AGENDA

- SysML v1 / v2 Overview
- SysML v2 Features

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**Development of OMG SysML v1 ("v ONE")**

* OMG SysML 1.5 was published in 2017.
* Work on OMG SysML 1.6 will be published this year.
* Work on OMG SysML 1.7 will started end of last year.
* Work on OMG SysML 2.0 has already started.

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**SysML v1 ("v ONE") Working Group(s)**

American Systems Corporation  
ARTISAN Software Tools  
BAE SYSTEMS  
The Boeing Company  
Deere & Company  
EADS Astrium GmbH  
EmbeddedPlus Engineering  
Eurostep Group AB  
Gentleware AG  
Georgia Institute of Technology  
I-Logix  
International Business Machines  
Lockheed Martin Corporation  
Mentor Graphics  
Motorola, Inc.  
National Institute of Standards and Technology  
Northrop Grumman Corporation  
oose Innovative Informatik  
PivotPoint Technology Corporation  
Raytheon Company  
Sparx Systems  
TelelogicAB  
THALES  
Vitech Corporation

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**SysML v1 = UML ++ --**

UML 2
- SysML
- UML reused by SysML (UML4SysML)
- UML not required by SysML (UML – UM4SysML)
- SysML extensions to UML (SysML Profile)

Source: SysML 1.5 specification

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**Unified Modeling Language (UML)**

* Current version UML 2.5.1
* First OMG version 1997: UML 1.1

The objective of UML is to provide system architects, software engineers, and software developers with tools for analysis, design, and implementation of software-based systems as well as for modeling business and similar processes. (UML 2.5.1)
**Concrete Syntax - Notation**

- **Sticky figure** is the notation of an **Actor**
- **Solid line** is the notation of an **Association**
- **Elipse** is the notation of a **Use Case**.

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**SysML is more than you see!**

**Concrete Syntax**

**Semantic**

**Abstract Syntax**
Concrete Syntax - Specification

18.1.4 Notation

A UseCase is shown as an ellipse, either containing the name of the UseCase or with the name of the UseCase placed below the ellipse. An optional stereotype keyword may be placed above the name.

A subject for a set of UseCases (sometimes called a system boundary) may be shown as a rectangle with its name in the top left corner, with the UseCase ellipses, usually located inside this rectangle. The same modeled UseCase may be

The specification defines the concrete syntax by text and examples (and sometimes BNF).

Semantic

UseCase [Class]

Description

A UseCase specifies a set of actions performed by its subjects, which yields an observable result that is of value for one or more Actors or other stakeholders of each subject.

Constraints

- binary_associations
  UseCases can only be involved in binary Associations.

```plaintext
forall Association.allInstances() ->forall(a | a.memberEnd.type<>include(self) implies a.memberEnd
  ->size() = 1)
```

Semantic = „The meaning of a word, phrase, or text.” (Oxford Dictionary)
Abstract Syntax

The Abstract Syntax defines the structure of the language, simply said, the data structure of the model data.

A Class Model defines the abstract syntax. UML defines itself!

Abstract Syntax - Example UML Specification

Source: UML 2.5.1 Specification

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The UML Specification Document

* Available for free
* CA. 800 pages
* Structure:
  
  <Model section>
  <Summary>
  <Abstract Syntax>
  <Semantics>
  <Notation>
  <Example>

Roadmap SysML v2

Next generation Modeling Language for the next 15-20 years!


We are here!

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SYSML v2 RFP

* 115 PAGES
* AROUND 200 REQUIREMENTS
  * MANDATORY
  * NON-MANDATORY
* PUBLISHED DECEMBER 2017

http://www.omg.org/cgi-bin/doc.cgi?ad/2017-12-2

SST - SYSML Submission Team

CONSORTIUM WITH AROUND 60 ORGANIZATIONS AND 100 PEOPLE!
By now most of SysML v2 happens behind the scenes

Boring Standard Requirements

* Model elements must be able to get a name
* SysML v2 shall provide a dependency relationship
* SysML v2 shall provide a container for other model elements
* Sequence, Activity, Statemachine modeling
* ...
Let's focus on the real NEWS

Precision

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SysML v2 will not be based on UML

Source: SysML 1.5 specification

Wow!

SysML v2 Language Architecture - KerML

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Version and Timestamp

SysML v2 shall provide a capability to apply version and timestamp data to model elements.

Data Protection

SysML v2 shall provide a capability to apply data protection controls to model elements.
SysML v2 shall provide a Cause-Effect Relationship.

Risk

SysML v2 shall provide a Capability to Model a Risk.
**Navigation**

**SysML v2 shall provide a Navigation relationship to link model elements to other internal or external elements (hyperlink).**

**Variant Modeling**

**SysML v2 shall provide a capability to represent Variants aligned with ISO/IEC 26550.**

* Variation point
* Variants
* Variability expressions
* Variant binding
Collections, Matrices

Material

SysML v2 shall include a capability to represent named materials with their material properties in a model library and assignment of such materials to physical elements such as hardware components.
Usage-oriented Modeling
Simply said, „IBD without BDD!”

Digital Twin
Modeling of Structures Of an Individual

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Support of Interface Levels

Functional, Logical, Physical
Mechanical, Electrical, Information

Sequence and Activities are different views of the same model
SysML v2 supports a real model-based RE approach. Textual requirements are also supported.
Support of Analyses and Decisions

Basic Geometry

SysML v2 may include a capability to represent basic two- and three-dimensional geometry of a structural element, including a base coordinate frame.
SysML v2 shall provide test cases to assess conformance of a SysML v2 implementation with the SysML v2 metamodel and profile specification.

[Diagrams?]

[Text]

[Geometry]

[Tables, Matrices]
One more Thing...

SysML v2 API and Services

Provide a standardized, and tool-independent API and basic services to access a SysML model.

The standard will make it possible to write applications using the API and services independent of a specific SysML tool.
THANK YOU!

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