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SMSWG - *SMS Terms & Definitions* *Committee (SMSTDC)*

Lead: Ed Ladzinski

Report out at IW 2019, Torrance, CA
January 28, 2019

Systems Modeling and Simulation:*

The use of interdisciplinary functional, architectural, and behavioral models (with physical, mathematical, and logical representations) in performing MBSE to specify, conceptualize, design, analyze, verify and validate an organized set of components, subsystems, systems, and processes.

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Members

- Ed Ladzinski
- Paul Barnard
- Frank Popielas
- Joe Walsh

Purpose

The Systems Modeling and Simulation Terms and Definitions Committee is to be the authoritative source for systems modeling and simulation terms and definitions and provide ongoing strategic direction for the initiative.

Goals and Objectives

- Increased awareness at all levels regarding this initiative
- Increased awareness at all levels of success stories and continued motivation of this initiative

Role of the Committee

- Facilitate vision & strategy setting
- Monitor execution of strategy and results
- Communicate with the SMSWG Steering Committee and general SMSWG user community
- Communicate with standards setting organizations
 - Not for Profit / Nonprofit (NAFEMS, INCOSE, etc.)
 - Industry
 - Government (NIST, DOD, et.)
 - Universities
 - Consultants
 - Vendors
 - Initiatives

Charter and How We Will Operate

- **Execution:**

- Steering Committee will be responsible for analysis, strategy setting, measurement and ongoing collection of terms and definitions candidates
- Steering Committee will work through a global execution of strategies and action plans
- Steering Committee will be responsible for involving others in the geography as needed to support implementation

- **Structure of meetings:**

- The specific meetings, structure and timing of the activities of the committee will be identified by the committee chair and will initially be:
 - Monthly Meeting of the SMSTDC
 - Quarterly updates to the SMSWG Steering Committee
 - Bi-yearly updates to the general SMSWG
 - Online database will be updated quarterly (if new terms and definitions are created)

- **Organization and Staffing:**

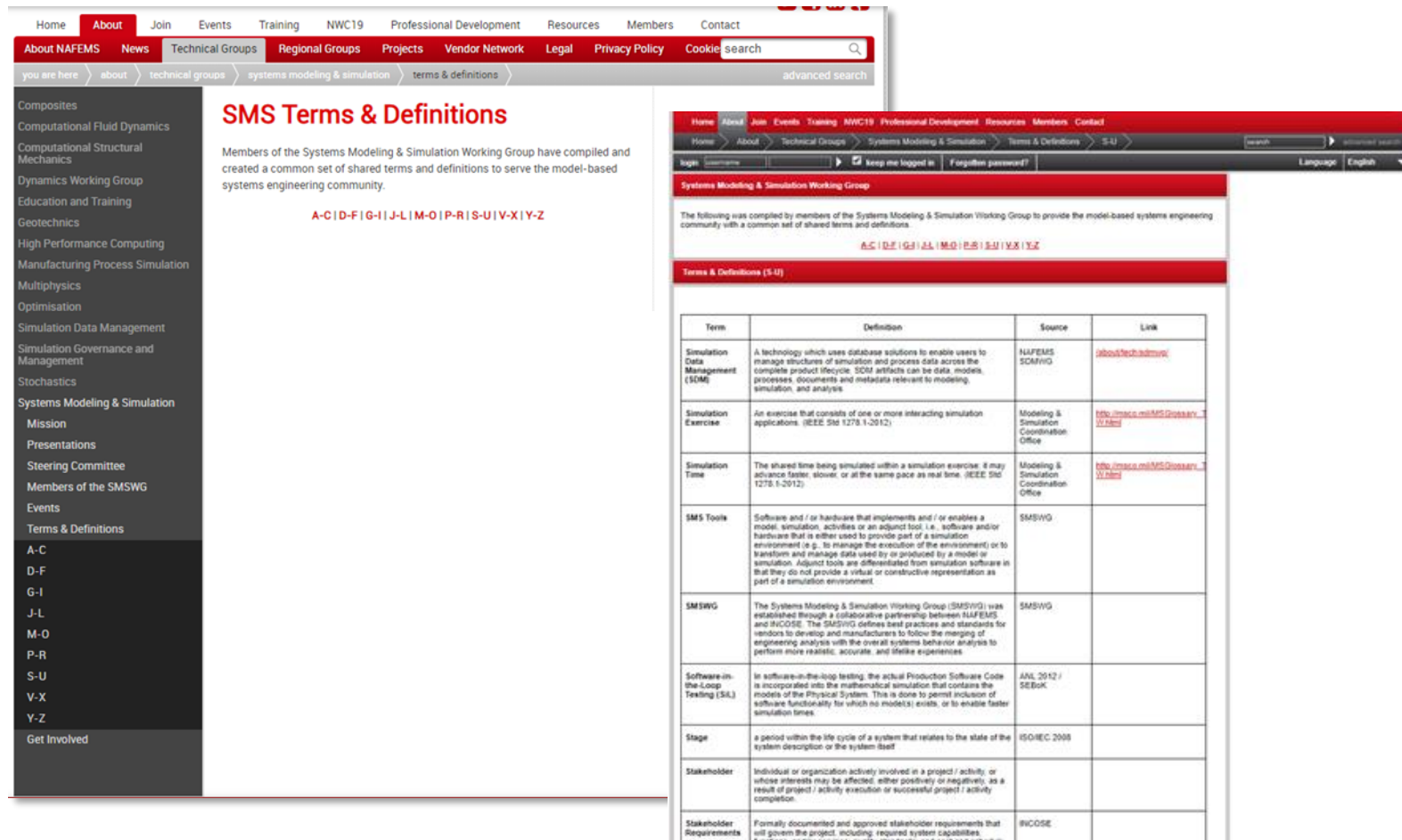
- Membership on the committee will be determined by the chairman of the executive committee
- The committee shall consist of at least 3 members with an attempt to balance membership across:
 - Not for Profit / Nonprofit
 - Industry
 - Government
 - Universities
 - Consultants
 - Vendor
- The committee shall be led by a committee chair who is appointed by the SMSWG Steering Committee Chairman and whose term shall end by the decision of the SMSWG Steering Committee Chairman
- Each committee member will serve for a 2 year term which is renewable. In the second year, half the committee will be designated as serving 3 year terms to provide for staggered membership.

Current Status

- Kick-Off with Committee members completed
 - Charter reviewed and approved
 - Plans for next steps discussed and agreed
 - Database of most current T-Ds received from NAFEMS and distributed to the committee
 - Candidates for consideration compiled among committee members and distributed
- Next meeting scheduled for February 7, 2019
 - Review T-D candidates
 - Solicit input from organizations mentioned previously in this presentation
 - Agree or agree to disagree
 - Prepare a 'report out' to be provided to the SMSWG Steering Committee

Where Does One Find the NAFEMS Site T-Ds

https://www.nafems.org/about/technical-working-groups/systems_modeling/smstermsdefinitions/



SMS Terms & Definitions

Members of the Systems Modeling & Simulation Working Group have compiled and created a common set of shared terms and definitions to serve the model-based systems engineering community.

A-C | D-F | G-I | J-L | M-O | P-R | S-U | V-X | Y-Z

Term	Definition	Source	Link
Simulation Data Management (SDM)	A technology which uses database solutions to enable users to manage structures of simulation and process data across the complete product lifecycle. SDM artifacts can be data, models, processes, documents and metadata relevant to modeling, simulation, and analysis.	NAFEMS SCSWVG	about/technicalgroups/
Simulation Exercise	An exercise that consists of one or more interacting simulation applications. (IEEE Std 1278.1-2012)	Modeling & Simulation Coordination Office	http://nafe.ms.org/MS/Discovery/1/1.htm
Simulation Time	The shared time being simulated within a simulation exercise. It may advance faster, slower, or at the same pace as real time. (IEEE Std 1278.1-2012)	Modeling & Simulation Coordination Office	http://nafe.ms.org/MS/Discovery/1/1.htm
SMS Tools	Software and / or hardware that implements and / or enables a model, simulation, activities or an adjunct tool, i.e. software and/or hardware that is either used to provide part of a simulation environment (e.g. to manage the evolution of the environment) or to transform and manage data used by or produced by a model or simulation. Adjunct tools are differentiated from simulation software in that they do not provide a virtual or constructive representation as part of a simulation environment.	SMSWVG	
SMSWVG	The Systems Modeling & Simulation Working Group (SMSWVG) was established through a collaborative partnership between NAFEMS and INCOSE. The SMSWVG defines best practices and standards for vendors to develop and manufacturers to follow the merging of engineering analysis with the overall system behavior analysis to perform more realistic, accurate, and lifelike experiences.	SMSWVG	
Software-in-the-Loop Testing (SIL)	In software-in-the-loop testing, the actual Production Software Code is incorporated into the mathematical simulation that contains the models of the Physical System. This is done to permit inclusion of software functionality for which no model(s) exists, or to enable faster simulation times.	ANL 2012 / SE&UK	
Stage	a period within the life cycle of a system that relates to the state of the system description or the system itself	ISO/IEC 2008	
Stakeholder	Individual or organization actively involved in a project / activity, or whose interests may be affected, either positively or negatively, as a result of project / activity execution or successful project / activity completion.		
Stakeholder Requirements	Formally documented and approved stakeholder requirements that will govern the project, including: required system capabilities, functional, performance, quality, reliability, and cost and schedule.	INCOSE	

First issued in 2016

T-D Candidates

- Definitions around “Model-Based...”
 - MBD
 - MBE
 - MBT
 - ...
 - MiL
 - HiL
 - SiL
 - HiL
 - ...

Model-Based Definitions



- **Model-Based Engineering (MBE)** - a.k.a., Model-Driven Engineering (MDE) and Model-Driven Development (MDD).
"An approach to engineering that uses models as an integral part of the technical baseline that includes the requirements, analysis, design, implementation, and verification of a capability, system, and/or product throughout the acquisition life cycle." (Final Report, Model-Based Engineering Subcommittee, NDIA, Feb. 2011). It is the umbrella for many other MBx activities.
- **Model-Based Systems Engineering (MBSE)** – "the formalized application of modeling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases." (INCOSE SE Vision 2020 (INCOSE-TP-2004-004-02, Sep 2007). MBSE is a subset of Model Based Engineering (MBE) and Systems Engineering (SE).
- **Model-Based Design (MBD)** – "Real-time, high fidelity systems models that use mathematical, acausal, and visual methods to define system behavior, and performance. Often constructed as lumped parameter models supporting designs for complex controls, signal processing, and communication systems." (Wikipedia) It is a subset of Model Based Engineering.
- **Model-based definition (MBD)** "is the practice of using 3D models (such as solid models, 3D PMI and associated metadata) within 3D CAD software to define (provide specifications for) individual components and product assemblies. The types of information included are geometric dimensioning and tolerancing (GD&T), component level materials, assembly level bills of material, engineering configurations, design intent, etc." (Wikipedia) It is a subset of Model Based Design.
- **Model-Based Safety Analysis (MBSA)** – "An approach in which the system and safety engineers share a common system model created using a model-based development process. By extending the system model with a fault model as well as relevant portions of the physical system to be controlled, automated support can be provided for much of the safety analysis." (Model-Based Safety Analysis, NASA, Feb. 2006). It is a sub-set of Model Based Engineering.
- **Model-Based Enterprise (MBE)** – "A strategy where an annotated digital three-dimensional (3D) model of a product serves as the authoritative information source for all activities in that product's lifecycle." (Wikipedia) It is the culmination of MBE.

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Discussion