SMS Community Update –
SMS Terms & Definitions Focus Team

April 12, 2022

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.

*SMSWG – Terms & Definitions: https://www.nafems.org/about/technical-working-groups/systems_modeling/smstermsdefinitions/s-u/

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Purpose

This Focus Team has an ongoing task to compile a common set of shared terms and definitions to serve the model-based systems engineering community.

- This focus team attempts to be comprehensive, bringing many related T&D's together in one place

- Gather candidate terms and vet definitions through various standard setting organizations

A common language is instrumental for understanding

Process

We are here

System Modeling and Simulation
Terms and Definitions Focus Team

Defined T&D Release Process:

All steps are to be performed by the SMS T&D focus team unless explicitly stated otherwise.

1. Identify requests for new terms to be defined and/or existing terms & definitions to be updated
   a. Input will be requested from the SMS Community (i.e., top 3 terms/person)
   b. Other input sources
2. Terms are selected that will be defined by the T&D focus team
3. Propose, review and converge on candidate definitions for each selected term
   a. This will be done through a combination of email exchanges between the monthly T&D focus team meetings
   b. Consistency will be cross checked with other references such as SEBoK, IEEE, various standards, etc.)
   c. Timeframe for convergence and consensus is 2-3 months.
4. Socialization and feedback from the SMS community and INCOSE
   a. During the next SMS community meeting, the terms and definitions will be presented in order to provide exposure and solicit feedback from this group.
   b. Phyllis will be the focal point to INCOSE, in order to solicit feedback with respect to the new terms and definitions
   c. Time frame for input: within 2 weeks
      i. (Input request is to receive objections, recommendations, source info, or proposed changes, otherwise they are deemed accepted)
5. SMSWG approval is given for the definitions after above mentioned input is considered.
6. Approved T&Ds are published on the SMS Terms & Definitions website.
   a. The publication update is performed by the NAFEMS TWG manager on behalf of the SMSWG
7. Optionally, announcement of newly published terms and definitions may be made via posts on either the NAFEMS SMS Community Pages or the INCOSE Connect SMSWG pages

"In the loop" Definitions

Proposed Term	Common Acronyms	Resulting Definition
Hardware In the Loop	HIL, HWIL, HITL	A dynamic simulation approach that incorporates one or more actual operational components within a virtual simulation environment, with the interaction being real-time for a simulator environment, or sequential and iterative when used during development of a system.
Software in the Loop	SIL	The integration of compiled production source code into a mathematical plant model simulation, providing engineers with a practical, virtual simulation environment for developing and testing complex systems.
Model in the Loop	MIL	A technique used to abstract the behavior of a system or sub-system within a model that can be re-used to test, simulate, and verify that system or sub-system within a larger model.
Human in the Loop	HITL, HuITL	A simulation or a simulator where human interaction is required and operates live, alongside virtual components of a system model.
Processor in the Loop	PIL	A test technique that allows designers to evaluate production code running on a dedicated processor in conjunction with a simulated plant.
Field Programmable Gate Array in the Loop	(FPGA) ~~ (FIL)	An FPGA is an integrated circuit that is designed to be configured after it is manufactured. When an FIL approach is used in developing embedded systems, the configuration of an FPGA is specified at that time, to enable simultaneous development of system software (SW) with hardware (HW) that result in system performance simulations very early during development, thereby allowing insight into various configurations of an FPGA (SW and HW) before final freezing of the system architecture.

Call for Action

- Review the definitions for each term (refer to spreadsheet)

- Provide feedback to Greg Garstecki (gregmg@garsteckimodelingsolutions.com) on:

    1. The definitions
        1. List any additional acronyms that we may have missed
    2. Terms that you would like defined in 2022

- **Deadline is April 26th**

    – After this date, the definitions will be deemed accepted by this community

Thank you for your input in advance!