IEC 61636

Edition 2.0 2021-06

INTERNATIONAL STANDARD

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Software Interface for Maintenance Information Collection and Analysis (SIMICA)

IEC 61636:2021-06(en) IEEE Std 1636-2018

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.01; 35.060

ISBN 978-2-8322-9804-6
IEEE (PDF) STD24777 ISBN 978-1-5044-7671-3

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IEEE Std	FDIS	Report on voting
1636 (2018)	91/1716/FDIS	91/1728/RVD

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

Sponsor

IEEE Standards Coordinating Committee 20 on Test and Diagnosis for Electronic Systems

Approved 27 September 2018

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Abstract: Promoting and facilitating interoperability between components of automatic test systems where test results and/or maintenance actions need to be shared is addressed in this standard. The standard defines the common elements between both test results data and maintenance action data. The common schema becomes a class of information that shall be used within the SIMICA family of standards.

Keywords: automated test system (ATS), extensible markup language (XML), IEEE 1636™, maintenance action information, OWL ontology, Software Interface for Maintenance Information Collection and Analysis (SIMICA), test results and session information, XML schema

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Introduction

This introduction is not part of IEEE Std 1636-2018, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA).

Maintainers of complex systems require the ability to capture and share test result and or maintenance action 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 Std 1636, Software Interface for Maintenance Information Collection and Analysis (SIMICA) family. SIMICA's purpose is to specify a software interface for access, exchange, and analysis of product diagnostic and maintenance information.

This document provides the description of the common elements the SIMICA family component (e.g., 'dot') standards shall each utilize.

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

1. Overview

General

Software Interface for Maintenance Information Collection and Analysis (SIMICA) is a family of IEEE standards, associated web ontologies (OWL), and extensible markup language (XML) schemas which allow automatic test system (ATS), test result and session information, and maintenance action information to be exchanged in a common format adhering to the OWL and XML standards.

The SIMICA family of standards has been developed and is being maintained under the guidance of IEEE Standards Coordinating Committee 20 (SCC20) to serve as a comprehensive environment for integrating test results, test session information, and maintenance action information, while allowing this unit under test (UUT) related data to be interchanged between heterogeneous systems.

The SIMICA family of standards is organized as a base Standard (IEEE Std 1636™— this document) and two (2) family component standards:

— Test results and session information (IEEE Std 1636.1™)

— Maintenance action information (IEEE Std 1636.2™)

The SIMICA family 'dot' standards and their relationship to this document are depicted in Figure 1.

This document specifically defines the common complex types, elements and groups that are utilized by both IEEE Std 1636.1 and IEEE Std 1636.2 OWL ontologies and XML schemas.

1.1 Scope

This standard is an implementation-independent specification for a software interface to information systems containing data pertinent to the diagnosis and maintenance of complex systems consisting of hardware, software, or any combination thereof. These interfaces support service definitions for creating application programming interfaces (API) for the access, exchange, and analysis of historical diagnostic and maintenance information.

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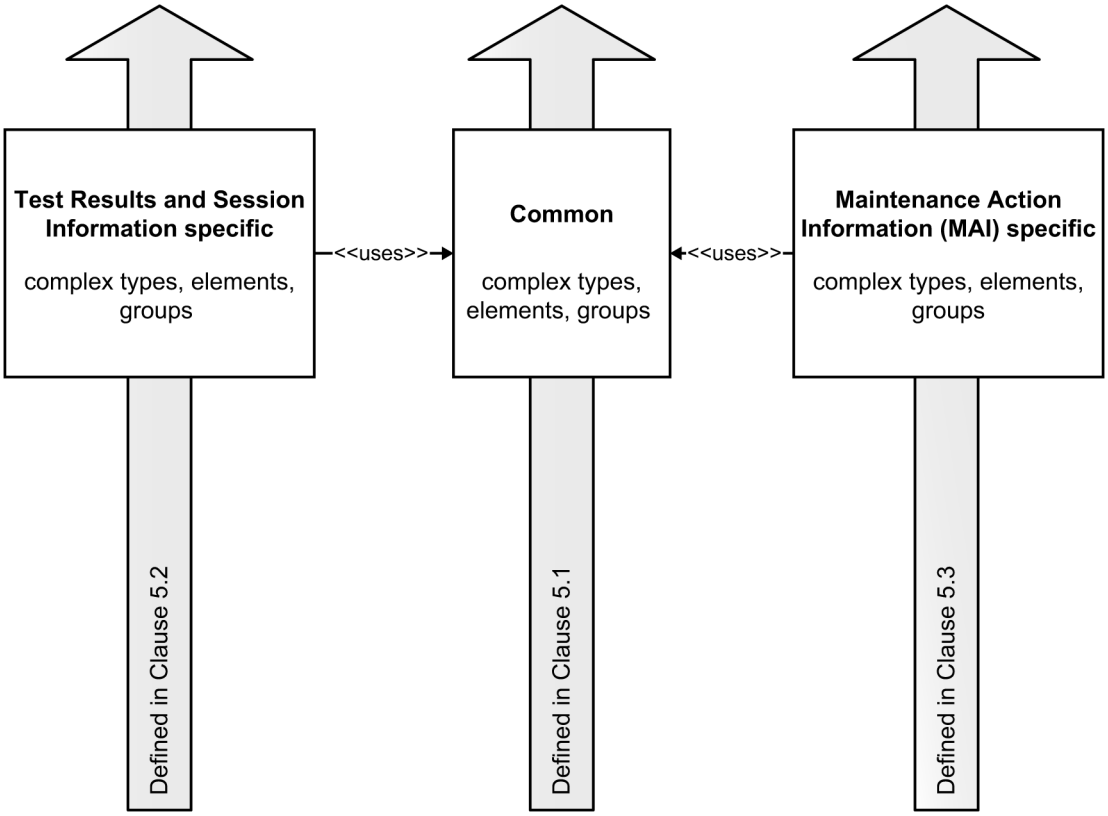

Figure 1—Relationship of the SIMICA family of standards

1.2 Application

1.2.1 Of this document

This document provides formal specifications of the information required for the development of shared maintenance data and the results of testing.

Anticipated users of this standard include the following:

a) System developers

b) System maintainers

c) Test program set (TPS) developers

d) TPS maintainers

e) Automatic test equipment (ATE) system developers

f) ATE systems maintainers

g) Test instrument developers

h) Reliability, maintainability, and diagnostic analytical applications

1.2.2 Of this document's annexes

This document includes two annexes. Of these two, one is normative (Annex A).

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Annex A contains descriptive information about each of the SIMICA common XML schema and OWL ontology elements and types.

Annex B contains the bibliography. This is informative, and thus is provided strictly as information, for both users and maintainers of this document.

1.3 Precedence

In the event of conflict between this document and a normatively referenced standard (see Clause 2), the normatively referenced standard, as it applies to the information being produced, shall take precedence.

In the event of conflict between this document and another SIMICA family component standard, this document shall take precedence.

1.4 Conventions used in this document

1.4.1 General

All groups, complex types, simple types, and attribute groups are listed in Annex A. Descriptive information for each is provided.

Where there are references to groups, complex types, simple types, and attribute groups within the associated XML schema or OWL ontology (Simica.xsd and Simica.owl), the convention of [name] at [element] is used to indicate where the user can locate the data within either the Simica.xsd or Simica.owl files.

Example: The 1636-2018 download at: https://standards.ieee.org/downloads indicates the user is to open the Simica.xsd schema at the location provided and find *Example* for the schema definition.

The namespace prefix "c:" identifies that the type or attribute group associated with this document.

All specifications for OWL and XML within this document are given in the *Courier* type font and italicized.

1.4.2 Word usage

In this document, the word "shall" is used to indicate a mandatory requirement. The word "should" is used to indicate a recommendation. The word "may" is used to indicate a permissible action. The word "can" is used for statements of possibility and capability.

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.

World Wide Web Consortium, (W3C) extensible Markup Language (XML), 1.0 (Fifth Edition) Proposed Edited Recommendation.[1]

World Wide Web Consortium, (W3C) OWL Web Ontology Language (OWL 2), W3C Recommendation Definitions, acronyms and abbreviations.

[1]Available at: https://www.w3.org/.

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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* should be consulted for terms not defined in this clause.[2]

diagnostic maturation: The process of monitoring diagnostic system predicted versus actual performance to identify and implement corrective actions. The goal is to enhance diagnostic effectiveness throughout the product life cycle. Diagnostic elements that may benefit from the maturation process include (but are not limited to) diagnostic models, system performance models, test programs, and product design.

ontologies: A formal way to define the structure of knowledge.

system: **(A)** A collection of entities to be processed by applying a top-down, hierarchical approach **(B)** A collection of elements forming a collective, functioning entity **(C)** A collection of hardware or software components necessary for performing a function.

3.2 Acronyms and abbreviations

API	application program interface
ATE	automatic test equipment
ATS	automatic test system
GUID	globally unique identifier
OWL	web ontology language
SCC20	Standards Coordinating Committee 20
SIMICA	software interface to maintenance information collection and analysis
TPS	test program set
URL	universal resource locator
UUID	universal unique identifier
UUT	unit under test
W3C	World Wide Web Consortium
XML	extensible markup language

4. Diagnostic maturation

The process of maturing a system diagnostic design begins in the system's conceptual design phase and continues throughout the system life cycle. Generally, diagnostic design is demonstrated prior to delivery of the first unit to meet the diagnostic and health management requirements that have been levied. However, once a system is fielded and used in an operational environment, unexpected and unplanned system level design interactions, operational and environmental stresses, performance characteristics of tests and monitors, and other influences tend to reveal deficiencies in the diagnostic capabilities. When such deficiencies result in a system readiness/availability or cost of ownership problem, remedial actions shall be taken:

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