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**Enterprise modelling and  
architecture — Constructs for  
enterprise modelling**

*Modélisation et architecture d'entreprise — Constructions pour la  
modélisation d'entreprise*



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# Contents

Page

<b>Foreword</b>	<b>vi</b>
<b>Introduction</b>	<b>viii</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
<b>4 Abbreviated terms</b>	<b>11</b>
4.1 General	11
4.2 Construct-specific	11
<b>5 Representations, relationships, roles and common concepts</b>	<b>12</b>
5.1 Modelling language constructs, purpose and applicability	12
5.2 Dimensions of enterprise models	13
5.2.1 Dimension of genericity	13
5.2.2 Dimension of enterprise model phase	13
5.2.3 Dimension of enterprise model views	13
5.3 Construct representation	13
5.4 Common structure for modelling language constructs	14
5.5 Template for modelling language constructs	14
5.6 Referential integrity	15
5.7 Representation of attributes	17
5.8 Notation used to describe template contents	17
5.9 Support for modelling phases	18
5.10 Representation of relationships	19
5.11 Specializations	19
5.12 Complementary concepts	20
<b>6 Conceptual structure</b>	<b>20</b>
6.1 The four-component model	20
6.2 Meta-model component	21
6.3 Core component	22
6.4 Derivations component	24
6.5 Views component	25
<b>7 Core constructs</b>	<b>26</b>
7.1 Domain	26
7.1.1 Purpose	26
7.1.2 Description	26
7.1.3 Usage	26
7.1.4 Construct template for Domain	26
7.2 Business Process	28
7.2.1 Purpose	28
7.2.2 Description	28
7.2.3 Usage	29
7.2.4 Construct template for Business Process	29
7.2.5 Behavioural rules	30
7.3 Enterprise Activity	31
7.3.1 Purpose	31
7.3.2 Description	31
7.3.3 Usage	31
7.3.4 Construct template for Enterprise Activity	32
7.4 Service	34
7.4.1 Purpose	34
7.4.2 Description	34
7.4.3 Usage	34
7.4.4 Construct template for Service	35

7.5	Event	37
7.5.1	Purpose	37
7.5.2	Description	37
7.5.3	Usage	37
7.5.4	Construct template for Event	37
7.6	Enterprise Object	38
7.6.1	Purpose	38
7.6.2	Description	38
7.6.3	Usage	38
7.6.4	Construct template for Enterprise Object	39
7.7	Enterprise Object View (Object View)	40
7.7.1	Purpose	40
7.7.2	Description	40
7.7.3	Usage	40
7.7.4	Construct template for Object View	40
7.8	Organizational Unit	41
7.8.1	Purpose	41
7.8.2	Description	41
7.8.3	Usage	41
7.8.4	Construct template for Organizational Unit	42
7.9	Decision Centre	43
7.9.1	Purpose	43
7.9.2	Description	43
7.9.3	Usage	43
7.9.4	Construct template for Decision Centre	43
7.10	Role	45
7.10.1	Purpose	45
7.10.2	Description	45
7.10.3	Usage	45
7.10.4	Construct template for Role	45
7.11	Product	46
7.11.1	Purpose	46
7.11.2	Description	46
7.11.3	Usage	46
7.11.4	Construct template for Product	47
7.12	Order	48
7.12.1	Purpose	48
7.12.2	Description	48
7.12.3	Usage	48
7.12.4	Construct template for Order	49
7.13	Resource	50
7.13.1	Purpose	50
7.13.2	Description	50
7.13.3	Usage	51
7.13.4	Construct template for Resource	51
7.14	Capability	53
7.14.1	Purpose	53
7.14.2	Description	53
7.14.3	Usage	53
7.14.4	Construct template for Capability	53
7.15	Performance Indicator	54
7.15.1	Purpose	54
7.15.2	Description	54
7.15.3	Usage	55
7.15.4	Construct template for Performance Indicator	55
7.16	Template attributes for core constructs	56
<b>8</b>	<b>Derived constructs</b>	<b>57</b>
8.1	Overview	57

8.2	Derivations for a manufacturing-oriented enterprise .....	58
8.2.1	Purpose .....	58
8.2.2	Use of core constructs .....	58
8.2.3	Manufacturing derivations and core constructs .....	59
8.3	Derivations for a service-oriented enterprise .....	61
8.3.1	Purpose .....	61
8.3.2	Service system suppliers .....	61
8.3.3	Use of core constructs .....	61
8.3.4	Service derivations and core constructs .....	62
8.4	Derived constructs .....	63
8.4.1	Organizational Role .....	63
8.4.2	Operational Role .....	64
8.4.3	Person Profile .....	65
8.4.4	Stakeholder .....	67
8.4.5	User .....	68
8.4.6	Co-provider .....	69
8.4.7	Functionality .....	69
<b>Annex A (normative)</b>	<b>Behavioural rules — Detailed description and syntax .....</b>	<b>71</b>
<b>Annex B (informative)</b>	<b>Model views .....</b>	<b>85</b>
<b>Bibliography</b> .....		<b>110</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.

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](http://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](http://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 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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 5, *Interoperability, integration, and architectures for enterprise systems and automation applications*.

This second edition cancels and replaces the first edition (ISO 19440:2007), which has been technically revised.

The main changes compared to the previous edition are as follows:

- updates to the terms and definitions to address latest practice and harmonize with ISO 15704 and ISO/IEC/IEEE 42010;
- reorganization of the material into four components (metamodel, core constructs, specializations and model views), as described in [6.1](#);
- separation of the constructs into a slightly smaller number of core constructs in [6.3](#) and [Clause 7](#), and specializations thereof (which can be extended by a model user) in [Clause 8](#);
- introduction of a Service construct as a core construct, with specializations in [8.3](#) to address servitization;
- expansion of the Decision View in [Clause B.4](#) and introduction of a new Collaboration View in [Clause B.5](#) to demonstrate extensibility, i.e. use in other application domains;
- renaming of the construct property 'descriptive' as 'attribute';
- introduction of a Role core construct as a generalization of Organizational Role, Operational Role and Person Profile;
- introduction of a Performance Indicator core construct to support operational monitoring and process improvement;
- allowing an Enterprise Activity to be decomposable into sub-activities;

- elimination of Functional Entity to reduce the number of core constructs and replacing it by 'active Resource';
- insertion (in [Clause A.1](#)) of new text explaining why and how behavioural rules need to be constrained;
- deletion of annexes which will be included in a future Technical Report on typical usages of identification and usage of constructs in each model phase.

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](http://www.iso.org/members.html).

## Introduction

This document defines the generic concepts that are required to enable the creation of enterprise models for industrial and other businesses and to provide support for the use of frameworks by industrial and other enterprises. This document builds upon ISO 19439 and defines and details a set of conformant user-oriented modelling language constructs for manufacturing and related services, which provide common semantics and enable the unification of models developed by different stakeholders in the various phases of model development. Such models are aimed at model-based support of operational decision-making and can be employed for model-based operation monitoring and control.

The modelling language constructs defined in this document can be specialized or assembled or both specialized and assembled into structures for specific purposes, for example for an industry or enterprise sector or for a distinct kind of enterprise concern such as maintenance. In turn, such structures and generic modelling language constructs can be used for developing distinct models for a specific enterprise.

The general requirements that determine the characteristics of the core constructs necessary for computer-supported modelling of enterprises are

- a) the provision of an explicit model of Business Processes, with their dynamics, functions, information, resources, relationships and organizational responsibilities,
- b) sufficient detailing and qualification of enterprise components to allow the creation of a model for a specific enterprise,
- c) support for management of change, and
- d) end-user-oriented representation to enable operational use.

**NOTE** All Unified Modelling Language (UML) class model figures are computer-generated scalable vector graphics (SVG). All generalization-specialization relationships in those class models are coloured red for increased clarity. [Figures B.10](#) and [B.11](#) are line drawings.

The names of terms representing core constructs (see [Clause 7](#)) and derived constructs (see [Clause 8](#)) are capitalized throughout this document to aid the reader in distinguishing them from general usages of the same term, specifically in order to distinguish the constructs Capability, Domain, Enterprise Activity, Event and Resource from general usage of capability, domain (or enterprise domain), enterprise activity, event and resource.



# Enterprise modelling and architecture — Constructs for enterprise modelling

**IMPORTANT** — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

## 1 Scope

This document identifies and specifies constructs necessary for users that model enterprises in conformance with ISO 19439.

This document focuses on, but is not restricted to, engineering and the integration of manufacturing and related services in the enterprise. The constructs enable the description of structure and functioning of an enterprise for use in configuring or implementing in different application domains. This document specifies an implementation framework in [Clause 6](#) to map model constructs into such domains.

## 2 Normative references

There are no normative references in this document.

## 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

#### aggregation

<enterprise modelling> process of, or result of, combining *modelling language constructs* ([3.50](#)) and other *model* ([3.49](#)) *components* ([3.9](#)) into a *whole entity* ([3.35](#))

Note 1 to entry: Modelling language constructs and other model components can be part of more than one aggregation.

Note 2 to entry: Both Part-of and Consists-of are used in the aggregation *relationships* ([3.64](#)) described in [7.16](#).

### 3.2

#### attribute

piece of information stating a property of an *entity* ([3.35](#))

[SOURCE: ISO 19439:2006, 3.2]

### 3.3

#### behavioural rule

<enterprise modelling> description of the logical sequencing *relationships* ([3.64](#)) of constituent activities used in the specification of *Business Process* ([3.4](#)) and *Service* ([3.71](#)) behaviour