

9 SACM Argumentation Metamodel

9.1 Argumentation Class Diagram

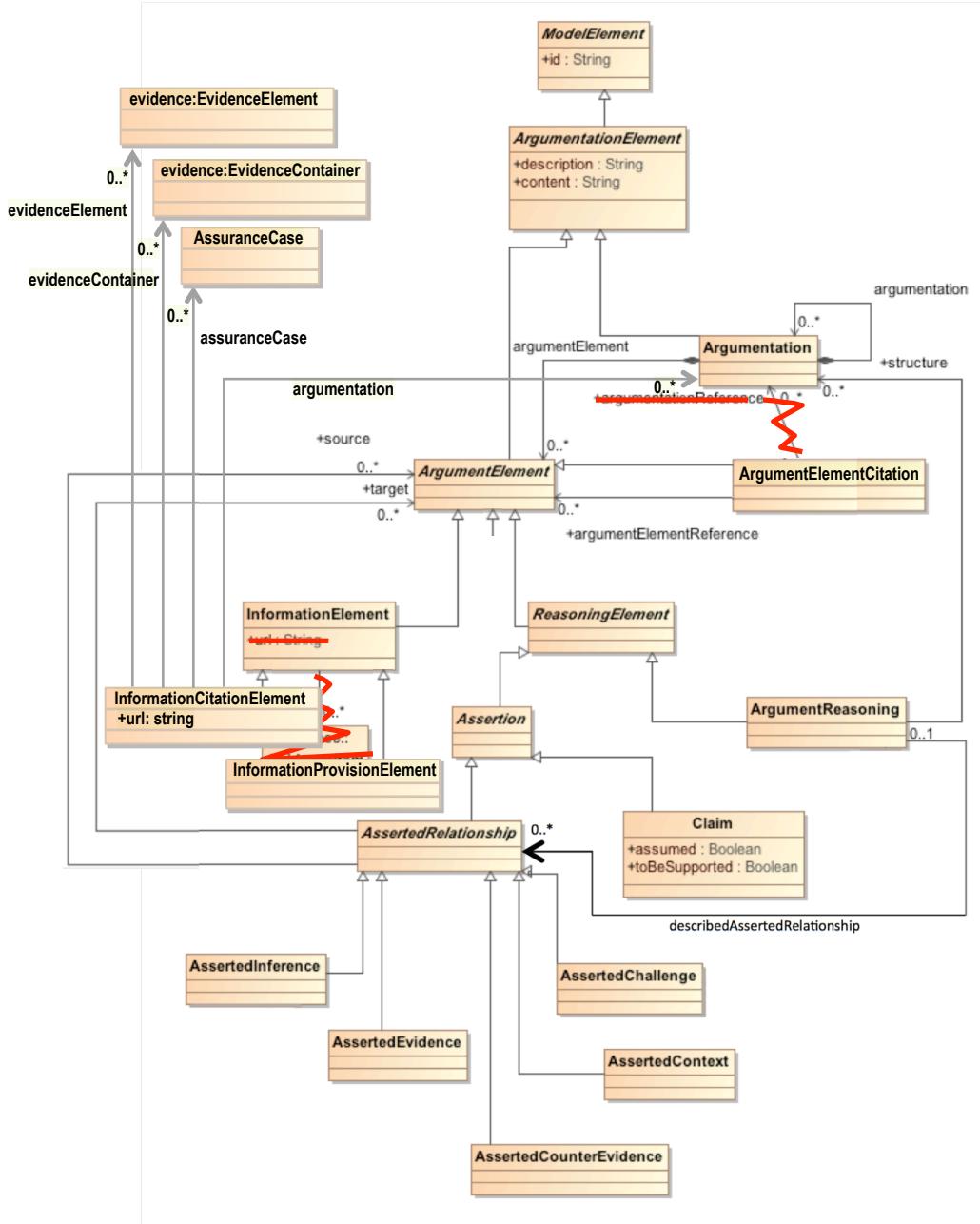


Figure 9.1 -Argumentation Class Diagram

In the following sub clauses we describe the model elements.

Semantics

ArgumentElements represent the constituent building blocks of any structured Argument.

For example, ArgumentElements can represent the Claims made within a structured Argument.

9.1.4 Assertion Class (Abstract)

Assertions are used to record the propositions of Argumentation (including both the Claims about the subject of the argument and structure of the Argumentation being asserted). Propositions can be true or false, but cannot be true and false simultaneously.

Superclass

ReasoningElement

Semantics

Structured arguments are declared by stating claims, citing evidence and contextual information, and asserting how these elements relate to each other.

9.1.5 ReasoningElement Class (Abstract)

The ReasoningElement Class is the abstract class for the elements that comprise the core reasoning of any structured argument represented using the Argumentation Metamodel – Assertions and ArgumentReasoning (the description of inferential reasoning that exists between Claims).

Superclass

ArgumentElement

Semantics

inclusion or of information

The core of any argument is the reasoning that exists to connect assertions of that argument. Reasoning is captured in the SACM through the linking of fundamental claims and the description of the relationships between the claims. ReasoningElements represent these two elements.

9.1.6 InformationElement Class

The InformationElement Class enables the citation of a source that *relates* to the structured argument. ~~The citation is made by the InformationElement class.~~ The declaration of relationship is made by the AssertedRelationship class.

Superclass

ArgumentElement

Attributes

• ~~url: String~~

~~An attribute recording a URL to external evidence.~~

Associations

• ~~evidence:Evidence::EvidenceItem[0..*]~~

~~The EvidenceItems referenced by the current InformationElement object.~~

or directly provide information,
Semantics
 It is necessary to be able to cite sources of information that support, provide context for, or provide additional description for the core reasoning of the recorded argument. InformationElements allow there to be an objectified citation of this information within the structured argument, thereby allowing the relationship between this information and the argument to also be explicitly declared.

~~The url attribute is to be used only when the argumentation aspects of the SACM are complied with. If compliance is claimed against both the argumentation and evidence packages, then the association to Evidence..EvidenceItem shall be used to reference evidence by means of a URL.~~

Example

```
<containsArgumentElement xsi:type="ARM:InformationElement" xmi:id="14" identifier="S2.1" description="" content="black  
box testing"/>
```

ArgumentElementCitation

9.1.7 CitationElement Class

The CitationElement Class cites an Argumentation, or an ArgumentElement within another Argumentation, for use within the current Argumentation.

Superclass

ArgumentElement

Associations

- argumentElementReference:ArgumentElement[0..*]
 References an ArgumentElement within another Argument.
- argumentationReference:Argumentation[0..*]
 References an Argumentation.

Semantics

Within an Argumentation (package) it can be useful to be able to cite elements of an Argumentation (i.e., ArgumentElements) to act as explicit proxies for those elements acting within the argumentation structure. For example, in supporting a Claim it may be useful to cite a Claim or InformationElement declared within another Argumentation. It can also be useful to be able to cite entire Argumentations. For example, in supporting a Claim it may be useful to cite an existing (structured) Argumentation.

9.1.8 Claim Class

Claims are used to record the propositions of any structured Argumentation. Propositions are instances of statements that could be true or false, but cannot be true and false simultaneously.

Superclass

Assertion

Attributes

- assumed: Boolean
 An attribute recording whether the claim being made is declared as being assumed to be true rather than being supported by further reasoning.

9.1.16 AssertedContext Class

The AssertedContext association class declares that the information cited by an InformationElement provides a context for the interpretation and definition of a Claim or ArgumentReasoning element.

Superclass

AssertedRelationship

Semantics

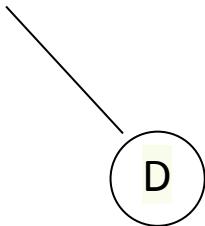
Claim and ArgumentReasoning often need contextual information to be cited in order for the scope and definition of the reasoning to be easily interpreted. For example, a Claim can be said to be valid only in a defined context (“Claim A is asserted to be true only in a context as defined by the information cited by InformationItem B” or conversely “InformationItem B is the valid context for Claim A”). A declaration (AssertedContext) of context (InformationItem) for a ReasoningElement (A – the contextual InformationItem – and B – the ReasoningElement) denotes that A is asserted to be valid contextual information for B (i.e., A defines context where the reasoning presented by B holds true).

Example

```
<containsAssertedRelationship xsi:type="ARM:AssertedContext" xmi:id="21" identifier="CIRC1.1" target="4" source="2"/>
```

Invariants

```
context AssertedContext
inv SourceMustBeInformationElement :self.source->forAll(s|s.ocllsTypeOf(InformationElement))
inv TargetMustBeReasoningElement : self.target->forAll(t|t.ocllsTypeOf(ReasoningElement))
```



9.1.17 InformationCitationElement Class

The InformationElementCitation Class enables the citation of a source of information that *relates* to the structured argument. The citation is made by the InformationElement class. The declaration of relationship is made by the AssertedRelationship class.

Superclass

InformationElement

Attributes

- url: String

An attribute recording a URL to external evidence.

Associations

evidenceElement:Evidence::EvidenceElement[0..*]

The EvidenceElements cited by the current InformationElementCitation object.
evidenceContainer:Evidence::EvidenceContainer[0..*]

The EvidenceContainer cited by the current InformationElementCitation object.
assuranceCase:AssuranceCase[0..*]

The assuranceCase cited by the current InformationElementCitation object.
argumentation:Argumentation[0..*]

The argumentation structure cited by the current InformationElementCitation object.

Semantics

It is necessary to be able to cite sources of information (EvidenceElements, EvidenceContainers, entire AssuranceCases, entire Argumentation structures, or external objects) that support, provide context for, or provide additional description for the core reasoning of the argumentation structure.

InformationCitationElements allow there to be an objectified citation of this information within the argumentation structure, thereby allowing the relationship between this information and the argument to also be explicitly declared.

The url attribute is to be used when citing sources of information outside of an SACM model.

The evidenceElement and evidenceContainer associations can only be used when conforming to the Assurance Case compliance point.”

9.1.18 InformationProvisionElement Class

The InformationProvisionElement Class enables the direct provision of information that *relates* to the structured argument. The declaration of relationship is made by the AssertedRelationship class.

Superclass

InformationElement

Attributes

Associations

Semantics

It is sometimes necessary to directly provide sources of information, that support, provide context for, or provides additional description for the core reasoning of the recorded argument. InformationProvisionElements allow the provision of this information within the structured argument, thereby allowing the relationship between this information and the argument to also be explicitly declared.