Systems Modeling Language (SysML)
INCOSE MDSD Review

SysML Partners
www.sysml.org

10 July 2005

Objectives

- Summarize submission status and proposed updates to V0.9 since MDSD Review at INCOSE IW on Jan 30, 2005
- Review vendor prototype implementations
- Provide usability feedback

Agenda

- Background and Status Update – Cris/Sandy
- Vendor Prototype Demonstrations
  - Telelogic – Chris Sibbald
  - Artisan – Alan Moore
  - I-Logix – Eran Gery
  - EmbeddedPlus – Cory Bialowas
- Open Discussion - All
- Summary – Cris/Sandy

Background

SysML Partners

- Informal partnership of modeling tool users, vendors, and government agencies
  - organized in May 2003 to respond to UML for Systems Engineering RFP (OMG doc# ad/03-03-41)
- Charter
  - The SysML Partners are collaborating to define a modeling language for systems engineering applications, called Systems Modeling Language (SysML). SysML will customize UML 2.0 to support the specification, analysis, design, verification and validation of complex systems

SysML Partners

- Partners
  - Industry
    - American Systems, BAE SYSTEMS, Boeing, Deere & Company, EADS Astrium, Eurostep, Israel Aircraft Industries, Lockheed Martin, Motorola, Northrop Grumman, oose.de, Raytheon, THALES
  - Government
    - DoD/OSD, NASA/JPL, NIST
  - Vendors
    - Artisan, Ceira, EmbeddedPlus, Gentleware, IBM, I-Logix, PivotPoint Technology, 3SL, Telelogic, Vitech
  - Organizations
    - INCOSE
  - Academia/Research
    - Georgia Institute of Technology
- Liaisons
  - AP-233, CCSDS, EAST, INCOSE, Rosetta

SysML Milestones

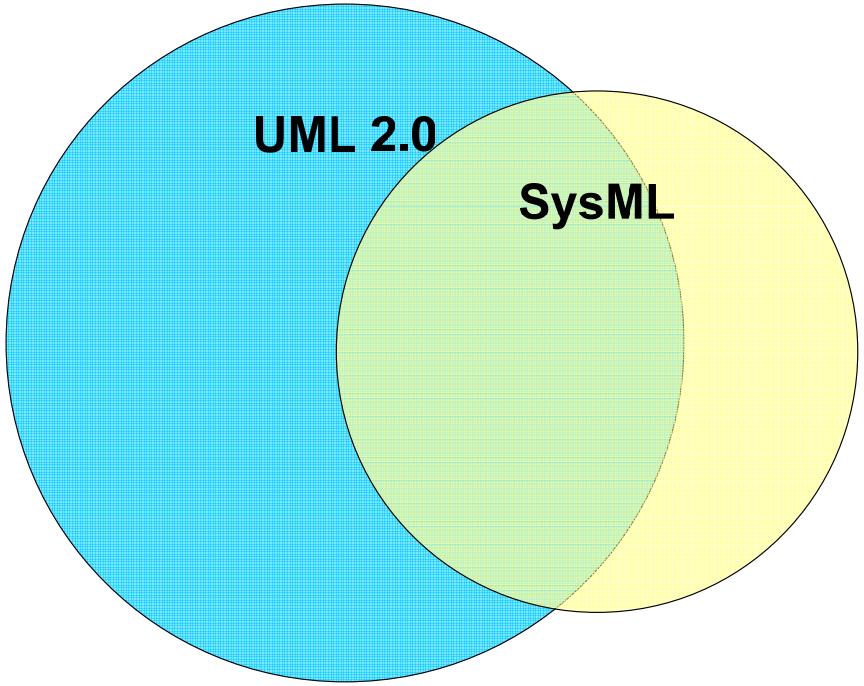
- UML for SE RFP issued – 28 March 2003
- Kickoff meeting – 6 May 2003
- Overview presentation to OMG ADTF – 27 Oct. 2003
- Initial draft submitted to OMG – 12 Jan. 2004
- INCOSE Review – 25-26 Jan. 2004
- INCOSE Review – 25 May 2004
- Revised OMG submission – 2 Aug. 2004
- 2nd Revised submission to OMG – 11 Oct. 2004
- 3rd Revised submission to OMG – 10 Jan. 2005
- INCOSE Review – 29-30 Jan. 2005
- Submission Update – 30 May 2005
- INCOSE Review and SysML Prototype Demos – 10 July 2005
- OMG technology adoption – H2 2005

Final OMG submission date TBD – see *Summary*

Requirements Summary

- Structure
  - e.g., system hierarchy, interconnection
- Behavior
  - e.g., function-based behavior, state-based behavior
- Properties
  - e.g., parametric models, time property
- Requirements
  - e.g., requirements hierarchy, traceability
- Verification
  - e.g., test cases, verification results
- Other
  - e.g., trade studies

UML 2 Reuse



Common diagrams: Activities, Block Definitions (UML2::Classes), Internal Blocks (UML2::Composite Structures), Sequences, State Machines, Use Cases

New diagrams: Allocations, Parametric Blocks, Requirements

Status Update

Summary of H1 2005 Activities

- Jan. 2005 – listening to our critics
  - INCOSE International Workshop MDSD WG review (Jan./Feb. 05) feedback regarding SysML v. 0.9 draft was generally positive
    - however, MDSD recommended that we needed to simplify and refine v. 0.9 to make it easier for SEs to learn and apply
  - SysML Partner vendors expressed various concerns regarding implementation and usability issues
- Feb.- July 2005 – responding to our critics
  - Four SysML vendors have been actively prototyping SysML v. 0.9 to validate that it is both implementable (from vendor perspective) and usable (from SE practitioner perspective)
  - SysML Structural SWAT team has been working on unification and simplification of new structural constructs (Blocks, Parametrics, Requirements) and Allocations

Current Status

- SysML Specification v. 0.9 Addendum
  - *Profiles and Model Libraries* Chapter Draft
    - submitted to OMG as ad/05-05-01 on 30 May 05
- Recommended changes to UML 2 Superstructure Profiles
  - submitted to OMG as Issues 8845-8854
- Open source license, copyrights, and trademarks reviewed by OMG legal counsel and found to be in order and compatible with OMG adoption process
  - “SysML” has no trademark status

Planned Improvements for Next Revision

- Unify and simplify Class, Assembly and Parametric constructs using Block construct
  - distinguish between logical and physical Ports, Flows and Interfaces
- Unify and simplify various kinds of Allocation dependencies
- Classify various kinds of Properties
  - includes ValueProperty which can be constrained in Parametric Block diagrams
- Reorganize specification to increase consistency and readability
  - Update Non-Normative Extensions appendix to include EFFBDs, Requirements taxonomy, MOE

Issue Status

- Seven critical issues currently identified
  - proposals in progress to resolve top 2
- 235 v. 0.9 issues in Issue Tracker, including critical issues
  - 6 resolved
  - 24 in progress
  - 205 not started

SysML Specification Outline Update

- Preface
- Part I - Introduction
- Part II – Structural Constructs
  - Blocks
    - Block Definition
    - Internal Block
    - Parametric Block
- Part III – Behavioral Constructs
  - Activities
  - Sequences
  - State Machines
  - Use Cases
- Part IV – Crosscutting Constructs
  - Model Management
  - Allocations
  - Requirements
  - Profiles & Model Libraries
- Appendices
  - Diagrams
  - Sample Problem
  - Non-Normative Extensions
  - Model Interchange (AP-233 and XMI)
  - Requirements Traceability
  - References

MDSD Recommendations From INCOSE IW 29-30 Jan. 2005

MDSD Recommendations

- Improve SysML tutorial
  - emphasize 5 Core diagrams and be driven by Requirements diagrams
  - replace UML-specific definitions with domain-specific explanations
  - present update at INCOSE Symposium (MDSD plenary)
- Increase readability of SysML specification for engineers and tool vendors
  - replace UML-specific definitions with domain-specific explanations
  - include a domain metamodel
- Include a model library for Requirement taxonomy
  - include MeasureOfEffectiveness (MOE; properties: weight, optimizationDirection)
  - MOE may also include a complementary Parametric construct to effect MOE constraints

MDSD Recommendations (cont'd)

- Include a model library for Assemblies that includes PhysicalAssembly (properties: supplier, modelNumber, serialNumber, lotNumber)
- Harmonize concepts, constructs, and usage examples for Allocations
  - make implicit Allocations explicit
  - test usability of multiple UI options via vendor prototypes
- Encourage and promote vendor SysML prototypes at INCOSE Symposium vendor exhibits

Wrap Up

Summary

- SysML v. 0.9 vendor prototyping has provided valuable implementation and usability feedback
  - some vendors already marketing SysML v. 0.9 tools
- Working to reach consensus on critical issues and resolve remaining detailed issues
  - time required dependent upon resources provided by vendors
  - striving to complete v. 1.0 before end of 2005
- Next public draft and revised submission planned for OMG September/Atlanta meeting
  - will be better able to estimate time required to finalize v. 1.0 after next public draft
- SysML needs your support
  - provide feedback to vendors regarding SysML v. 0.9 prototypes

Further Info

- SysML Forum
  - www.SysML.org
  - includes Feedback page
- SysML Forum discussion group
  - mailto:SysMLforum@googlegroups.com
- Chairs
  - Cris Kobryn
    - cris.kobryn@sysml.org; cris.kobryn@telelogic.com
  - Sandy Friedenthal
    - sanford.friedenthal@sysml.org; sanford.friedenthal@lmco.com