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Industrial automation systems and integration — Manufacturing software capability profiling for interoperability —

Part 6: Interface services and protocols for matching profiles based on multiple capability class structures

Systèmes d'automatisation industrielle et intégration — Profil d'aptitude du logiciel de fabrication pour interopérabilité —

Partie 6: Services d'interface et protocoles pour la correspondance des profils fondés sur les structures de classe d'aptitude multiple

Reference number
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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).

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 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 architectures for enterprise systems and automation applications*.

This second edition cancels and replaces the first edition (ISO 16100-6:2011), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— in 5.2 b) 5) and b) 6), changed “a requirement capability profile or a requirement capability profile” to “an MSU capability profile or a requirement capability profile”;

— in 6.2.2.2.2, changed “*createTemplate* service” in the second sentence to “*createProfile* service”;

— in Figure 8, NOTE 2, changed “unique template identifiers” to “unique profile identifiers”;

— in 6.2.5, changed “*returnTestingResult* services” to “*returnTestResult* services”;

— in 7.3.5, changed “The *deleteTemplate* service deletes an existing template” to “The *deleteProfile* service deletes an existing profile”;

— in 7.4.1.2, changed “generates a template” to “generates a CCS”;

— in 7.4.5, changed “deletes an existing template” to “deletes an existing CCS”;

— in Annex A, changed “the class capability model” to “the capability class model”;

— in Annex G, added double quotation marks for object names;

A list of all parts in the ISO 16100 series can be found on the ISO website.

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.

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Introduction

The motivation for ISO 16100 stems from the industrial and economic environment, in particular:

— a growing base of vendor-specific solutions;

— user difficulties in applying standards;

— need to move to modular sets of system integration tools;

— recognition that application software and the expertise to apply that software are assets of the enterprise.

ISO 16100 is an International Standard for the computer-interpretable and human-readable representation of a capability profile. Its goal is to provide a method to represent the capability of manufacturing application software relative to its role throughout the life cycle of a manufacturing application, independent of a particular system architecture or implementation platform. This can lead to reduced production and information management costs to users and vendors/suppliers of manufacturing applications.

Certain diagrams in this document are constructed following UML conventions. Because not all concepts embodied in these diagrams are explained in the text, some familiarity with UML on the part of the reader is assumed.

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Industrial automation systems and integration — Manufacturing software capability profiling for interoperability —

Part 6:
Interface services and protocols for matching profiles based on multiple capability class structures

WARNING — This document provides a specification intended to be implemented in software. Incompatibilities may result in machine-to-machine communication in the case of software developed on the basis of translations of this document into languages other than the official ISO languages. Accordingly, any implementations should be developed only on the basis of the texts in the official ISO languages.

1 Scope

This document defines the detailed interface services and protocols used in a matching method based on multiple capability class structures. This document also defines a CPTI (Capability Profile Template Interface) Service Group, an Extended CPI (Capability Profile Interface) Service Group and an Extended Matcher Interface Service Group, which is extensions of the Type 1, Type 2 and Type 3 services, respectively, specified in ISO 16100-3:2005,5.4.

This document also defines the CCSI (Capability Class Structure Interface) Service Group, an additional service group used to create, register, access and modify a capability class structure for the reference manufacturing domain models specified in ISO 16100-5:2009, Clause 6.

This document also specifies detailed contents of the specific part of a capability profile template defined in ISO 16100-5:2009, Clause 7.

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 16100-1:2009, *Industrial automation systems and integration — Manufacturing software capability profiling for interoperability — Part 1: Framework*

ISO 16100-2:2003, *Industrial automation systems and integration — Manufacturing software capability profiling for interoperability — Part 2: Profiling methodology*

ISO 16100-3:2005, *Industrial automation systems and integration — Manufacturing software capability profiling for interoperability — Part 3: Interface services, protocols and capability templates*

ISO 16100-4:2006, *Industrial automation systems and integration — Manufacturing software capability profiling for interoperability — Part 4: Conformance test methods, criteria and reports*

ISO 16100-5:2009, *Industrial automation systems and integration — Manufacturing software capability profiling for interoperability — Part 5: Methodology for profile matching using multiple capability class structures*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16100-1, ISO 16100-2, ISO 16100-3, ISO 16100-4, ISO 16100-5 and the following 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
capability class
<software unit capability class> element within the capability profiling method that represents software unit functionality and behaviour with regard to the software unit's role in a manufacturing activity

Note 1 to entry: The role of an MSU changes when used in different manufacturing activities; however, the MSU's corresponding capability class is positioned uniquely in an inheritance structure, but it can assume different positions in an aggregation structure.

Note 2 to entry: In this document, a capability class template is identical to a capability profile template (see ISO 16100-2:2003, 6.3 for requirements for capability templates).

Note 3 to entry: In general, a capability class maps to an activity. The capability class is distinct within a capability inheritance structure and can form a capability aggregation structure with other capability classes.

[SOURCE: ISO 16100-2:2003, 3.3, modified — The domain in angle brackets has been added; Note 1, 2 and 3 to entry have been added; the wording “software units role” has been changed to “software unit’s role”.]

3.2
capability class structure
hierarchy of capability classes

Note 1 to entry: This structure is intended for modeling capability aggregation hierarchies in the target domains of ISO 16100-1:2009, Figure 2.

3.3
capability class structure template
XML schema representing a capability class structure

[SOURCE: ISO 16100-5:2009, 3.2, modified — The full form for “XML” has been deleted; the wording “a hierarchy of capability classes” has been changed to “a capability class structure”.]

3.4
capability profile template
schema for a manufacturing software capability profile

3.5
extended service interface
set of service access points defined in this document that handle manufacturing domain data, manufacturing domain models, capability class structures, capability profiles and capability profile templates

Note 1 to entry: "Extended" refers to both the services specified in this document and the "basic" services specified in ISO 16100-3.

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3.6
manufacturing domain data
information, represented by a UML class, about manufacturing resources, manufacturing activities, or items exchanged among manufacturing resources within a particular manufacturing domain

[SOURCE: ISO 16100-5:2009, 3.3, modified — The wording “unified modeling language (UML) class representing information” has been changed to “informaiton, represented by a UML class”.]

3.7
manufacturing domain data template
XML schema representing a manufacturing domain data

[SOURCE: ISO 16100-5:2009, 3.4, modified — The full form for “XML” has been deleted.]

3.8
manufacturing domain model
particular view of a manufacturing domain, consisting of manufacturing domain data and relationships among them, corresponding to the domain's applications

[SOURCE: ISO 16100-5:2009, 3.5]

3.9
parts library
<manufacturing> collection of part descriptions or catalogue

Note 1 to entry: The term "parts library" also refers to a dictionary such as a PLIB dictionary in ISO 13584 or OTD in ISO 22745.

4 Symbols and abbreviated terms

BSU Basic Semantic Unit

CCS Capability Class Structure

CCSI Capability Class Structure Interface

CPI Capability Profile Interface

CPTI Capability Profile Template Interface

CSI Conformance Statement for the Implementation

ESI Extended Service Interface

ESP Extended Service Provider

ICD International Code Designator

MDD Manufacturing Domain Data

MDM Manufacturing Domain Model

MSU Manufacturing Software Unit

OTD Open Technical Dictionary

PLIB Parts Library (as specified in ISO 13584)

UML Unified Modeling Language

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