INTERNATIONAL STANDARD

**ISO/IEC 18026**

Second edition
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# Information technology — Spatial Reference Model (SRM)

*Technologies de l'information — Modèle de référence spatial (SRM)*

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# Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 18026 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics, image processing and environmental data representation*, in collaboration with The SEDRIS Organization.

This second edition cancels and replaces the first edition (ISO/IEC 18026:2006), of which it constitutes a minor revision. It also incorporates the Technical Corrigendum ISO/IEC 18026:2006/Cor.1:2007.

# 0 Introduction

## 0.1 Purpose

Spatial information processing requires a robust capability to describe geometric properties such as position, direction and distance. Information might be spatially referenced to local structures (Example: building interiors) and regions (Example: cities), or spatially referenced to the Earth as a whole (Example: global weather). Information might be spatially referenced to other celestial bodies (Examples: astronomical, orbital, and geomagnetic observations). Information might also be spatially referenced to objects defined within contexts such as virtual realities (Example: 3D models). In each of these cases, a spatial reference frame is defined, with respect to which the values of geometric properties can be determined.

It is often necessary to represent a position in several different spatial reference frames, simultaneously, according to the context in which the position is to be used. Each spatial reference frame corresponds to a particular way of expressing position. Spatial reference frames might be relative to moving objects (Examples: planets and spacecraft), and therefore have values that are a function of time. It is necessary to specify the time to which the spatial position refers, and the time for which the spatial reference frame is defined.

This International Standard defines the conceptual model and the methodologies that allow the description, and transformation or conversion, of geometric properties within or among spatial reference frames. The Spatial Reference Model (SRM) supports unambiguous specification of the positions, directions, distances, and times associated with spatial information. It also defines algorithms for precise transformation of positions, directions and distances among different spatial reference frames.

## 0.2 Design criteria

The concepts in this International Standard were developed to fulfil the following requirements:

a) *Unification*: Define a comprehensive set of general principles and specific concepts that allow spatial information to be shared among different communities.

b) *Unambiguity*: Provide for the unambiguous specification of spatial concepts and the spatial relationships among geometric objects.

c) *Extensibility*: Provide a framework under which future spatial concepts can be accommodated through registration of new concepts.

d) *Completeness*: Specify a broad set of well-defined spatial reference frames, their parameter sets, and spatial operations.

e) *Implementability*: Define an application program interface supporting spatial reference frames and spatial operations.

f) *Mathematical formulation explicitness:* Provide mathematical formulations to support conformance testing.

# Information technology — Spatial Reference Model (SRM)

## 1 Scope

This International Standard specifies the Spatial Reference Model (SRM) defining relevant aspects of spatial positioning and related information processing. The SRM allows precise and unambiguous specification of geometric properties such as position (location), direction, and distance. The SRM addresses the needs of a broad community of users, who have a range of accuracy and performance requirements in computationally intensive applications.

Aspects of this International Standard apply to, but are not limited to:

a) mapping, charting, geodesy, and imagery;

b) topography;

c) location-based services;

d) oceanography;

e) meteorology and climatology;

f) interplanetary and planetary sciences;

g) embedded systems; and

h) modelling and simulation.

The application program interface supports more than 30 forms of position representation. To ensure that spatial operations are performed consistently, the application program interface specifies conversion operations with functionality defined to ensure high precision transformation between alternative representations of geometric properties.

This International Standard is not intended to replace the standards and specifications developed by ISO/TC 211, ISO/TC 184, the International Astronomical Union (IAU), and the International Association of Geodesy (IAG). It is applicable to applications whose spatial information requirements overlap two or more of the application areas that are the scope of the work of ISO/TC 211, ISO/TC 184, the IAU, and the IAG.

## 2 Normative references

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

NOTE 1 Because citations to International Standards are made by giving the number of the standard followed by the year (if applicable) and any other specific information identifying the portion of the standard cited, identifiers are not needed for this purpose. Therefore the identifier element is grey when a reference is an International Standard.

| Identifier | Reference |
|---|---|
| | ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*. |
| | ISO/IEC 9973:2006, *Information technology — Computer graphics, image processing and environmental data representation — Procedures for registration of items.* |
| | IEC 60559:1989, *Binary floating-point arithmetic for microprocessor systems* (previously designated IEC 559:1989). |
| | ISO 80000-2:—, *Quantities and units — Part 2: Mathematical signs and symbols to be used in the natural sciences and technology.* |
| | ISO 80000-3:2006, *Quantities and units — Part 3: Space and time.* |
| I460 | International Telecommunication Union (ITU). *Standard-Frequency and Time-Signal Emissions.* Geneva: ITU, 1997. ITU document ITU-R TF.460-6:2002. |
| RIIC | Seidelmann, P.K., *et al*. *Report of the IAU/IAG Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: 2000*. Celestial Mechanics and Dynamical Astronomy, vol. 82, p. 83-110. Dordrecht (Netherlands): Kluwer Academic Publishers, 2002. |
| 83502T | US National Geospatial-Intelligence Agency (NGA). *Department of Defense World Geodetic System 1984 - Its Definition and Relationships with Local Geodetic Systems*. Washington: NGA. Technical report TR 8350.2. |

NOTE 2 ISO 80000-2 is to be published as a technical revision of ISO 31-11:1992.

http://standards.iso.org/ittf/PubliclyAvailableStandards/