



2019

Annual **INCOSE**
international workshop

Torrance, CA, USA

January 26 - 29, 2019

Production and Logistics Systems Modeling

www.incose.org/iw2019

Production and Logistics Systems Modeling

CHAIR

Timothy Sprock (timothy.sprock@nist.gov)



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MEMBERS

8

CO-CHAIRS

Leon McGinnis (leon.mcginnis@isye.gatech.edu)

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INCOSE CONNECT ADDRESS



<https://connect.incose.org/WorkingGroups/MBSE/Pages/Home.aspx>

INCOSE WEB PAGE



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

Charter Summary



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WG PURPOSE/MISSION

The production and logistics modeling team is advancing the practice and adoption of formal system modeling and model-based systems engineering methodologies in production and logistics systems development and operations. Specific challenges in providing a foundation to production and logistics [systems] engineering are the lack of:

- Standard reference models
- Well-structured engineering design methodologies
- Integrated analysis models and tools available to support design and operational decision-making.

The purpose of this challenge team is to increase the availability of reference models, awareness of these models and methods, and successful use of MBSE in the production, logistics, and industrial engineering communities.

WG GOAL(S)

- Bring membership up to a common level of DELS modeling, by developing and delivering DELS modeling tutorials.
- Define and demonstrate capabilities for DELS modeling
- Identify target products for near-term work by the team:
- Common & domain-specific reference models and architectures (demonstrated using SysML)
- Integrated MBSE / design methodologies for DELS
- Integrated analysis tools (SAI for routine, common analysis models)
- Suitable use cases, and test cases.

WG SCOPE

The systems of interest are discrete event logistics systems (DELS). They can be described as:

- Structure: a network of *resources*, arranged in a *facility*; each resource has one or more processing capabilities that have a (maximum) capacity;
- Behavior: *products* flow through the network and are transformed by *processes* executed by resources; a process may

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require capabilities of multiple resources; a transformation can change location, age, or condition of a product.

These systems include, but are not limited to:

- supply chains,
- production & manufacturing systems,
- transportation networks,
- warehouses,
- and health care delivery systems.

The adjective “discrete” recognizes the nature of the products, flows, and processes. Products are discrete units, e.g., individual product units or components of product units, or batches of product units, flowing through the network separately. Processes have well-defined start and end times, e.g., the start of a machining or heat-treating process and completion of same, even though our knowledge of the well-defined time may be uncertain.

The scope of team activities is broad, covering almost all aspects of DELS. It might be narrowed and/or broken into smaller projects and outcomes based on the interest of team members. The scope can be defined along three axes:

- System Lifecycle Integration: conceive, design, realize, service, retire (SeBoK)
- Enterprise Integration: Process Control, SCADA, MOM, & ERP. (ISA-95 hierarchy).
- Product Lifecycle: procurement, manufacture, sustainment, retirement. (SCOR: Source, Make, Deliver, Return)

IW Outcomes



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IW Outcomes

- Discussion on MBSE Value Proposition for Production and Logistics Domain
 - 2018 Work Items Status Update
- Theory of DELS Specification: A "foundations" document describing SysML model libraries used to construct new system models and connect them to analysis tools
- Model-based Industrial and Systems Engineering Playbook: A playbook for practitioners describing how to use the model libraries to construct new system models
- Case Studies presented by challenge team members -- applications of work items
- Central Fill Pharmacy Models – Leon McGinnis, Georgia Tech
- Value Stream Mapping for Production – George Thiers, MBSE Tools
- Discussion of 2019 Roadmap:
- Document existing models and make them available
- Identify and Document Use Cases, Refine Value Proposition
- Identify Additional Case Studies
- Identify Potential Liaisons

Planned Work past IW



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PLANNED ACTIVITIES

Weekly Friday telecon @ 11am Eastern -- <https://bluejeans.com/406291803>

OMG ManTIS: March 18th @ Reston -- Continue discussion to identify collaboration opportunities

MBE Summit: April 1-4, 2019 @ NIST -- Continue collaboration and discussions within the Operations, Logistics, and Sustainment track.

PLANNED WORK PRODUCTS

- Theory of DELS Specification: A "foundations" document describing SysML model libraries used to construct new system models and connect them to analysis tools.
- Model-based Industrial and Systems Engineering Playbook: A playbook for practitioners describing how to use the model libraries to construct new system models
- Both work products (documents) are accompanied by SysML models
- Identify additional use cases and case studies to engage new team members