



MBSE Collaborations, MB Activities

Model Communities Outreach

Bill Schindel
ICTT System Sciences
schindel@ictt.com
V1.2.1

INCOSE External Model-Based Collaborations

- Concept: INCOSE collaborations with diverse <u>model-related</u> communities
- INCOSE has some history of effective collaboration with model-related communities, but . . .
- The number and diversity of these communities is growing rapidly.
- Difficult to be aware of each other and effectively leverage each other's efforts.
- INCOSE's <u>systems engineering</u> focus means it has a special interest in being aware and in touch with these modeling communities.

Formal vs. Informal Start-Up Relationships

- In some cases there may be formalized INCOSE
 Memorandum of Understanding (MoU) agreements, but
 not necessarily so for the most recently started
 interactions:
 - We like to first reach a point of some identified subject that both parties have begun to demonstrate interest in pursuing together.
 - As we reach out further, at first we are just seeking joint awareness of each other's interests and activities.



Some successful <u>model-based</u> INCOSE external collaborations to date

Collaboration	INCOSE POC							
OMG-INCOSE	INCOSE MBSE Initiative							
NAFEMS-INCOSE	INCOSE MBSE WG							
ISSS – INCOSE	INCOSE SSWG, Patterns WG							
ASME - INCOSE	INCOSE Patterns WG							
V4 Institute – INCOSE	ee ee							
IFSR – INCOSE	ee ee							
ST4SE - INCOSE	ee ee							
ASSESS - INCOSE	INCOSE MBSE Initiative							
US DoD – INCOSE Collaboration	INCOSE DEIX WG							
Others that you know about?								

OMG – INCOSE Collaboration



- One of INCOSE's earliest model-related collaborations.
- Now operating nearly 20 years—see most recently SysML V2.0.
- Led to definition of OMG SysML® standard modeling language for systems.



DOMAIN SPECIAL INTEREST GROUP

SYSTEMS ENGINEERING DIGG . SUBGROUP DIRECTORY . HOME

HSFFIII LINKS:

- SE DSIG Meetings
- OMG SvsML8
- OMG SysML Portal
- ▶ REI's & REP's
- Recent Activities
- Adopted Specs
- Upcoming Meeting
- Vote Status

CHAIR-

Sanford Friedenthal syseng-chair@amg.org

EMAIL LISTS:

The OMG maintains a number of email lists for our groups. Click here to view the email list(s) which are pertinent to this group. Many lists are only open to members of the OMG.

If you have any questions about adopted specifications, please feel free to contact the tech-editor.

SYSTEMS ENGINEERING DSIG



MISSION

Support evolution of model based systems engineering standards to achieve the following goals:

- Provide a standard systems modeling language to specify, design, and verify complex systems
- Facilitate integration of systems and software engineering disciplines
- Promote rigor in the transfer of information between disciplines and tools for developing systems

CHARTE

The SE DSIG Charter, which includes the mission and goals, was established at the OMG Technical Meeting in

Danvers on July 9 - 13, 2001. http://www.omg.org/cgi-bin/doc?dtc/2001-07-02

RELATED

- SE DSIG Background
- Systems Modeling Language (OMG SysML®)
- Unified Profile for DODAF/MODAF (UPDM)
- SysML-Modelica Transformation
- Model Interchange Working Group
- MBSE Wiki
- SysML v2 RFP Working Group

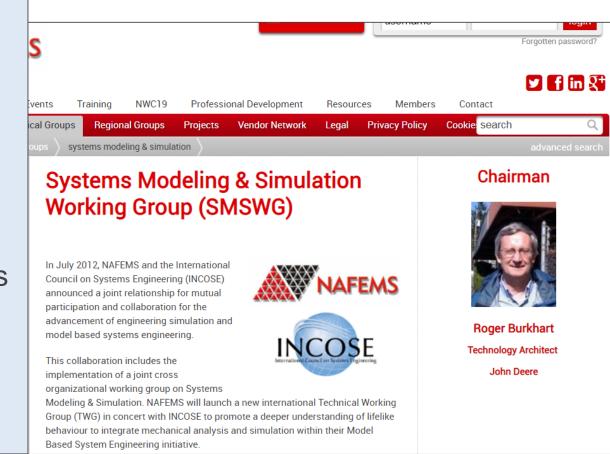
GET INVOLV

If you are interested in getting invalved with this group, want more information or would like to come as a guest to an upcoming meeting and obtain temporary access to the mailling list, please contact one of our Account Representative or contact one of the Chairs.



NAFEMS-INCOSE Collaboration

- SMS WG established seven years ago as NAFEMS -INCOSE collaboration.
- Defines best practices and standards for vendors to develop and manufacturers to follow
- Merging of engineering analysis with the overall systems behavior analysis to perform more realistic, accurate, and lifelike experiences.





ISSS – INCOSE Collaboration

- ISSS-INCOSE
 Collaboration for
 System Sciences /
 Systems Engineering,
 established 2011 by
 INCOSE SSWG.
- 2013-today: INCOSE MBSE Patterns WG joined collaboration with ISSS on model foundations of systems science.



ASME – INCOSE Collaboration



- 2013: INCOSE Patterns WG joined into ASME Model VVUQ **Standards Committee**
- Authoring guidelines and standards for verification, validation, uncertainty quantification of models themselves (credibility of models).



lacksonville, FL, USA January 20 - 23, 2018

INCOSE Collaboration In an ASME-Led Standards Activity

Standardizing V&V of Models

Bill Schindel, ICTT System Sciences schindel@ictt.com

January 20, 2019

www.incose.org/IW2018

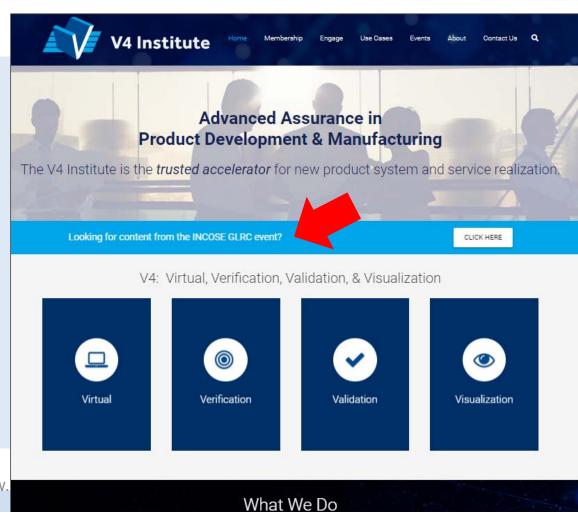


V1.2.1



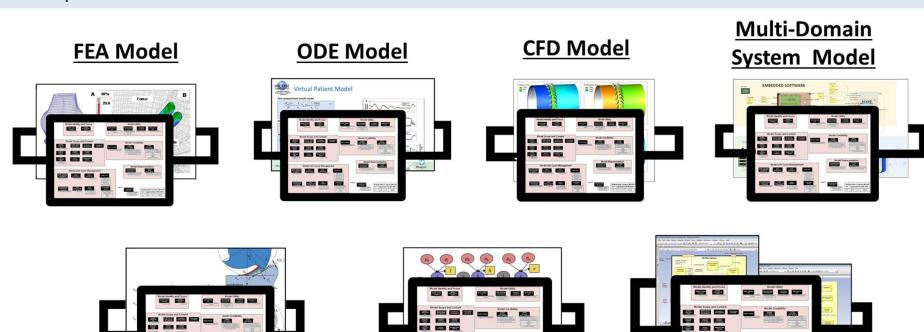


- Collaboration with INCOSE in advancing Virtual (model-based) Verification, Validation, and Visualization.
- V4I formed out of interest by ASME and INCOSE in 2016.

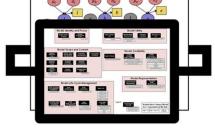


V4I-INCOSE Collab Example: Model VVUQ Pattern

- Uniform model "wrapper" describes all types of computational and representational models.
- Currently being used by INCOSE MBE Transformation to package diverse MBSE models.
- Developed with the INCOSE MBSE Patterns WG.







Data-Driven Bayesian Network Model



MBSE Model





IFSR - INCOSE Collaboration



Payment to IFSR

Imprint

Subscribe to IFSR Nev

Search

- INCOSE a member of IFSR since 2011
- Led by SSWG, several INCOSE WGs collaborating.
- At IFSR "Conversation" meeting of 2018-authored the "MBE Manifesto"



International Federation for Systems Research

Uniting the World in Systems Science

lome

SR Publications

IFSR Activities

Member Societies

IFSR Conversations

Resources

Contact Us

What is the IFSR?



THE INTERNATIONAL FEDERATION FOR SYSTEMS RESEARCH (IFSR), founded 1981, is a non-profit, scientific and educational organization comprising 45 member organizations (status April 2016) from all continents. The overall purpose of the Federation is to advance cybernetic and systems research and systems applications in order to serve the international systems community (see also its constitution).

The Federation is guided by a Board of Directors, composed of two individuals from each member organization. The Board elects a President, one to three Vice Presidents, and the Secretary General. These officers form the Executive Committee (EC). The EC acts for the Board pursuant to the authorization of the Board. The Board meets bi-annually in even years, the EC annually.

The IFSR utilizes the following major means of publication

- The Journal of Systems Research and Behavioural Science
- The IFSR Book Series on Systems Science and Engineering
- The IFSR Newsletter
- Proceedings of Fuschl Conversations
- IFSR W. Ashby Memorial Lectures (held at EMCSR Conferences)

Archives

October 2018 September 2018

July 2018

June 2018

April 2018

March 2018 February 2018

December 2017

November 2017

October 2017

September 2017 August 2017

July 2017

June 2017

April 2017

March 2017

January 20, 2019

www.incose.org/IW2019

1



ST4SE - INCOSE Collaboration

- Semantic Technologies for Systems Engineering (ST4SE).
- INCOSE collaborating with members from NASA, CSER, others.
- In support of shared ontology for systems engineering, supported by semantic technologies.

Report to INCOSE Fellows at INCOSE IS2018

Semantic Technologies for Systems Engineering

Bill Schindel
ICTT System Sciences

Based on earlier presentation by Steve Jenkins and contributions by other ST4SE Core Team Members

January 20, 2019

www.incose.org/IW2019



ASSESS - INCOSE Collaboration

- Historical ASSESS focus on simulations particularly demand versus capabilities.
- Joint participation in both INCOSE IW MBSE Workshops and ASSESS Congresses.



MEMBERSHIP CONGRESS THEMES RESOURCES ABOUT CONTACT

CONGRESS

2019 2018 2017 2016 2015

ASSESS 2019 CONGRESS

Initial investigations into the "Simulation Revolution" have proven that an initiative to compliment the struggle to meet the growing demand for Engineering Simulations in all areas of business was necessary.

The ASSESS 2019 Congress is organized by the ASSESS Initiative to help advance the required "Simulation Revolution".

As the ASSESS Initiative grows in memberships and Congress attendance, a diversity of ideas and perceptions are essential in developing a way forward that helps everyone involved in the "Simulation Revolution". This movement is made possible with participants willing to work together to create new perspectives and activities that facilitate broader use and benefit of Engineering Simulation. The effort to move Engineering Simulation forward brings together thought leaders in Engineering Simulation who then collaborate regardless of titles and companies to create a



OCT 27-29

SPONSORS

January 20, 2019

WWW

- INCOSE Digital Engineering Information Exchange (DEIX) WG
- Not limited to defense focus, inviting civil enterprise, common interest.
- But encouraged by DoD to increase mutual leverage in shared Digital Engineering (DE) interests

US DoD – INCOSE Collaboration





A better world through a systems approach

🚨 Login

♣ loin us

ransformational Application Domains Analytic Enablers Process Enablers

change Lean Systems Engineering MBSE Initiative MBSE Patterns M

SE Patterns Model Based Concept Design Object-Oriented SE N

stems Science Tool Integration and Model Lifecycle Management INCOSE-NAFEMS Collaboration Ontology

Digital Engineering Information Exchange

f ≇ in

Digital Artifacts: A digital form of information content that a digital engineering ecosystem produces and consumes by generally following the systems engineering life cycle's process areas as defined in ISO 15288. Includes all information content shared between stakeholders to execute the total technical and managerial effort required to transform a set of stakeholder needs, expectations, and constraints into a solution and to support that solution throughout its life.

Digital artifacts provide "data for alternative views to visualize, communicate, and deliver data, information, and knowledge to stakeholders. They include model-based representations of "information that originates and terminates in many forms (e.g. audiovisual, textual, graphical, numerical) and mediums (e.g., electronic, printed, magnetic, optical)." Organization constraints, e.g., infrastructure, interorganizational communications, and distributed project workings, are taken into account. Relevant information item standards and conventions are used according to policy, agreements and legislation constraints". Includes include data sheets (electronics), databases (software), documents (operator role), and exportable data files (mechanics) and more. (ISO 15288 NOTE in Information Management Process)

Digital Engineering Information Exchange (DEIX): The exchange of digital artifacts between system engineering entities (processes, models, and organizational elements).

January 20, 2019

Chair: John Coleman / Frank Salvatore / Chris Schreiber

All good, but barely scratching the surface

- Numerous other model-related communities
- Example: Many simulation societies
- Not just the "model creators" (modelers)—Much larger are the model user populations:
 - e.g., Decision-makers (e.g., management associations)
- Educators (e.g., ASEE)
- Other technical professional societies
- Simulation societies
- Model-oriented tooling suppliers
- Application domains (chemistry, construction, etc.)

Population <-- Size (Log)

Stakeholders in A Successful MBE Transformation (showing their related roles and parent organizations)

Industry of Sunt. Internative by the Confidence of the Confidence



		Int	\018	0, 1e.	ACC	100	
Model C	Consumers (Model Users):						
	Non-technical stakeholders in various Systems of Interest, who acquire / make decisions about / make use of those systems,						
****	and are informed by models of them. This includes mass market consumers, policy makers, business and other leaders,	х	х			х	
	investors, product users, voters in public or private elections or selection decisions, etc.						
**	Technical model users, including designers, project leads, production engineers, system installers, maintainers, and	v	. v			v	
44	users/operators.	Х	Х			Х	
*	Leaders responsible to building their organization's MBSE capabilities and enabling MBSE on their projects	Х	Х			Х	
Model C	reators (including Model Improvers):						
*	Product visionaries, marketers, and other non-technical leaders of thought and organizations	Х	Х		х	Х	
*	System technical specifiers, designers, testers, theoreticians, analysts, scientists	Х	х		Х	Х	
*	Students (in school and otherwise) learning to describe and understand systems				Х	х	
*	Educators, teaching the next generation how to create with models	Х	х		Х		
*	Researchers who advance the practice		х	Х	х		
*	Those who translate information originated by others into models	Х	х		х	Х	
*	Those who manage the life cycle of models	Х	х		х	Х	
Complex	k Idea Communicators (Model "Distributors"):						
**	Marketing professionals	х	Х	Х		Х	
**	Educators, especially in complex systems areas of engineering and science, public policy, other domains, and including	v	v	v			
**	curriculum developers as well as teachers	Х	Х	Х	Х		
**	Leaders of all kinds	Х	х	Х	Х	Х	
Model In	nfrastructure Providers, Including Tooling, Language and Other Standards, Methods:						
*	Suppliers of modeling tools and other information systems and technologies that house or make use of model-based information			х			
*	Methodologists, consultants, others who assist individuals and organizations in being more successful through model-based				<u> </u>		
•	methods	Х	Х	Х	Х		
*	Standards bodies (including those who establish modeling standards as well as others who apply them within other standards)	х				х	
NCOSE	and other Engineering Professional Societies						
*	As a deliverer of value to its membership					Х	
*	As seen by other technical societies and by potential members					Х	
*	As a great organization to be a part of					Х	
*	As promoter of advance and practice of systems engineering and MBSE					Х	

INCOSE Outreach Planning & Work Session

- At INCOSE IW2019: Tuesday, January 29
- Available 8:30 11:30 AM PT (come & go)
- Salon H -- or dial-in
- Purpose: Start improving our collective understanding of the different model-based community segments, relationships, how we gain by improving awareness and interaction:
 - Including awareness & support for current outreach efforts by others.
- Along with ideas on additional actions that INCOSE and others can take to improve our effectiveness as a connected community advancing the practice of modelbased approaches.



Remote participation in this meeting

PARTICIPANT GlobalMeet Join Details - Join as GUEST

Meeting Details Web Address: https://incose.pgimeet.com/GlobalmeetFourteen

Dial In Numbers:

USA /Canada (toll free): 1-877-860-3058

USA/Canada: 1-719-867-1571

Or attend on site: Salon H at IW2019

Guest Passcode: 288 747 4803



Meeting/Work Session Agenda

- Objectives
- Introductions
- Some existing INCOSE examples
- Model community segments
- Identification of organizations, interests
- Contact tree: contributions and follow ups
- Generation of initial directory
- Other next steps

January 20, 2019

www.incose.org/IW2019



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

www.incose.org/IW2019