

In SACM 2.4, updates, restructuring, and additions to the SACM 2.3 model have been made as address noted issues. With these changes SACM 2.4:

- is a “standard complete” MOF model
- is usable by a wider set of demographics (including System Engineers)
- is usable by people using their favorite tools (e.g. Profiles)
- is embeddable in other modeling languages
- is able to reference other models (and elements within those models)
- is based on UML and KerML (the basis of SysML2) concepts
- provides tighter semantics in the metamodels to replace unneeded OCL statements with a new annex to provide additional details about the concepts of package interfaces and bindings and their use within the standard.

In SACM 2.3, a new normative annex and corresponding compliance point to provide a UML profile allowing UML-based tools to work with SACM concepts and the allowing for categories to contain categories as a mechanism for organizing concepts in the Terminology class.

- provides strength weights for defining the strength of the relationships between argument elements
- provides various Assurance Case Diagram types
- widens the applicability of various elements in the model (e.g. Properties)
- is more specific about packaging semantics
- now supports all concepts from GSN, CAE, Assurance 2.0
- supports Architecture Views (see GSN)
- supports other types of logics (e.g. Inductive, Deductive, Abductive, other)
- supports (multiple conflicting) Assessments of an Assurance Case
- supports Joins (compare with GSN)

2 Conformance

2.1 Introduction

The Structured Assurance Case Metamodel (SACM) specification defines the following five compliance points:

- ~~Argumentation Model~~ ^{Argument}
 - ~~Artifact Model~~ ^{Packaging}
 - ~~Assurance Case Model~~
 - Terminology Model
 - SACM UML Profile
- Join compliance point
 - Advanced Argument compliance point
 - SACMView compliance point
 - Assessment compliance point
 - DataTimeDuration compliance point
 - NamedValue compliance point

2.2 ~~Argumentation Model~~ ^{Argument} compliance point

Software that conforms to the SACM specification at the ~~Argumentation~~ ^{Argument} Model compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the normative MOF metamodel defined in the ~~Argumentation~~ ^{Argument} subpackage of the SACM specification, including the common elements defined in the Common and Predefined diagrams of the SACM. The top object of the ~~Argumentation~~ ^{Argument} package as a unit of interchange shall be the ~~Argumentation::ArgumentPackage~~ ^{Argumentation::ArgumentPackage} element of the SACM.

Conformance to the ~~Argumentation~~ ^{Argument} Model compliance point does not entail support for the Evidence subpackage of SACM, or the terminology sub package of the SACM.

This compliance point facilitates interchange of the structured argumentation documents produced by existing tools supporting existing structured argument notations such as the Goal Structuring Notation (GSN) and the Claims-Arguments-Evidence (CAE) notation which provide their own mapping onto SACM argumentation aspects. ~~Further details of these mappings are given in Annex A.~~

Mappings have been defined in Annex A to help explain the connections of SACM to GSN and CAE.

2.3 Artifact Model compliance point

Software that conforms to the specification at the Artifact Model compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the normative MOF metamodel defined in this Artifact subpackage of the SACM specification, including the common elements defined in the Common and Predefined diagrams of the SACM. The top object of the Evidence package as a unit of interchange shall be the ~~Artifact::ArtifactPackage~~ ^{Artifact::ArtifactPackage} element of the SACM.

Conformance to the Artifact Model compliance point does not entail support for the Argumentation subpackage of SACM, or the terminology diagram of the SACM. This compliance point facilitates interchange of the packages of evidence. In particular, this compliance point facilitates development of evidence repositories in support of software assurance and regulatory compliance.

2.4 ~~Assurance Case Model~~ ^{Packaging} compliance point

This compliance point is mandatory. Software that conforms to the specification at the ~~Assurance Case~~ ^{Packaging} Model compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the normative MOF metamodel defined in this entire specification. The top object of the Assurance Case package as a unit of interchange shall be the ~~SACM::AssuranceCasePackage~~ ^{SACM::AssuranceCasePackage} element.

- This conformance point also requires strict adherence to the restrictions imposed on various kinds of package ownership. these include:
- AssuranceCasePackage can own subpackages of type: AssuranceCasePackage, ArgumentPackage, ArtifactPackage, TerminologyPackage, and BindingPackage
- Section Packages (e.g. ArgumentPackage) can own another section package, or a section interface package (e.g. ArgumentInterfacePackage)
- Section Interface Package can own another Section Interface Package
- Section Packages and Interface Packages can own their Section Assets
- Any Package can own BaseElements
- There is only one BindingPackage rather than one for each section, and a BindingPackage can own any SACMElement

The Conformance clause identifies which clauses of the specification are mandatory (or conditionally mandatory) and which are optional in order for an implementation to claim conformance to the specification.

2.5 Terminology Model compliance point

Software that conforms to the specification at the Terminology Model compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the normative MOF metamodel defined in this entire specification. The top object of the Terminology package as a unit of interchange shall be the Terminology::TerminologyPackage element.

The Conformance clause identifies which clauses of the specification are mandatory (or conditionally mandatory) and which are optional in order for an implementation to claim conformance to the specification.

2.6 SACM UML Profile compliance point

A tool demonstrating SACM UML Profile interchange conformance can import and export conformant XMI for all valid SACM UML models

Note: In the SACM metamodel there is a Foundation section that defines the semantics of various elements in SACM. This set of foundation concepts are already resident in the UML base classes that are extended by the SACM Profile elements, so there is no need for any representation of the Foundation in the Profile.

3 References

3.1 Normative References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

ISO/IEC 15026-1:2019 Systems and software engineering - Systems and software assurance - Part 1: Concepts and vocabulary, 2019. <https://www.iso.org/standard/73567.html>

ISO/IEC 15026-2: 2011 Systems and software engineering - Systems and software assurance - Part 2: Assurance case, 2011. <https://www.iso.org/iso/catalogue_detail.htm?csnumber=52926>

OMG UML 2.5.1 Infrastructure Specification formal/17-12-05. <<https://www.omg.org/spec/UML/>>
 OMG Meta-Object Facility (MOF) version 2.5.1 formal/19-10-01.
 <<https://www.omg.org/spec/MOF/>>

OMG MOF XML Metadata Interchange (XMI) Specification, version 2.5.1, formal/2015-06-07
 <<https://www.omg.org/spec/XMI>>

3.2 Non-normative References

The following non-normative documents contain provisions which, through reference in this text, provide informative context for material in this specification.

Assurance Case Working Group. Goal Structuring Notation Community Standard. Technical Report SCSC-141BA v2.0, Safety Critical Systems Club, 2018. <<https://scsc.uk/SCSC-141B>> Open Platform for Evolutionary Certification of Safety-critical Systems (OPENCROSS) WP4: Common Certification Language, 2012-2015. <<http://www.opencross-project.eu/node/7>>

Open Platform for Evolutionary Certification of Safety-critical Systems (OPENCROSS) WP6: Evolutionary Evidential Chain, 2012-2015. <<http://www.opencross-project.eu/node/7>>.

Evidence management for compliance of critical systems with safety standards: A survey on the state of practice, Information and Software Technology 60: 1-15, Elsevier (North-Holland) (2015).
 <<https://www.sciencedirect.com/science/article/pii/S0950584914002560>>

OMG Structured Pattern Metamodel Standard (SPMS), 1.2, formal/17-11-01

2.7 Join compliance point

Software that conforms to the SACM specification at the Join compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative Join subpackage section of the specification.

2.8 Advanced Argument compliance point

Software that conforms to the SACM specification at the Advanced Argument compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative AdvancedArgument subpackage section of the specification.

2.9 SACMView compliance point

Software that conforms to the SACM specification at the SACMView compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative SACMView subpackage section of the specification.

2.10 Assessment compliance point

Software that conforms to the SACM specification at the Assessment compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative Assessment subpackage section of the specification.

2.11 DateTimeDuration compliance point

Software that conforms to the SACM specification at the DateTimeDuration compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative DateTimeDuration subpackage section of the specification.

2.12 NamedValue Types compliance point

Software that conforms to the SACM specification at the NamedValue Types compliance point shall be able to import and export XMI documents that conform with the SACM XML Schema produced by applying XMI rules to the non-normative MOF metamodel defined in the informative NameValueTypes subpackage section of the specification.