The SACM Artifact Metamodel defines a catalog of elements for constructing and interchanging packages of evidence that communicate how the evidence was collected.

In conjunction with the Argumentation Metamodel, certain claims may be expressed to be supported by evidence that is within the Artifact Metamodel, to permit the authors of the assurance claims to offer evidentiary support for their positions. Evidence is usually collected by applying systematic methods and procedures and is often collected by automated tools. Evidence is information or objective artifacts, based on established fact or expert judgment, which is presented to show that the claim to which it relates is valid (i.e., true). Various and diverse things may be produced as evidence, such as documents, expert testimony, test results, measurement results, records related to process, product, and people, etc.

1.4   History, Motivation, and Rationale

The original Structured Assurance Case Metamodel version 1.0 was the composite of two efforts within the OMG's Systems Assurance Task Force. One effort, the Structured Assurance Evidence Metamodel (SAEM) was created through the OMG Request For Proposal (RFP) approach and the other, the Argumentation Metamodel (ARG) was created through the OMG Request For Comment (RFC) approach. Both were completed in the mid-2010 timeframe and then put into the same Finalization Task Force (FTF) due to the interconnectedness of their topics and concepts. The first version of SACM was eventually produced in the spring of 2012 consisting of a top-level container object joining SAEM and ARG without significantly altering the two original metamodels.

A Revision Task Force (RTF) was convened to drive further integration of the two original parts of SACM into one Metamodel and that effort formulated a set of goals to shape and guide the integration. Basically the stated goals were:

- Improve support for ISO/IEC 15026-2. In order to facilitate the use of structured assurance cases for producing and reviewing ISO/IEC 15026-2 conformant assurance cases, the structured assurance case metamodel needs to more fully support the constructs and entities in ISO/IEC 15026-2.

- Improve support for "Goal Structuring Notation." In order to facilitate the use of structured assurance cases by the existing community of practitioners across the world that are currently using Goal Structuring Notation (GSN) and the specific capabilities in GSN for working with assurance cases, the structured assurance case metamodel needs to more fully support the constructs and entities in GSN.

- Harmonization of Parts. In order to facilitate acceptance and successful use of SACM, the argumentation and evidence container metamodels need to be more consistently aligned and integrated. Areas of focus include elimination of overlap, making useful facilities now available on one side generalized to be useful on both sides, achieving uniform terminology and consistency, and using common concepts.

- Add initial support for Patterns/Templates. In order to make the use of assurance cases more practical and efficient for users including those that do not have in-depth experience within the assurance case domain (e.g., acquisition officials, systems integrators, auditors, regulators, and tool vendors), the structured assurance case metamodel needs to support the concept of assurance case patterns and templates. Patterns will provide support to enable reuse and the effective composition of assurance cases along with the underlying argumentation supporting goals. Templates will provide support for defining and describing constraining conventions that a community may require for assurance cases within a particular domain due to regulatory requirements or accepted practices in that domain/industry/community.

- Improve the modularity and simplicity of SACM

- Provide for future concepts such as structured expressions and other formalisms

The SACM 1.1 was subsequently worked to attempt to meet these goals and a draft metamodel was created during the summer OMG 2013 Berlin meeting. However the magnitude of the changes necessary to actually integrate the two original metamodels into one cohesive approach and achieve some of the other goals turned out to be too big of a

9 Structured Assurance Case Packages

9.1 General

This clause presents the normative specification for the SACM Packages Metamodel. It begins with an overview of the metamodel structure followed by a description of each element.
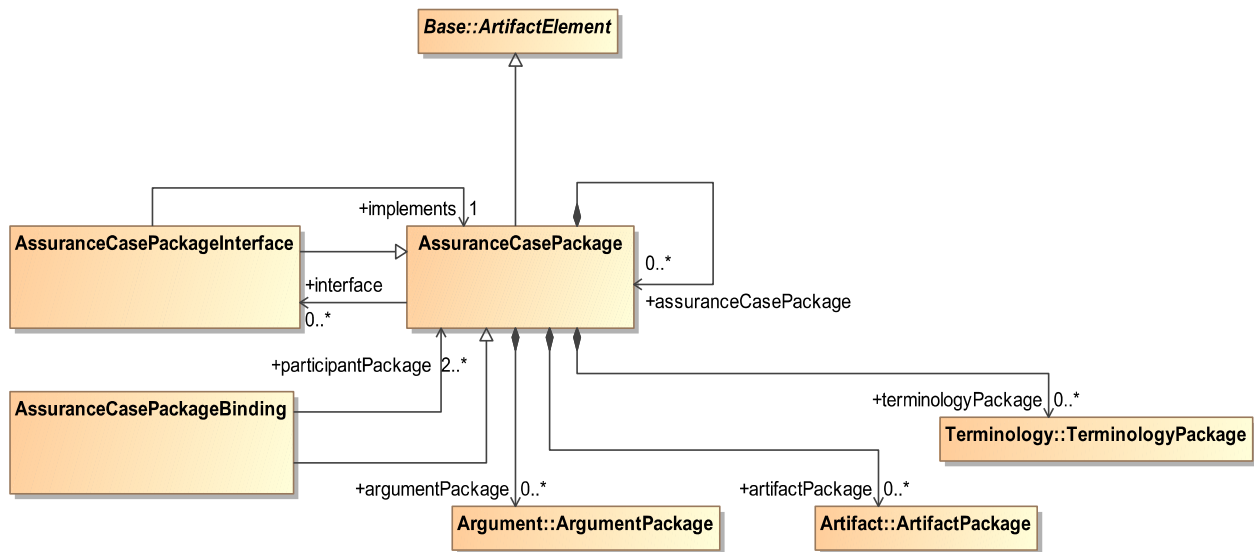

Figure 9.1 - Structured Assurance Case Packages Class Diagram

In SACM, the parent container element is AssuranceCasePackage. AssurancesCasePackages can be thought of as assurance case 'modules'. Packages can contain other packages, including citations to other packages not contained within the same package hierarchy. Packages optionally can have a separately declared interface (AssuranceCasePackageInterface) (analogous to a public header file) that declares selected packages contained by a package.

Assurance cases (AssuranceCasePackages) consist of arguments (contained in ArgumentPackages), evidence descriptions (contained in ArtifactPackages), and Terminology definitions (contained in TerminologyPackages).

9.2 AssuranceCasePackage

AssuranceCasePackage is an exchangeable element that may contain a mixture of artifacts, argumentation, and terminology. When users exchange content, it is expected they use this as the top level container. It is a recursive container, and may contain one or more sub-packages.

This follows the existing practice of considering an assurance case when fully completed to comprise both argumentation and evidence, although each may be exchanged individually.

AssuranceCasePackage is a sub-class of Base::ArtifactElement. Semantically an AssuranceCasePackage can be considered as an artifact of evidence (e.g., from the perspective of another AssuranceCasePackage).

Superclass

Base::ArtifactElement

11 SACM Argumentation Metamodel

11.1 General

This clause presents the normative specification for the SACM Argumentation Package. It begins with an overview of the metamodel structure followed by a description of each element.
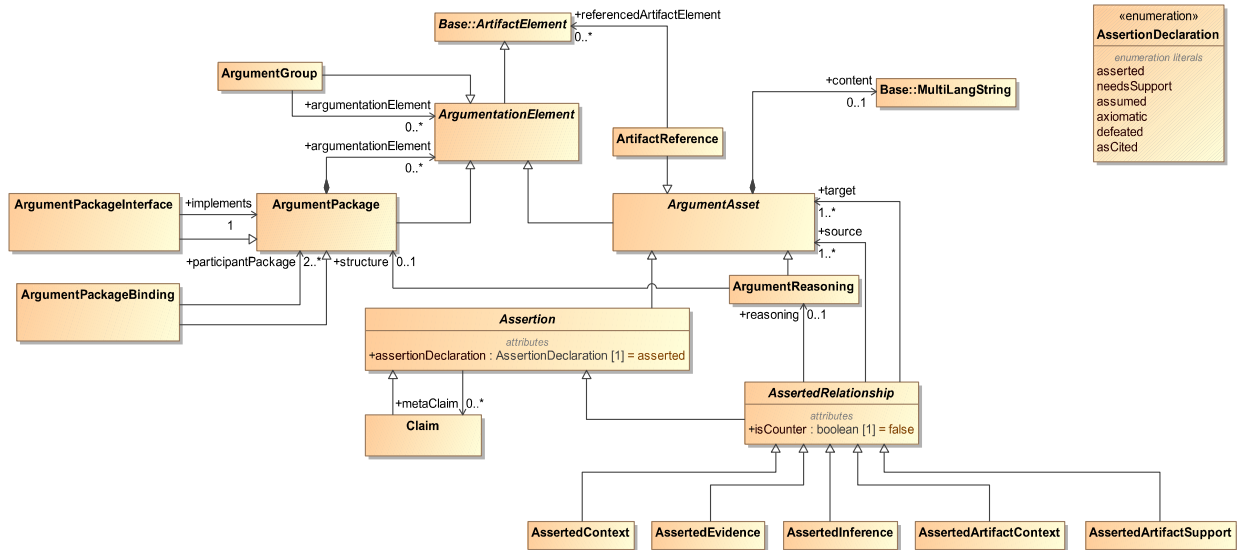

Figure 11.1 - Argumentation Package Diagram

This portion of the SACM model describes and defines the concepts required to model structured arguments. Arguments are represented in SACM through explicitly representing the Claims and citation of artifacts (e.g., as evidence) (ArtifactReference), and the 'links' between these elements – e.g., how one or more Claims are asserted to infer another Claim, or how one or more artifacts (referenced by ArtifactReference) are asserted as providing evidence for a Claim (AssertedEvidence). In addition to these core elements, in SACM it is possible to provide additional description of the ArgumentReasoning associated with inferential and evidential relationships, represent counter-arguments and counter-evidence (through isCounter:Boolean), and represent how artifacts provide the context in which arguments should be interpreted (through AssertedContext).

The packaging of structured arguments into 'modular' argument packages is enabled through ArgumentPackages, an optional declaration of an interface for the package (ArgumentPackageInterface) that organizes a specific selection of the ArgumentElements contained within the package, and the ability to link (by means of an argument) two or more argument packages (through an ArgumentPackageBinding). It is also possible within a package to cite elements contained within other argument packages (through AssertedContext).

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