IEC 61636-99

Edition 1.0 2016-11

INTERNATIONAL STANDARD

IEEE Std 1636.99™

Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

IEC 61636-99:2016-11(en) IEEE Std 1636.99-2013

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.01; 35.060

ISBN 978-2-8322-3685-7

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The text of this standard is based on the following documents:

IEEE Std	FDIS	Report on voting
1636.99 (2013)	91/1361/FDIS	91/1372/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

Sponsor

IEEE Standards Coordinating Committees on Test and Diagnosis for Electronic Systems (SCC20)

Approved 23 August 2013

IEEE-SA Standards Board

Abstract: This standard is intended to promote and facilitate interoperability between components of SIMICA. The standard defines EXPRESS information models and XML schemas that together define the common information elements supporting these interfaces.

Keywords: automated test system (ATS), eXtensible markup language (XML), IEEE 1636.99™, session information, Software Interface for Maintenance Information Collection and Analysis (SIMICA), test results, XML schema

IEEE Introduction

This introduction is not part of IEEE Std 1636.99™-2013, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements.

Maintainers of complex systems require the ability to capture and share historical test and maintenance-related information in a way that supports such activities as performance analysis, post-production product improvement, maintenance process improvement, and diagnostic maturation. Principal stakeholders of this project include but are not limited to maintenance organizations within various Departments/Ministries of Defense, the commercial airlines, the automotive industry, and the telecommunications industry. This standard is being developed as a component of the IEEE 1636™ Software Interface for Maintenance Information Collection and Analysis (SIMICA) project. SIMICA's purpose is to specify a software interface for access, exchange, and analysis of product diagnostic and maintenance information. Maintenance action information provides a subset of the data needed to satisfy SIMICIA requirements.

The use of formal information models will facilitate exchanging historical maintenance information between information systems and analysis tools. The models will facilitate creating open system software architectures for maturing system diagnostics.

The XML schema described in this standard where appropriate utilizes and references components of the IEEE Std 1671™ schema set.

It is anticipated that these schemas will be used throughout industries that utilize diagnostic and maintenance data as an exchange format that can be understood by humans or machines. In order to ensure wide acceptance throughout the user community, the schemas have been designed to encompass a broad range of use cases. To accommodate use cases beyond the released design, the schemas provide means for user extensibility.

Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

1. Overview

1.1 General

This standard, which is a component of the Software Interface for Maintenance Information Collection and Analysis (SIMICA) standard, was developed by the Diagnostic and Maintenance Control Subcommittee of the IEEE Standards Coordinating Committee 20 (SCC20) on Test and Diagnosis for Electronic Systems to provide standard, unambiguous definitions of common SIMICA element semantics, and interrelationships.

This standard specifically describes a set of formal specifications consisting of the logical representation of the information that is common between IEEE Std 1636.1™ and IEEE Std 1636.2™, which may be used during related diagnostic and maintenance processes. The information model contained in this document provides a normative formal specification of the information concepts and precise semantics that support the unambiguous exchange of information between producers and consumers in a platform-independent manner.

The schemas described in this document are intended to be shared by all SIMICA "dot" standards. The Express schema in this standard is based on ISO 10303-11:1994 [B9][1]. The XML schema associated with this standard is based on the W3C eXtensible Markup Language (XML) 1.0 Recommendation [B1][2].

1.2 Application of this documents annexes

This document includes three annexes. Of these three, two are normative (Annex A and Annex B).

Annex A contains the description of each of the XML schema elements and types.

Annex B contains the description of the EXPRESS and EXPRESS-G model elements.

Annex C is informative, and thus is provided strictly as information, for both users and maintainers of this document.

1.3 Scope

The SIMICA family of standards provides an implementation-independent software interfaces to information systems containing data pertinent to the diagnosis and maintenance of complex systems consisting of hardware, software, or any combination thereof. This standard defines EXPRESS information models and XML schemas that together define the common information elements supporting these interfaces.

1.4 Referenced IEEE Standards

SIMICA Common makes reference to IEEE Std 1671™-2010 Annex B.1. This normatively referenced IEEE standard, when utilized, is therefore considered part of the SIMICA definition.

1.5 Application

This standard provides a specification for information shared by SIMICA "dot" standards (e.g., IEEE Std 1636.1, IEEE Std 1636.2). Anticipated users of this standard include the following:

a) System developers

b) System maintainers

c) Reliability, maintainability, and diagnostic analytical applications

1.6 Conventions used in this document

1.6.1 General

In accordance with *IEEE Standards Style Manual* [B3], any schema examples will be shown in `Courier` font. In cases where instance document examples are necessary to depict clearly use of a schema type or element, such examples will also be shown in `Courier` font. When the characters "..." appear in an example, it indicates that the example component is incomplete.

[1] The numbers in brackets correspond to those of the bibliography in Annex C.
[2] W3C is a registered trademark of the World Wide Web Consortium.

All simple types, complex types, attribute groups, and elements will be listed; explanatory information will be provided, along with examples if additional clarification is needed. The explanatory information shall include information on the intended use of the elements and/or attributes where the name of the entity does not clearly indicate its intended use. For elements derived from another source type (e.g., an abstract type), only attributes which extend the source type shall be listed; details regarding the base type shall be listed along with the base type.

When referring to an attribute of an XML element, the convention of *[element]@[attribute]* shall be used. In cases where an attribute name is referred to with no associated element, the attribute name shall be enclosed in single quotes.

In tables that describe XML elements, the column "Use" indicates the occurrence constraints for each element.

a) "Required" indicates that the element shall appear exactly once.

b) "Optional" indicates that the element may appear once or not at all.

c) "1..∞" indicates that the element shall appear at least once and may appear multiple times.

d) "0..∞" indicates that the element may appear multiple times, once, or not at all.

All specifications for the EXPRESS language are given in the `Courier` type font which includes references to entity and attribute names in the supporting text.

This standard uses the vocabulary and definitions of relevant IEEE standards. In case of conflict of definitions, except for those portions quoted from standards, the following precedence shall be observed: 1) Clause 3, and 2) The *IEEE Standards Dictionary Online* [B2][3].

1.6.2 Word usage

In accordance with *the IEEE Standards Style Manual* [B3], the word *shall* is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*). The use of the word *must* is used only to describe unavoidable situations. The use of the word *will* is only used in statements of fact.

The word *should* is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability (*can* equals *is able to*).

[3] *IEEE Standards Dictionary Online* subscription is available at:
http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 1636™-2009, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA).[4, 5]

IEEE Std 1671™-2010, IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Equipment and Test Information via XML.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* [B2] should be consulted for terms not defined in this clause. In the event a term is explicitly redefined, or defined in more detail, in an SIMICA component standard, the component standards definition shall be normative for that SIMICA component standard.

component (in eXtensible Markup Language (XML) schema): The generic term for the building blocks that compose the abstract data model of the schema.

eXtensible Markup Language (XML) attribute: Name-value pair associated with an XML element.

eXtensible Markup Language (XML) document: A (text) data object that conforms to the XML requirements for being well-formed (as defined by W3C).

eXtensible Markup Language (XML) namespace: A method for distinguishing XML elements and attributes that may have the same name but different meanings. A URL is used as a prefix to a "local name." This combination ensures the uniqueness of the element or attribute name. The URL is used only as a way to create a unique prefix and does not have to resolve to a real page on the Internet.

NOTE—See Namespaces in XML 1.0 [B10] and Schenk and Wilson [B11][6].

eXtensible Markup Language (XML) schema: The structure or framework used to define a data record. This includes each field's name, type, shape, dimension, and mapping.

framework: A framework is a real or conceptual structure expressed as a set of abstract classes. The framework provides a context for the components to be used.

instance document: A textual information set grouped for some purpose that is governed by a single XML schema.

[4] IEEE publications are available from The Institute of Electrical and Electronics Engineers (http://standards.ieee.org/).
[5] The IEEE standards or products referred to in this clause are trademarks of The Institute of Electrical and Electronics Engineers, Inc.
[6] Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

maintenance: Activity intended to keep equipment (hardware) or programs (software) in satisfactory working condition, including replacements, adjustments, repairs, software/firmware updates, and program improvements. Maintenance can be preventative or corrective (adapted from MIL-STD-1309D [B12]).

particle (in eXtensible Markup Language (XML) schema): A kind of component.

sequence (in XML schema): A compositor for model group schema components which specifies that subordinate elements in an instance document must correspond, in order, to the specified particles.

3.2 Acronyms and abbreviations

AI-ESTATE	Artificial Intelligence Exchange and Service Tie to All Test Environments
ATML	Automatic Test Markup Language
ATS	automatic test system
ISO	International Organization for Standardization
OID	object identifier
SIMICA	Software Interface for Maintenance Information Collection and Analysis
URL	uniform resource locator
URN	uniform resource name
UUT	unit under test
W3C	World Wide Web Consortium
XML	eXtensible Markup Language

4. SIMICA common elements

4.1 SIMICA common element partitioning

Common elements provide for the definition of XML types and attributes that are utilized within more than one SIMICA family XML schema.

Common element XML schemas are reference XML schemas containing only type definitions that may be used in other XML schemas. They have no root element, and there will be no instance documents directly validated against them.

Having each SIMICA family XML schema include the SIMICA common elements allows for a consistent definition of shared XML types and prevents each XML schema from defining XML types used by other SIMICA family XML schemas (which would have had to also define that XML type, possibly differently).

SIMICA Common elements as a result are simply a toolbox for the SIMICA family XML schemas to include.