
**Building information modelling
and other digital processes used
in construction — Methodology
to describe, author and maintain
properties in interconnected data
dictionaries**

iTeh STANDARD PREVIEW
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*Modélisation des informations de la construction et autres processus
numériques utilisés en construction — Méthodologie de description,
de création et de gestion des propriétés dans les dictionnaires de
données interconnectés*

ISO 23386:2020

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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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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 442, *Building Information Modelling (BIM)*, in collaboration with ISO Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 13, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In the digital built environment, there will not be a single data dictionary which comprises all the definitions which are needed in all BIM domains. Different groups, possibly in different countries, will create or have created separate data dictionaries, specialized for their needs, based on the legislation and culture. We are, and will be faced with, various separated data dictionaries. They may even reside on the same platform yet logically they are detached.

For the future of BIM, it is important to ensure that these data dictionaries can be interoperable in tools and applications.

- The elements of the data dictionaries need to be described by the same attributes. If this is agreed and done by all data dictionary providers, it becomes possible to map properties in one data dictionary to properties in other data dictionaries. This can lead to reuse of properties and to the harmonization of properties across data dictionaries. In addition, this is an important step to allow BIM applications to use multiple data dictionaries consistently.
- The governance of the data dictionaries needs to follow the same rules with respect to the building and development of the data dictionaries' content.

The assumption is that the data dictionaries are independent from each other, they are connected in a coordinated network of data dictionaries (again, there may exist several of these networks). Within the network, the data dictionaries are related, which is visible, for instance, using a specific attribute which maps properties and groups of properties of different data dictionaries to each other. Any data dictionary in the network of coordinated data dictionaries is independent, i.e. it has its own processes and committees to control the development and evolution of the data dictionary; meanwhile, they all follow the same description and governance rules described in this document.

This document specifies the attributes to define properties and groups of properties of a single data dictionary as well as the processes and commissions/roles for the governance of a single data dictionary in a network of coordinated data dictionaries. In the governance processes, it is described how the single data dictionary deals with queries and change requests and the extension of queries to other connected data dictionaries; information of other connected data dictionaries regarding change is an integral part of this process.

This document contributes to ensuring the quality and the unicity of property descriptions and avoiding the creation of duplicates.

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Building information modelling and other digital processes used in construction — Methodology to describe, author and maintain properties in interconnected data dictionaries

1 Scope

This document establishes the rules for defining properties used in construction and a methodology for authoring and maintaining them, for a confident and seamless digital share among stakeholders following a BIM process.

Regarding the definition of properties and groups of properties, this document provides:

- definitions of properties and groups of properties as a list of attributes;
- definitions of all the provided attributes.

Regarding the authoring and maintaining process, this document provides:

- definitions and roles of applicants;
- definitions and roles of experts and the commission of experts;
- definitions of request's attributes;
- definitions of expert's attributes;
- requirements to establish the management rules to interconnect data dictionaries through the mapping process for properties and groups of properties.

To apply the methodology of this document, it is presupposed that the following are in place:

- an established governance model for a data dictionary;
- a framework for a network of data dictionaries.

It is not in the scope of this document to provide the content of the interconnected data dictionaries.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 3166-2, *Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code*

ISO 4217, *Codes for the representation of currencies*

ISO 8601 (all parts), *Date and time — Representations for information interchange*

ISO/IEC 11404, *Information technology — General-Purpose Datatypes (GPD)*

ISO 12006-3, *Building construction — Organization of information about construction works — Part 3: Framework for object-oriented information*

ISO 80000 (all parts), *Quantities and units*

IETF <https://www.ietf.org/>

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 alternative use

category of *group of properties* (3.14) not corresponding to *class* (3.7), *domain* (3.11), *reference document* (3.18) or *composed property* (3.8)

Note 1 to entry: This category of group of properties shall be used only after having considered the possible use of all the other categories.

3.2 applicant

user (3.21) formulating a request for the creation, modification or deactivation of a *property* (3.17) or a *group of properties* (3.14)

3.3 area of competence

area of an *expert's* (3.12) proficiency and knowledge associated to one or several *groups of properties* (3.14)

EXAMPLE An area of competence could be:

- *domain* (3.11);
- *class* (3.7);
- *reference document* (3.18).

3.4 attribute

data element for the computer-sensible description of a *property* (3.17), a *group of properties* (3.14), etc.

Note 1 to entry: An attribute describes only one single detail of a property or a group of properties.

EXAMPLE The name of a property, the definition of a group of properties.

[SOURCE: ISO 13584-42:2010, 3.3, modified — In the definition and Note 1 to entry, references to "a relation or a class" have been replaced with "a group of properties"; the EXAMPLE has been updated.]

3.5 base quantity

quantity in a conventionally chosen subset of a given system of quantities, where no *quantity* (3.16) in the subset can be expressed in terms of the other quantities within that subset

[SOURCE: ISO 80000-1:2009, 3.4, modified — NOTES 1 to 4 have been removed.]

3.6

building information modelling BIM

use of a shared digital representation of an asset to facilitate design, construction and operation processes to form a reliable basis for decisions

[SOURCE: ISO 19650-1:2018, 3.3.14, modified — The wording "a built asset" has been changed to "an asset"; Note 1 to entry has been removed.]

3.7

class

description of a set of objects that share the same characteristics

Note 1 to entry: The characteristics may be embodied by the use of properties, operations, methods, relations, semantics, etc.

Note 2 to entry: Each class is a hierarchical element of a classification.

[SOURCE: ISO 22274:2013, 3.4, modified — Note 2 to entry has been added.]

3.8

composed property

category of *group of properties* (3.14) corresponding to a feature needing multiple properties to be defined

Note 1 to entry: Using this category of group of properties requires to fill all the properties part of the composed property. There is no *value* (3.20) attached to the group of properties.

EXAMPLE To describe the characteristic "concrete facing quality" it is mandatory to describe 3 properties: concrete planarity, concrete hue, concrete texture.

3.9

data dictionary

centralized repository of information about data such as meaning, relationships to other data, origin, usage and format

Note 1 to entry: The definition is from IBM Dictionary of Computing^[15].

3.10

derived quantity

quantity (3.16), in a system of quantities, defined in terms of the *base quantities* (3.5) of that system

EXAMPLE In a system of quantities having the base quantities length and mass, mass density is a derived quantity defined as the quotient of mass and volume (length to the power three).

[SOURCE: ISO 80000-1:2009, 3.5, modified — The NOTE has been removed.]

3.11

domain

area of activity covering a science, a technique, a material, etc.

Note 1 to entry: A domain can be associated with a group to which the *property* (3.17) applies.

3.12

expert

person who, through knowledge or experience, has competence to give an opinion in the fields about which he/she is consulted

[SOURCE: ISO 13302:2003, 3.10, modified — The domain "<general sense>" has been removed; the NOTE has been removed.]

3.13

globally unique identifier GUID

unique identifier generated using an algorithm

Note 1 to entry: In ISO 16739-1 and ISO 12006-3 the compressed version of GUID is used.

3.14

group of properties

collection enabling the *properties* (3.17) to be prearranged or organized

Note 1 to entry: A Property Set as defined in ISO 16739-1 is a group of properties, but a group of properties is not necessarily a Property Set.

Note 2 to entry: There are five categories of possible groups of properties: *class* (3.7), *domain* (3.11), *reference document* (3.18), *composed property* (3.8), *alternative use* (3.1).

Note 3 to entry: The category of group of properties alternative use shall be used only after having considered the possible use of all the other categories.

Note 4 to entry: A *property* (3.17) can be member of several groups of properties. A property cannot be member of several Property Sets as defined in ISO 16739-1.

3.15

interconnected data dictionaries

set of *data dictionaries* (3.9) following this document and connected using specific *attributes* (3.4)

3.16

quantity

property (3.17) of a phenomenon, body, or substance, where the property has a magnitude that can be expressed by means of a number and a reference

Note 1 to entry: Quantities can appear as *base quantities* (3.5) or *derived quantities* (3.10).

EXAMPLE 1 Length, mass, electric current (ISQ base quantities).

EXAMPLE 2 Plane angle, force, power (derived quantities).

[SOURCE: ISO 80000-1:2009, 3.1, modified — NOTES 1 to 6 have been removed; new Note 1 to entry and two EXAMPLES have been added.]

3.17

property

inherent or acquired feature of an item

EXAMPLE Thermal efficiency, heat flow, sound reduction index, sound power level, colour.

[SOURCE: ISO 6707-1:2017, 3.7.1.3, modified — The EXAMPLE has been added.]

3.18

reference document

publication that is consulted to find specific information, particularly in a technical or scientific *domain* (3.11)

Note 1 to entry: A reference document can be associated with any data present in a *data dictionary* (3.9).

3.19**unit**

unit of measurement

measurement unit

real scalar quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared to express the ratio of the second quantity to the first one as a number

[SOURCE: ISO 80000-1:2009, 3.9, modified — NOTES 1 to 5 have been removed; "unit" has been changed to be a preferred term and "unit of measurement" an admitted term.]

3.20**value**

quantity value

value of a quantity

number and reference together expressing magnitude of a quantity

EXAMPLE 1 Length of a given rod: 5,34 m or 534 cm.

EXAMPLE 2 Mass of a given body: 0,152 kg or 152 g.

EXAMPLE 3 Curvature of a given arc: 112 m⁻¹.

EXAMPLE 4 Celsius temperature of a given sample: -5 °C.

EXAMPLE 5 Electric impedance of a given circuit element at a given frequency, where *j* is the imaginary unit (3.19): (7 + 3j) Ω.

EXAMPLE 6 Refractive index of a given sample of glass: 1,32.

EXAMPLE 7 Rockwell C hardness of a given sample (150 kg load): 43,5 HRC (150 kg).

EXAMPLE 8 Mass fraction of cadmium in a given sample of copper: 3 µg/kg or 3 × 10⁻⁹.

EXAMPLE 9 Molality of Pb²⁺ in a given sample of water: 1,76 µmol/kg.

EXAMPLE 10 Amount-of-substance concentration of lutropin in a given sample of plasma (WHO international standard 80/552): 5,0 IU/l (WHO International Units per litre).

[SOURCE: ISO 80000-1:2009, 3.19, modified — NOTES 1 to 5 have been removed; "value" has been changed to be a preferred term and "quantity value" an admitted term.]

3.21**user**

person or legal entity that interacts with the *interconnected data dictionaries* (3.15) via an interface providing access to the network of *data dictionaries* (3.9)

4 Rules to define properties and groups of properties**4.1 General**

To be non-ambiguous, machine-readable as well as human-understandable, properties and groups of properties shall be defined by a set of attributes. Some attributes are mandatory, and others are optional.

For a property to be human-understandable, any application following this document may be able to display the value of many attributes defining this property, for example name, name of the reference document, test method, unit, etc.

4.2 Property

A property shall be defined using the set of attributes as listed in [Table 1](#).

4.3 Group of properties

A group of properties shall be defined using the set of attributes as listed in [Table 2](#).

Applicants can propose a group of properties as appropriate for their needs.

The different categories of a group of properties are (exhaustive list):

- alternative use;
- class;
- composed property;
- domain;
- reference document.

Groups of properties can be organised in tree structures. Any property attached to a group of properties is inherited by the sub-group(s) of properties.

Any property may be included in several groups of properties.

EXAMPLE

- class: Panel (class corresponding to a family of products in a classification);
- class: ifcWall;
- domain: Acoustic (domain corresponding to a scientific discipline), architecture, economy;
- composed property: “concrete facing quality” is a group of properties linking 3 properties (concrete planarity, concrete hue, concrete texture).

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4.4 Attributes list

4.4.1 Attributes of a property

[Table 1](#) provides an exhaustive list of attributes used to manage a property within a data dictionary.

[Table 1](#) contains 8 columns:

- Code: code that can be used to identify the attribute;
- Name: name of the attribute;
- Description: description of the attribute, and how it shall be used;
- Example: some examples of possible values for the attribute;
- Interconnected data dictionaries management rule: rule that defines if it is mandatory or not to provide a value for the attribute. When “calculated” is noticed, this means that the value of the attribute is provided by the system managing a data dictionary, not by a user (i.e. when a request has been validated, the system shall change the property’s attribute “status” to “active”);
- Request form management rule: rule that defines if it is mandatory or not relevant to provide a value for the attribute in a request form to interact with the data dictionary;
- Type: datatype of the attribute;
- List of values: list of possible values for the attribute.

Table 1 — Property attributes

Code	Name	Description	Example	Interconnected data dictionaries management rule	Request from management rule	Type	List of values
PA001	Globally unique identifier	Globally unique identifier	936DA01F-9ABD-4D9D-80C7-02AF85C822A8	Mandatory Calculated	Not relevant	String Single-value	
PA002	Status	Status of the property during its life cycle	Active	Mandatory Calculated	Not relevant	Enumeration Single-value	Active Inactive
PA003	Date of creation	Date of validation of the property creation request by experts	2014-04-30T10:39:53Z	Mandatory Calculated	Not relevant	Date In accordance with ISO 8601 (all parts) Format = YYYY-MM-DDThh:mm:ssTZD	
PA004	Date of activation	Date after when the property can be used	2014-04-30T10:39:53Z	Mandatory if the property is validated Calculated	Not relevant	Date In accordance with ISO 8601 (all parts) Format = YYYY-MM-DDThh:mm:ssTZD	
PA005	Date of last change	Date of validation of the last change request by experts	2014-04-30T10:39:53Z	Mandatory if the property has changed Calculated	Not relevant	Date In accordance with ISO 8601 (all parts) Format = YYYY-MM-DDThh:mm:ssTZD	
PA006	Date of revision	Date of the revision	2014-04-30T10:39:53Z	Mandatory Calculated	Not relevant	Date In accordance with ISO 8601 (all parts) Format = YYYY-MM-DDThh:mm:ssTZD	
PA007	Date of version	Date of the version	2014-04-30T10:39:53Z	Mandatory Calculated	Not relevant	Date In accordance with ISO 8601 (all parts) Format = YYYY-MM-DDThh:mm:ssTZD	