.4.4	IG_KnowledgeBase	43
8.5	Geographic imagery decision support — Context-specific applications	45
8.5.1	General	45
8.5.2	Decision support services	45
8.5.3	Geographic portrayal	46
8.5.4	Fitness for use context	48
8.5.5	Decision fusion	50
9	Computational viewpoint — Services for imagery	51
9.1	Task-oriented computation	51
9.2	Computational patterns	51
9.3	Geographic imagery services	52
9.4	Service chaining for imagery	54
9.5	Service metadata	54
10	Engineering Viewpoint — Deployment approaches	54
10.1	General	54
10.2	Distributed system for geographic imagery	55
10.3	Imagery Collection Node	56
10.4	Sensor Processing Node	57
10.5	Imagery Archive Node	57
10.6	Value Added Processing Node	58
10.7	Decision Support Node	59
10.8	Channels: networks and DCPs	60
10.8.1	Imagery considerations for channels	60
10.8.2	Space to ground communications	60
Annex A	(normative) Abstract test suite	61
Annex B	(informative) ISO Reference Model for Open Distributed Processing (RM-ODP)	63
Annex C	(informative) Imagery use cases	64
Annex D	(informative) Changes from ISO/TS 19101-2:2008	68
Bibliography	69

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This edition cancels and replaces the first edition (ISO/TS 19101-2:2008) which has been technically revised. In order to promote backward compatibility between different versions of standards, the changes that have been made between this document and the previous version are described in [Annex D](#).

A list of all parts in the ISO 19101 series can be found on the ISO website.

Introduction

This document provides a reference model for processing of geographic imagery which is frequently done in open distributed manners. The motivating themes addressed in this reference model are given below.

In terms of volume, imagery is the dominant form of geographic information.

- Stored geographic imagery volume will grow to the order of an exabyte.
- National imagery archives are multiple petabytes in size; ingesting a terabyte per day.
- Individual application data centers are archiving hundreds of terabytes of imagery.
- Tens of thousands of datasets have been catalogued and can be accessible online.

Large volumes of geographic imagery will not be portrayed directly by humans. Human attention is the scarce resource, and is insufficient to view petabytes of data. Semantic processing will be required: for example, automatic detection of features; data mining based on geographic concepts.

Information technology allows the sharing of geographic information products through processing of geographic imagery. Standards are needed to increase creation of products. A number of existing standards are used for the exchange of geographic imagery.

Examples of technical, legal, and administrative hurdles to moving imagery online include

- technical issues of accessibility – geocoding, geographic access standards,
- maintenance of intellectual property rights,
- maintenance of individual privacy rights as resolution increases, and
- technical issues of compatibility requiring standards.

Governments have been the predominant suppliers of remotely sensed data in the past. This is changing with the commercialization of remotely sensed data acquisition. Geographic imagery is a key input to decision support for policy makers.

The ultimate challenge is to enable the geographic imagery collected from different sources to become an integrated digital representation of the Earth widely accessible for humanity's critical decisions.

Currently a large number of standards exist that describe imagery data. The processing of imagery across multiple organizations and information technologies (IT) is hampered by the lack of a common abstract architecture. The establishment of a common framework will foster convergence at the framework level. In the future, multiple implementation standards are needed for data format and service interoperability to carry out the architecture defined in this document.

The objective of this document is the coordinated development of standards that allow the benefits of distributed geographic image processing to be realized in an environment of heterogeneous IT resources and multiple organizational domains. An underlying assumption is that uncoordinated standardization activities made without a plan cannot be united under the necessary framework.

This document provides a reference model for the processing of geographic imagery which is frequently done in open distributed manners. The basis for defining an information system in this document is the Reference Model for Open Distributed Processing (RM-ODP).^[42] A brief description of RM-ODP can be referenced in [Annex B](#). The basis for defining geographic information in this document is the ISO 19100 series of standards.

The RM-ODP^[42] viewpoints are used in the following fashion.

- Typical users and their business activities, and policies to carry out those activities, are addressed in the Enterprise Viewpoint.

- Data structures and the progressive addition of value to the resulting products are found in the schemas of the Information Viewpoint.
- Individual processing services and the chaining of services are addressed in the Computational Viewpoint.

Approaches to deploy the components of the Information and Computational viewpoints to distributed physical locations are addressed in the Engineering Viewpoint.

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO 19101-2:2018](https://standards.itih.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018)

<https://standards.itih.ai/catalog/standards/iso/c2bff42b-04f6-4e7b-8037-b80c2b2232ad/iso-19101-2-2018>