

NAFEMS Technical Working Group Overview

Systems Modeling and Simulation (SMSWG)
2019

Systems Modeling & Simulation

a NAFEMS / INCOSE* joint Working Group



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'

* INCOSE: International Council on Systems Engineering

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

Systems Modeling and Simulation

- The Systems Modeling & Simulation Working Group (SMSWG) is a joint working group, formed under an agreement between the International Council on Systems Engineering (INCOSE) and the International Association of the Engineering Modelling, Analysis and Simulation Community (NAFEMS). The group's activities began in January 2013. The focus of the SMSWG is on the merging of engineering analysis with overall systems analysis to perform more realistic, accurate and lifelike behaviour modelling and simulation.
- The mission of the joint NAFEMS/INCOSE Systems Modeling & Simulation Working Group (SMSWG) is:
 - Develop a **vendor-neutral, end-user driven** consortium that not only promotes the advancement of the technology and practices associated with integration of engineering analysis and systems engineering, but also acts as the **advisory body to drive strategic direction for technology development and standards in the space of complex engineering**.
 - This group will support activities that bridge engineering analysis and systems engineering to provide digital solutions to represent real life experiences; and optimize the integration of systems engineering and simulation solutions for both OEM and supplier.
 - This includes education, communication, promotion of standards, and development of requirements that will have general benefits to the simulation and analysis community with the identification of benchmarks and major strategic issues (grand challenges).
- Monthly online meetings via WebEx and regular face-to-face meetings.
- **Chair:** Roger Burkhart, John Deere
Co-Chair: Frank Popielas, SMS_ThinkTank
- A list of organisations represented in the SMSWG can be found at www.nafems.org/community/working-groups/systems_modelling/smswg
- Information about the Systems Modeling and Simulation Working Group can be found on the NAFEMS website at www.nafems.org/community/working-groups/systems_modeling
- To enquire about joining this working group complete the online form at www.nafems.org/community/working-groups/systems_modeling/get_involved

Systems Modeling and Simulation

- Due to its size, the working group is coordinated through a Steering Committee representing various industries.
- Member status:
 - Members: around 188
 - Companies: around 108
- Focus teams have been created to coordinate specific activities and create materials.

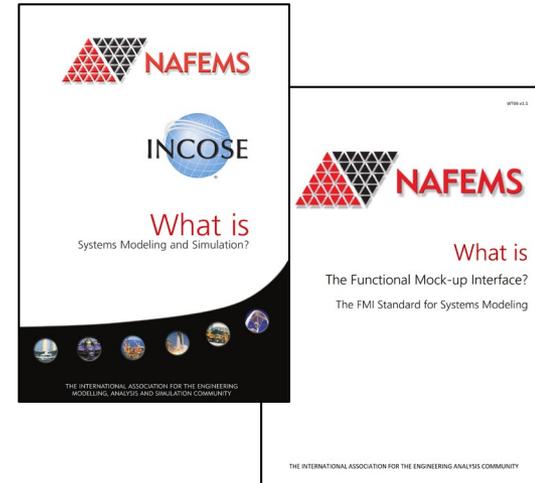
Focus Groups:

- SMS Roadmap and Best Practices (Lead – Frank Popielas, SMS_ThinkTank)
- Terms & Definitions (Lead – Ed Ladzinski, SMS_ThinkTank)
- Emerging Standards Ecosystem for SMS (Lead – Don Tolle, CIMdata)

Systems Modeling and Simulation

Major Activities

- What is Flyers
 - FMI in 2018
 - SMS in 2019 (first co-branded flyer)
 - More to follow covering model-based topics
- Terms and Definition
 - First published in 2016 on website (over 500 were evaluated)
 - New definitions are being works on
- Supporting organization of events
 - Automotive Days in Troy, MI, USA (annually)
 - MBE Day in Columbus, OH, USA (first on 10/1/2019)
- Close participation annually at the IW Workshops from INCOSE
- Roll out of SMS Presentation Topics and combine with company experiences (use cases from end users)



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Systems Modeling & Simulation Working Group

The following was compiled by members of the Systems Modeling & Simulation Working Group to provide the model-based systems engineering community with a common set of shared terms and definitions.

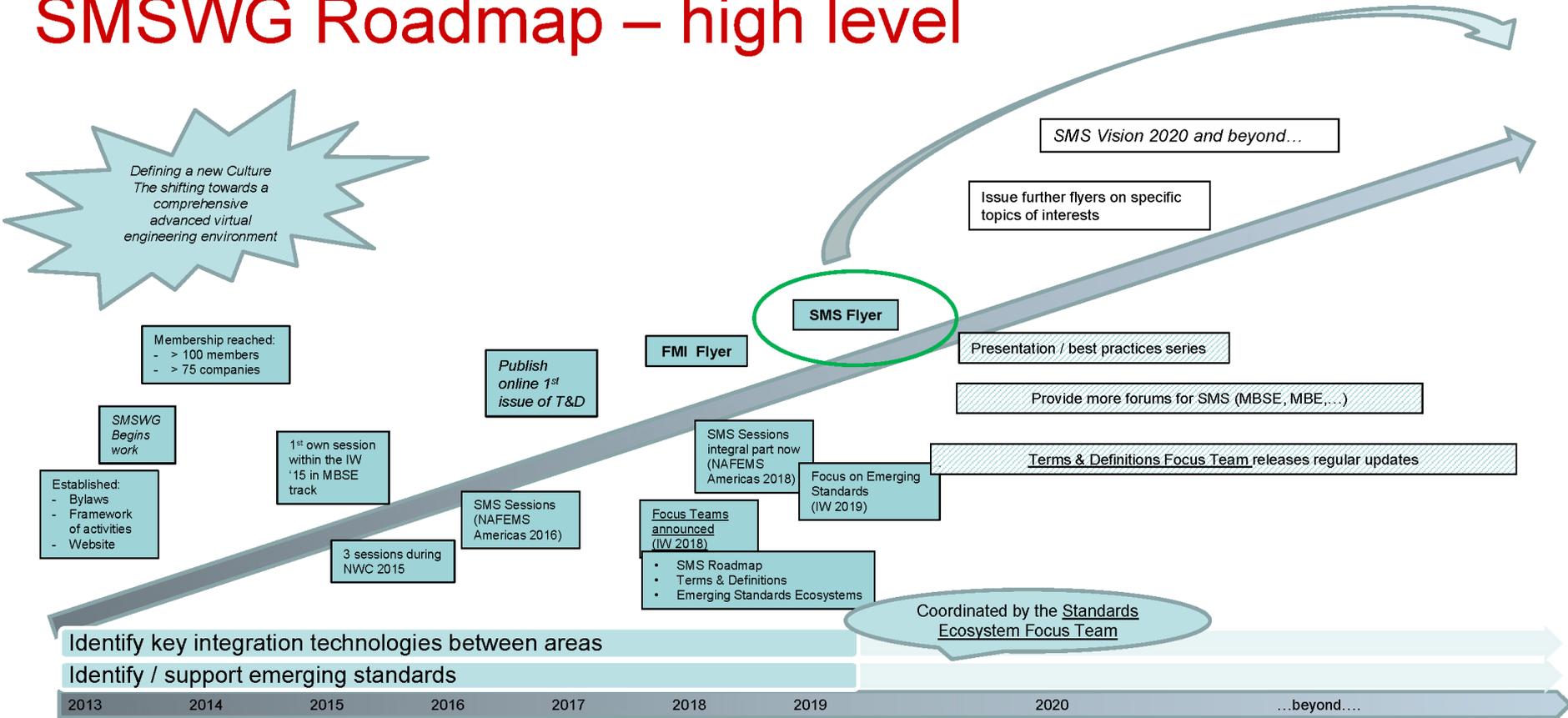
A-C | D-F | G-I | J-L | M-O | P-R | S-U | V-X | Y-Z

Terms & Definitions (S-U)

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 SDMWG	/about/tech/sdmwg/
Simulation Exercise	An exercise that consists of one or more interacting simulation applications. (IEEE Std 1278.1-2012)	Modeling & Simulation Coordination Office	http://msco.mil/MSGlossary_TRM_S-W.html
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://msco.mil/MSGlossary_TRM_S-W.html
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 execution 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	SMSWG	

Systems Modeling and Simulation

SMSWG Roadmap – high level



Chair Bios

Roger Burkhart – SMSWG Chair

Roger Burkhart is a Technology Architect at Deere & Company. He is one of the architects of the System Modeling Language (SysML) which extends the Unified Modeling Language (UML) from software to systems of all kinds. At both INCOSE and the Object Management Group (OMG), he helped drive the development of SysML to enable adoption of Model-Based Systems Engineering (MBSE). At OMG he has served as co-chair of the SysML Revision Task Force and the Systems Engineering Special Interest Group. At INCOSE, he is active in the MBSE Initiative and the Systems Modeling and Simulation Working Group (SMSWG). Roger assumed the role of SMSWG Chairman in July 2016.



Roger's research work seeks to expand the use of computer-based models to collaborate across diverse business and technical concerns. Previously at Deere, he developed databases and decision-support systems, with applications from factory design to production agriculture. He has developed research tools for agent-based modeling and simulation, managed a software tools group, and introduced the use of object-oriented programming and distributed computing within Deere. He began at Deere as a summer intern in the 1970's while studying mechanical engineering at MIT.

Frank Popielas – SMSWG Co-Chair

Frank Popielas is Managing Partner and Co-Founder of SMS_ThinkTank™. He has over 20 years of global experience in engineering and R&D product and materials development, IP management, as well as testing, with a specific focus on the development and application of simulation tools, and the establishment of the required supporting infrastructure at Dana Holding Corporation. His expertise includes technology exchange and transfer, business assessments in engineering and manufacturing focusing on the virtual aspect, as well as process development and democratization of its application in this area.



In Addition, Frank is a member of the NAFEMS Americas Steering Committee since 2011 and became founding chairman of the joint Systems Modeling and Simulation Working Group (SMSWG) between NAFEMS and INCOSE in 2013 and continues his leading role in the SMSWG as Co-chair since August 2016. He joined the COE organization as volunteer in 2017 and is section chair within the Engineering, Analysis and Simulation Division responsible for CAE and SPDM (Simulation Process and Data Management). His activities and achievements include over 35 granted patents globally on the areas of sealing, shielding and fuel cells, over 30 publications globally covering all the mentioned areas with the main focus on the past decade on virtual engineering, its tools and practices, presentations and speaking engagements at conferences and various companies, interviews, case studies and teaching engagements. Mr. Popielas received his MSc degree in Engineering, majoring in Theoretical Physics from the Technological University (MIS&A – Institute for Steels and Alloys) in Moscow, Russia. Frank is fluent in English, German and Russian.