INTERNATIONAL STANDARD

ISO 15704

Enterprise modelling and architecture — Requirements for enterprise-referencing architectures and methodologies

Modélisation et architecture d'entreprise — Exigences pour les architectures et les méthodologies de référencement d'entreprise

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Contents

Page

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).

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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 Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 5, *Interoperability, integration, and architecture for enterprise systems and automation applications*.

This second edition cancels and replaces the first edition (ISO 15704:2000), which has been technically revised. It also incorporates the Amendment ISO 15704:2000/Amd.1:2005.

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

— alignment of terminology for consistency with other standards developed by ISO/TC 184/SC 5;

— incorporation of the rules and guidelines for modelling from ISO 14258 to express enterprise-referencing architecture methodologies;

— revision of content related to recursive structure and iterative methods;

— redrafting of life history concept to address enterprise change management;

— discussion of modelling dimensions necessary for user views, including the extent of detail and composite models that span dimensions;

— harmonization with ISO/IEC/IEEE 42010 and other International Standards related to architecture for enterprise systems;

— inclusion of discussion concerning the relationship of this document with other International Standards related to architecture for enterprise systems (ISO/IEC 10746, IEC 62264, ISO 15745);

— updating of Annex B on Generalized Enterprise Reference Architecture and Methodology (GERAM) in accordance with GERAM 1.6.3.

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

0.1 Rationale for enterprise architectures and models

Industrial and information age enterprises create and modify manufacturing and business operations to improve performance in local and global markets. In operation they deploy a variety of resources including people, information systems, automated machinery and business services. Individually and collectively these resources provide the functional capabilities required to perform manufacturing and business processes and their constituent activities. The arrangement, targeting and interworking of resources need to accomplish the enterprise mission, which requires suitable business rules and organizational structures that enable the enterprise to provide products and services in conformance with agreed upon criteria.

Enterprises operate under uncertain and changing market and environmental conditions that make ongoing enterprise engineering beneficial. Enterprises cooperate within a heterogeneous environment with multiple constituents using different models and systems. In addition, most enterprises operate within the context of another enterprise with which it interoperates, as with a supply chain or the parent company. It follows that enterprise personnel have a variety of responsibilities in the conception and ongoing development of the mission, business rules, manufacturing and business processes, organizational structures, and supporting resources and services. Because of the complexity involved in enterprise engineering, invariably it becomes necessary to deploy means of assessing, structuring, coordinating and supporting these engineering activities, including means for collaboration support and interoperation.

Generalized enterprise-referencing architecture concerns and components of enterprise modelling constitute a reference base that provides a generally applicable means of arranging and coordinating enterprise engineering and associated technology development and deployment projects. By adopting and adapting such a reference base, enterprise personnel can cooperate in progressing enterprise engineering projects, improving the enterprise, improving stakeholder's communications and utilizing enterprise resources. By adopting appropriate tool sets, enterprise personnel can reuse in a practical way explicit enterprise designs and models to realize the benefits of enterprise engineering on a continual basis and realize further improvements in enterprise operation.

Such a reference base needs to include capabilities that:

— capture concerns of mission fulfilment stakeholders (manufacturing, transport, service delivery, etc.) and of business stakeholders;

— describe suitable solutions to identified problems within the enterprise;

— model the whole life history of an enterprise integration project from its initial concept through development, operation and finally decommissioning or obsolescence; and

— encompass the people, processes, resources and organizations involved in performing, managing, and controlling the enterprise mission.

From an enterprise engineering perspective, the following distinction is drawn:

— enterprise architecture refers to the arrangement of physical components, logical relationships, and human interactions involved in the development, implementation and operation for a programme such as enterprise integration or other enterprise related programme, usually including a set of projects; and

— system architecture refers to the arrangement of physical components and logical relations of a system that is a constituent of an enterprise; for example, the computer-control-system part of an overall enterprise or product.

This document does not present or adopt specific methodologies for creating or using enterprise architectures or models. The focus is on establishing a reference base capable of supporting specific enterprise programmes, rather than a design intended to fulfil the stated requirements.

This document identifies an extensive collection of potential artefacts for expressing an enterprise-referencing architecture and its associated methodologies. Not all of these artefacts will be applicable, necessary or even desirable for all architecting efforts. The identification of these artefacts assures that this document meets the needs of the widest possible number of enterprise-referencing architecture and methodology situations. Users of this document need to assess not only the value of generating an identified artefact but also the value of maintaining that artefact under the changing circumstances of the referenced enterprise.

0.2 Rationale for this document

Well-designed standards in the domain of enterprise integration and modelling provide a point of reference for enterprise architects and designers, thereby significantly reducing the risk of investing in islands of integration. Where an island does exist, these standards assist the architect or designer to create the translation necessary for the island to interact within an established context. A standard for enterprise-referencing models enhances interoperability by establishing the elements that are required in a model intended to support enterprise architecture.

This document defines concepts, rules and requirements for architecture descriptions that refer to an enterprise, most often articulated as models, with the intent to guide and constrain other standards or implementations that do or will exist on the topic. To realize this intent, this document specifies the concepts to use when producing an enterprise-referencing architecture (see Clause 5) and when constructing enterprise-referencing models (see Clause 6). This document provides a reference base, guidelines and constraints for enterprise architecture and models to anyone engaged in enterprise activities where models are utilized.

0.3 Benefits of this document

The requirements of the reference base for enterprise-referencing architecture and models in this document allow assessment of an enterprise architecture framework or other approach as well as associated methodology and languages for completeness with respect to current and future purpose of the architecture effort. This document will help guide development programmes.

When conforming implementation designs have the same technology areas and nomenclature, or can map to them readily, the information from one enterprise or process is more readily sharable with information of another enterprise or process.

The benefit will be most relevant to any group charged with improving an enterprise infrastructure or its processes. Such a group will find it necessary to either select or create a reference architecture of its own with terminology that pertains specifically to the company, industry, and culture involved. This document will help guide that selection or creation.

This document expects users that are:

— enterprise planners, builders, modifiers, and analysts using the requirements to check completeness of their activity;

— enterprise-referencing model builders using the requirements to assure consistency between models to enable model interoperability; and

— developers of standards for enterprise representation using the requirements to assure consistency between their standards and this document.

NOTE   While the requirements specified herein cover a broad range of enterprise considerations, many users find it advantageous to structure the topics considered into a specific framework for their own work. Such a framework is a methodological choice of the user and goes beyond the scope of this document. Annex B discusses a framework consistent with this document and other International Standards provide further framework guidance.

Enterprise modelling and architecture — Requirements for enterprise-referencing architectures and methodologies

1 Scope

This document specifies a reference base of concepts and principles for enterprise architectures that enable enterprise development, enterprise integration, enterprise interoperability, human understanding and computer processing. This document further specifies requirements for models and languages created for expressing such enterprise architectures.

This document specifies those terms, concepts and principles considered necessary to address stakeholder concerns and to carry out enterprise creation programmes as well as any incremental change projects required by the enterprise throughout the whole life of the enterprise. This document forms the basis by which enterprise architecture and modelling standards can be developed or aligned.

This document does not define standard enterprises, standard organizational structures, standard enterprise processes, or standard enterprise data. In addition, this standard does not specify enterprise modelling processes.

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:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
architecture
conceptualization of the form, function, and fitness-for-purpose of an *enterprise* (3.4) in its *environment* (3.9), as embodied in the elements of the enterprise, the relationships between those elements, the relationship of the enterprise to its environment and the principles guiding the design and evolution of the enterprise

Note 1 to entry: Since architecture in an enterprise context, e.g. an enterprise architecture, is always conceptual, the expression of architecture as an architecture description is through models of the enterprise reality to which the architecture applies. Detailed designs conforming to an enterprise architecture description often take less abstract forms as they approach enterprise reality.

Note 2 to entry: The notion of fitness-for-purpose distinguishes architecture from other characteristics of design by adding the obligation of elegance in efficiency and effectiveness to design form and function — a distinguishing characteristic separating an ad hoc assemblage of parts necessary to conduct an enterprise from an intentional composition of constituent elements necessary to achieve and sustain superior enterprise performance.

[SOURCE: ISO/IEC/IEEE 42010:2011, 3.2, modified — Content of original definition has been adapted to the context of this document and Notes to entry have been added.]