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

Part 18:

**Description methods: SysML XMI to
Web services 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).

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 4, *Industrial data*.

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.

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 the web services defined for ISO 10303. It includes the rationale for the selection of the web services and their scope. It does not include any specifications for management or maintenance of information and data on the server. This document supports the STEP extended architecture^{[12][13]}.

The need for standardized services

The traditional means for exchanging data using ISO 10303 is to share large packets of information using files. However, with increasingly interconnected organizations and tool sets, the need has arisen for secure flexible sharing of smaller packets of data. This need is valid for every industrial domain from analysis to design, and lifecycle support. It is also true for the different models of the STEP Extended architecture with services needed for the core, domain and data planning models.

The rapid evolution of web technologies means that the services definitions need to be independent of technology, with technology specific implementation schemas generated from the definitions.

The purpose of standardized services is to:

- define services against a model so that two or more vendors provide consistent implementations;
- provide a minimum specification to ensure consistency so that a third party can use the services from either of the vendors (such as “plug and play”).

The document development method:

Much of the content for [Clause 5](#) was harvested from public deliverables of the Aerospace Technology Institute^[21] APROCONE project^[22] where intent was declared in these deliverables for the content to be used in this document. This was approved by all APROCONE project members.

The main components of this document are:

- types of services: a description of the categories of services from domain and technology independent to specific, and the rationale for the scope for this document;
- technology-independent services definition: the definition of the technology-independent services along with their inputs and outputs;
- technology-dependent methods: SysML XMI to OpenAPI 3.0.0 JSON schema;
- [Annex B](#): SysML to OpenAPI - Canonical XMI and equivalent in OpenAPI JSON schema;
- [Annex C](#): SysML to OpenAPI – Example files;
- [Annex D](#): SysML to OpenAPI - A listing of, and mapping between, SDAI and HTTP response status codes.

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

Part 18:

Description methods: SysML XMI to Web services transformation

1 Scope

This document specifies the definition for services at the point of interaction between a client and server.

The following are within the scope of this document:

- the specification of the structure, components and conventions for domain- and technology-independent services implementation methods for STEP (ISO 10303-1);
- transformation of the SysML metamodel constructs to OpenAPI constructs for RESTful web services (see OpenAPI:3.0.0^[25] and IETF RFC7231).

The following are outside the scope of this document:

- domain specific services definitions;
- the transformation of SysML metamodel constructs into OpenAPI constructs that are not used in the STEP extended architecture^{[12][13]};
- the transformation of SysML metamodel constructs into OpenAPI constructs for other purposes than representing SysML constructs as STEP concepts;
- codes and scripts to transform SysML XMI to OpenAPI schema;
- the transformation of SysML constraints into OpenAPI schema;
- implementation of technology-specific services definitions other than RESTful OpenAPI;
- definition of management and maintenance of information and data on a server.

2 Normative references

There are no normative references in this document.

3 Terms, definitions, and abbreviated terms

3.1 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/>