



INCOSE OOSEM Working Group Charter

PURPOSE

Advance the use of the Object-Oriented Systems Engineering Method (OOSEM) in support of Model-Based Systems Engineering (MBSE), while providing input to the ongoing development of the Systems Modeling Language (SysML).

(See *Background: What is OOSEM?* below.)

GOAL

Improve the practice of model-based systems engineering by applying concepts, notations, and methods that:

1. Support capture, analysis and understanding of complex systems specifications and design
2. Improve integration between systems, software, hardware, test, and other engineering disciplines, and
3. Facilitate system-, element-, and component-level reuse and design evolution.

Stakeholders include all practitioners of systems engineering (whether or not they use that term), from areas of application such as:

- defense
- renewable energy
- agriculture
- communications
- transportation
- cloud-based computing

BACKGROUND: WHAT IS OOSEM?

The following description of OOSEM is excerpted from Chapter 16 of “A Practical Guide to SysML: The Systems Modeling Language” by Friedenthal, Moore, Steiner [1].

OOSEM is a top-down, scenario-driven process that uses SysML to support the analysis, specification, design, and verification of systems. The process leverages object-oriented concepts and other modeling techniques to help architect more flexible and extensible systems that can accommodate evolving technology and changing requirements. OOSEM is also intended to ease integration with object-oriented software development, hardware development, and test processes.

OOSEM includes fundamental systems engineering activities such as needs analysis, requirements analysis, architecture, trade studies and analysis, and verification. It has similarities with other methods such as the Harmony process and the Rational Unified Process for Systems Engineering (RUP SE), which also apply a top-down, scenario-driven approach that leverages SysML as the modeling language. OOSEM includes

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various modeling techniques, such as causal analysis, logical decomposition, partitioning criteria, node distribution analysis, control strategies, and parametrics, to deal with a wide array of system concerns.

OOSEM was developed in 1998 and further evolved as part of a joint effort between Lockheed Martin Corporation and the Systems and Software Consortium (SSCI), which previously was the Software Productivity Consortium [2]. Early pilots were conducted to assess the feasibility of the method [3], and then it was further refined by the INCOSE OOSEM Working Group beginning in 2002. Tool support has been substantially improved for OOSEM with the adoption of the SysML specification beginning in 2006.” OOSEM is included as one of the model based systems engineering methods in the Survey of MBSD Methodologies [4].

[1] Friedenthal, Moore, Steiner , A Practical Guide to SysML: The Systems Modeling Language. Elsevier, 2008 .

[2] Lykins, Friedenthal, Meilich, Adapting UML for an Object-Oriented Systems Engineering Method (OOSEM), Proceedings of the INCOSE International Symposium. Minneapolis, July 15–20, 2000.

[3] Steiner, Rick, Friedenthal, Sanford, Oesterheld, Jerry, and Thaker, Guatam, Pilot Application of the OOSEM Using Rational Rose Real Time to the Navy CC & D Program, Proceedings of the INCOSE International Symposium, Melbourne, July 1–4, 2001.

[4] Estefan, Jeff, Survey of Candidate Model-Based Systems Engineering (MBSE) Methodologies, Rev. B, June, 2008 (refer to <http://www.omg.sysml.org> under publications).

SCOPE

In-scope areas include:

- MBSE methods (e.g., OOSEM) and related standards (e.g., SysML)
- exchange of information between OOSEM and methods in software, hardware, test, and other engineering disciplines
- review of related work (e.g., case studies, major research efforts by graduate students)
- review and evaluation of tool support for OOSEM (expected in future)
- education and training

Methods for various engineering disciplines—as opposed to exchanges between OOSEM and those methods—are out of scope.

SKILLS AND EXPERTISE REQUIRED

Members should have a general understanding of model-based systems engineering, and a willingness to learn and advance the method.



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MEMBERS, ROLES AND RESPONSIBILITIES

Participating Members should:

- attend as many monthly and special meetings as possible
- contribute to discussion, and,
- contribute work on special projects when appropriate

Three co-chairs facilitate the group's decisions, which are made by consensus.

Role	Responsibilities
Technical Co-Chair	Convene monthly meetings, monitor progress on technical tasks.
Logistics Co-Chair	Ensure that facilities are available for monthly and special meetings. Liaise with provider of meeting facilities, currently the Applied Physics Laboratory of Johns Hopkins University.
INCOSE Liaison Co-Chair	Liaise with INCOSE International and with the Chesapeake Chapter.

OUTCOMES (PRODUCTS/SERVICES)

The following comprises the agenda for the next three years, and may change based on the needs of the systems engineering community.

Products

1. Updates to the SysML Training Course
2. Updates to the OOSEM Training Course
3. OOSEM case studies
4. A "Light" version of OOSEM, useful in cases where applying the full method would be too expensive or complex
5. "Storybook" documentation of light version of OOSEM

Services

1. Provide expert assistance to users of OOSEM, especially new users.
2. Review results of research and development (e.g., systems engineering courses) by systems engineers outside the group.

APPROACH

- Meet monthly, usually on the second Saturday of the month, to review and advance technical projects, making decisions by consensus.



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- Delegate between-meeting work on technical projects to one or more members, who incorporate feedback from the group and flesh out details for discussion.
- Communicate by email and share results using INCOSE Connect.

MEASURES OF SUCCESS

- Papers submitted to the INCOSE Symposium and other conferences
- Contributions of the group and individual members to efforts by other organization
 - for example, three members of the group recently served as question authors for the OMG SysML certification exams
- Number of members and guests at each meeting

RESOURCE REQUIREMENTS

Meeting facilities including a room, projector, refreshments, and phone and internet connections for remote attendees are provided by the Johns Hopkins University Applied Physics Laboratory.

DURATION

The group hopes to continue its efforts as long as there is a need for model-based systems engineering. This Charter will remain in effect until rescinded by the signatory.

SIGNATURES

Enter the signature block of the submitter

Date

1st Level of Approval

Date

August 23, 2011

Technical Director, INCOSE

2nd Level of Approval (Note this will be added by the INCOSE Technical Director when deemed appropriate.)

Chairman, INCOSE Board of Directors

Date

Revision History

<u>Date</u>	<u>Revision</u>	<u>Description</u>	<u>Author</u>
6/12/2011	1.0		OOSEM Working Group