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Part 15: Description methods: SysML XMI to XSD transformation

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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.

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A list of all parts in the ISO 10303 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

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the life cycle of a product and independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and archiving.

This document is a member of the description methods series. This document specifies a mapping of SysML XMI to the XSD. This document supports the STEP extended architecture.[17][18][19] This document specifies the transformation from a STEP data model in SysML XMI to a STEP XSD.

The object management group (OMG) has standardized the XML metadata interchange specification (XMI) that integrates the OMG systems modeling language (SysML), the OMG unified modeling language (UML), and the World Wide Web Consortium (W3C) extensible markup language (XML). SysML inherits the XMI interchange capability from UML. XMI is a mechanism for the interchange of metadata between UML-based modeling tools. OMG has also standardized an XMI compliant interchange format for the SysML thus specifying a lexical representation of SysML models based on a standardized metamodel of the SysML.

The W3C has standardized the XML schema definition (XSD). XSD allows to define shared vocabularies and allow machines to carry out rules made by developers. They provide a means for defining the structure, content and semantics of XML documents.

This document specifies a description method of the STEP parts family, which defines the transformation of SysML constructs to the XSD constructs. Because the XMI standard specifies the XML representation of SysML metamodel constructs, standardizing the binding of SysML constructs into XSD constructs supports the representation of SysML models as XML schemas.

The specified mapping is a one-way transformation from SysML information model represented in XMI into an XML schema. These limitations make the mapping unsuitable for the transformation of arbitrary SysML models to XSD.

A detailed knowledge of the W3C XML and XSD languages, and the OMG systems modelling language is useful.

The main components of this document are:

— the structure, conventions and concepts of the XSD;

— the specification of the transformation from SysML XMI to XSD for each STEP element modelled in SysML.

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Industrial automation systems and integration — Product data representation and exchange —

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1 Scope

This document specifies the transformation of SysML (ISO/IEC 19514:2017) constructs to XSD (World Wide Web Consortium's XML schema definition language) constructs for the purpose of representing the SysML model represented in XMI (ISO/IEC 19509:2014) as XML (World Wide Web Consortium's XML) schemas. The specified mapping is a one-way transformation from SysML information model represented in XMI into an XML schema. These limitations make the mapping unsuitable for the transformation of arbitrary SysML models to XML schemas.

The following are within the scope of this document:

— the specification of the structure, components, and conventions of the XSD for the STEP (ISO 10303-1) XML implementation method;

— the transformation of SysML metamodel constructs represented in XMI to XSD constructs for the purpose of representing SysML information models as XML schemas.

The following are outside the scope of this document:

— the transformation of SysML metamodel constructs into XSD constructs that are not used in the STEP extended architecture;

— the transformation of SysML metamodel constructs into XSD constructs for other purposes than representing SysML constructs as STEP concepts;

— codes and scripts to transform SysML XMI to XSD schema;

— the transformation of SysML constraints (OCL, see ISO/IEC 19507) into Schematron (see ISO/IEC 19757-3).

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 10303-11:2004, *Industrial automation systems and integration — Product data representation and exchange — Part 11: Description methods: The EXPRESS language reference manual*

ISO/IEC 19505-1:2012, *Information technology — Object Management Group Unified Modeling Language (OMG UML) — Part 1: Infrastructure*

ISO/IEC 19514:2017, *Information technology — Object management group systems modeling language (OMG SysML)*

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