INCOSE PANEL
UML for Systems Engineering

Background & Motivation
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Sanford Friedenthal
Lockheed Martin Corporation
(703) 293-5557
sanford.friedenthal@lmco.com
Last Year (2001) UML for SE Panel

Summary

- **Title:** Enhancing UML for Systems Engineering
- **Moderator:** Mike Green
- **Well attended and spirited**

- **Key points**
  
  - **Dave Oliver:** UML SW focus does not accommodate SE concepts and physical reality
  
  - **Rick Steiner:** SE likes UML notation, but uses it in unconventional ways, which may conflict with SW
  
  - **Jack Ring:** UML is hopeless as a comprehensive SE notation. Will need to be supplemented to address ops concepts, budgets, tradeoffs, and goal seeking systems
This Year's (2002) Panel on UML for SE

Agenda

• Follow-up from last year's panel

• Theme: Moving Forward with UML for SE

• Agenda
  – Background & Motivation – S. Friedenthal (LMC)
  – SE, Physical Reality, and SW Engineering - D. Oliver
  – UML SE Proto. & Eval. Initial Findings - R. Steiner (Raytheon)
  – Applying UML to SE: Lessons Learned - M. Cantor (Rational)
  – Application of UML in Aegis OA - A. Winkler (LMC)
  – UML 2.0 for SE - C. Kobryn (Telelogic)
  – Q&A – Panel & Audience
Current Practice for Describing Systems

- Specifications
- Interface requirements
- System design description
- Trade studies
- Test plans
Communications Challenge for SE

Translating Customer Requirements to HW, SW, Specialty, and Test requirements
Why Model Based Approach?

• *Improved communications*

• *Reduced ambiguity*

• *Reduced errors*

• *More complete representation*

• *Enhanced knowledge capture*
Why UML for Describing Systems?

- *De-facto standard within the software community*
- *Robust and extensible language to meet SE needs*
- *OMG Infrastructure*
  - *Broad international and industry representation*
  - *Defined adoption process to evolve UML*
- *Tool vendor and training support*
Modeling Language

• **UML**
  – *Is a modeling language*
  – *Is not a methodology*

• **Modeling Language = Syntax + Semantics**
  – *Semantics = meaning*
  – *Syntax = representation of meaning*
System Modeling (Notional)

Safety Model

Behavior Models

Structure Models

Performance Model

Gain

\[ \frac{1}{S} \]

Dynamics

\[ \frac{1}{S} \]

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Request to proceed
OMG Systems Engineering Domain Special Interest Group (SE DSIG)

- Support development of **UML for Systems Engineering**, which supports the following goals:
  - Provide a standard SE modeling language to specify, design, and verify complex systems
  - Facilitate integration between systems, software, and other engineering disciplines
  - Promote rigor and correctness in the transfer of SE information between tools
Req’ts Analysis for UML for SE

- AP-233 Express Model
- SE Conceptual Model
- UML Meta-Model
- UML for SE RFI
- Industry Responses
- UML for SE Prototyping
- Issues & Approaches
- UML for SE Req’ts
- UML for SE Profile RFP
- UML V2.0 Input *

* Informal Channel
INCOSE Participation in SE DSIG

- **INCOSE Liaison is SE DSIG Chair**
- **Supports INCOSE MDSD**
- **Coordination with INCOSE AP-233 Liaison**
- **Inputs from INCOSE OOSEM Working Group**
- **INCOSE / OMG Subgroup established**
Summary

• Need system modeling language to address system complexity and bridge systems & software gap

• Extending UML offers a potential solution

• Established OMG SE DSIG with broad participation to extend UML from software to systems

• INCOSE is leveraging OMG activity to improve the practice of systems engineering