



2019
Annual **INCOSE**
international workshop
Torrance, CA, USA
January 26 - 29, 2019

MBSE Patterns

www.incose.org/iw2019

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25

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INCOSE WEB PAGE



<http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns>

Charter Summary



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WG PURPOSE/MISSION

The purpose of the INCOSE MBSE Patterns Working Group is to advance the availability and awareness of practices and resources associated with the impactful creation, application, and continuous improvement of MBSE Patterns over multiple system life cycles. The practice of MBSE using System Patterns is also referred to as Pattern-Based Systems Engineering (PBSE).

WG GOAL(S)

Stakeholders and Their Measures of Success

The following summarizes types of stakeholders in the work of this group, and the general areas of impact that measure related successes. Attachment 2 provides further discussion of the state of these measures:

System Innovation / Development Teams: Enjoy the benefits of MBSE with lower per-project model-origination and refinement time, effort, skill load, and risk, by employing configured System Patterns as early draft models.

System Modelers: Extend the span of influence of skilled individual modelers by making their models effectively available, applicable, and impactful to more projects, systems, and products.

Product Line Managers, Platform Managers, Portfolio Managers: Improve the effectiveness of families-of-systems disciplines, measured in terms of economic leverage.

System Verification Teams: Improve the performance of system verification planning and execution in high risk or complexity systems.

System Life Cycle Groups: Improve satisfaction with the early fit of systems to the learned needs of system life cycle communities, including manufacturing, distribution, end user, operations, and maintenance, over a broad range of issues that should not be re-

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discovered each generation (functionality, safety, many other aspects).

Tool Suppliers: Improve the ROI demonstrated by tools.

Enterprises: Improve organizational-level learning across individual people and projects, reducing occurrences of re-learning the same lessons and repeating the same mistakes.

WG SCOPE

As used here, System Patterns are configurable, re-usable System Models that would otherwise be like those expected and found in the practice of MBSE (not limited to, but including, OMG SysML models). Through the availability and use of System Patterns, the outcomes targeted by MBSE models are made more accessible, in terms of ease (and skill requirements) of generation and use, associated modeling cost, schedule, risk, completeness, and consistency, etc. Over time, System Patterns become points of accumulation of organizational learning and expertise. Because they are configurable and re-usable models of families or classes of systems, model-based System Patterns involve some additional methods and disciplines that extend the ideas of MBSE (e.g., Pattern Management, Configuration Rules, model minimality, etc.).

INCOSE has recognized the importance of model-based methods, in establishing the strategic objective to accelerate systems engineering transformation to a model-based discipline. The work of the MBSE Patterns Working Group increases the value, leverage, and applicability of system models as further described below.

The range and limitations on the scope of the work of this Working Group are closely associated with the range and limitations of scope of Pattern-Based Systems Engineering. Those scope boundaries are discussed at some length in http://www.omgwiki.org/MBSE/lib/exe/fetch.php?media=mbse:patterns:pbse_extension_of_mbse--methodology_summary_v1.5.5a.pdf, a product of the working group that compares and contrasts to a number of other related subjects and activities that are joint work opportunities with other INCOSE Working Groups.

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Although some background in MBSE may be helpful, this working group also provides a path for member learning about MBSE, so it is not a pre-requisite. Background in a specific domain (e.g., medicine, aerospace, etc.) or special enabling subject (e.g., agile systems, verification, etc.) are not required pre-requisites, but may add perspective for members wishing to apply PBSE on an impactful basis in their enterprises. Good collaboration skills and teamwork, along with interest in learning and willingness to share experience are valued skills and traits for this working group. An understanding the of breadth of system life cycles (as in ISO 15288, INCOSE Handbook, etc.) and the needs and challenges found there will likewise inform the member with a perspective on the impactful application of MBSE Patterns. An understanding of the essential nature of systems and the information used to describe them is likewise helpful, however this foundational knowledge is also detailed within the WG products and activities and can be acquired or improved by participation in this working group. PBSE provides a strong foundational metamodel and ontology to underpin and enable MBSE.

IW Outcomes



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IW Outcomes

Reviewed status of existing projects underway with other working groups and external entities.
Identified future projects of interest to IW2019 attendees

- **ASELCM/System of Innovation Pattern, Links to Learning, VVUQ, and Future of SE**
 - **S3 Pattern and INCOSE OCM—Enterprise WG collaboration**
 - **Progress in Model VVUQ Reference Pattern / Model Wrapper (with ASME Stds Committee)**
 - **V4 Institute Collaboration on Virtual Verification**
 - **Medical Device Model VVUQ Application**
 - **Mappings to Frameworks and Tools (suggested by members at IS2018 meeting)**
 - **Semantic Technologies for SE (ST4SE) Collaboration**
 - **Patterns in the Public Square: Regulated Innovation**
 - **IFSR Conversation Product: An MBE Manifesto**
 - **Augmented Intelligence Challenge Team Collaboration**
 - **Interface Patterns Project**
 - **Agile Patterns Project and WG Collaboration, IS 2019 Report Paper**
- **SysSciWG and ISSS Collaboration**

Planned Work past IW



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PLANNED ACTIVITIES

Continue current projects with INCOSE WGs and external entities.
Structure mappings project planning
Model Trust Pattern project planning

PLANNED WORK PRODUCTS

MBSE Penetration Planning and Analysis Aid
Model Planning, Analysis, and Metadata Wrapper Pattern