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

Agile Systems and SE

www.incose.org/iw2019

Agile Systems and SE

2019 Annual INCOSE international workshop
Torrance, CA, USA
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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/ASASE/Pages/Home.aspx

INCOSE WEB PAGE

www.incose.org/ChaptersGroups/WorkingGroups/knowledge/agile-systems-se

Charter Summary

WG PURPOSE/MISSION

Develop a body of knowledge that will inform systems engineering on how to deal with unpredictable, uncertain, and evolving environments

WG GOAL(S)

- Agile systems-engineering and agile-systems engineering fundamentals.
- Agile acquisition processes.
- Supplier Quick Reaction Capability (QRC).
- Design that can respond effectively to the pace of technology and changing user expectations.
- International engagement.

WG SCOPE

Fundamentally necessary and sufficient INCOSE-relevant architectural concepts and concept-employment principles that enable any system or process to be agile.

IW Outcomes

IW Outcomes

- Attendance was 36 people in person and four people on line through GlobalMeet.
- All past, open, and new projects were reviewed.
- New project initiated to produce a short video on the working group, as requested by TechOps.
- New project initiated to address fundamentals for hardware development agility.
- Agreed to distribute NDIA metrics survey to the WG membership.
- Met with Telecommunications WG to review their SE guidance document and investigate possible collaborative project interests.
- Initiated planning for possible involvement in ABET undergraduate SE curriculum accreditation criteria.
- Initiated new project to work on SE Hand Book revisions in appropriate sections.
- Met with Hand Book revision editors for planning guidance.

Planned Work past IW

PLANNED ACTIVITIES

- Joint project collaboration with NDIA working group on Continuous Iterative Development report. POC: Larri Rosser.
- Joint project collaboration with Complex Systems WG for IS2020 paper and pilot use of 2018/19 complexity management work. POC: Larri Rosser.
- Project to produce a short video on this WG was opened and will be attended to in 2019. POC: Larri Rosser.
- Evaluation of Assessment tool pilot projects for Agile SE Decision Guidance. POC: Ron Lyells.
- Agile SE Life Cycle Model (ASELCM) project will begin development of its planned INCOSE Product. POC: Rick Dove
- Hand Book revision planning to identify where/how the ASELCM project findings should influence section augmentation. POC: Rick Dove
- Discussion will occur with 15288 and related standards people to identify potential influence on standards from the ASELCM project. POC: Rick Dove.
- September INCOSE Webinar. POC: Rick Dove

PLANNED WORK PRODUCTS

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Architecture

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Architecture

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10 core, 150 occasional

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INCOSE CONNECT ADDRESS

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INCOSE WEB PAGE

http://www.incose.org/ChaptersGroups/WorkingGroups/process/architecture

Charter Summary

WG PURPOSE/MISSION

The purpose of the AWG is to expand the practice of architecture and advance the body of knowledge. Architecture is an integral part of the concepts and practice considered by Systems Engineering (SE) and other disciplines/specialities, and it must evolve with ongoing advancements whatever their origin. Therefore a standing working group is needed to facilitate and focus ongoing advances in all levels and types of Architecture and to support collaboration across INCOSE, across disciplines/specialities and with other international bodies that have a common interest.

WG GOAL(S)

The primary stakeholders of the AWG are practitioners, researchers, domain experts and tool developers in all levels and types of Architecture. The AWG seeks to accomplish standing goals and goals are established each year at the INCOSE IW.

Within the context of Systems Engineering, the AWG pursues the following standing goals:

- Advance and evolve the body of knowledge on architecture
- Promote the use and practice of architecture
- Share best practices for the use of architecture
- Expand the effort in architecture related standards and specifications.

These goals are conducted in association with other bodies where appropriate. For example, over several years the ISO working groups JTC1/SC7/WG42 and TC184/SC5/WG1 have been 'customers' for AWG input and collaborations with the IEEE, OMG and FEAPO have been established.

WG SCOPE

The AWG will address Architecture in relevant areas (such as Traditional Systems, Enterprises and Software) as it relates to Systems Engineering applied to all levels and types of systems.

IW Outcomes

IW Outcomes

Total attendance – 34
Presentation, including Q&A, from editors of both SE Handbook and SE Body of Knowledge
Agreed to respond to Tools Database inquiries as a WG rather than individually
Agreed to continue supporting UK Architecture Styles initiative
Agreed to support work by UK and India Chapters to produce guides/primer for System Architecting and encourage both chapter to work with INCOSE on international distribution
Discussed need to continue alignment and convergence of the various civil and military oriented architecture frameworks (i.e. NAF, UAF, TOGAF, Archimate, etc.) as a single effort beyond 90% to avoid confusion in user community
Discussed ways in which architecture facilitates dialog between system science and system engineering communities (result of presentation on use of Effects-based Models)
Agreed to support continued work to complete standards documents in process – ISO/IEC/IEEE/WD 42010.2, ISO/IEC/IEEE 42020, ISO/IEC/IEEE 42030, ISO 15704.2, and ISO/IEC/NW 42021
Discussed use of 420xx standards and UK styles approaches to architecture in context of product lines
Discussed terminology concerns of INCOSE liaison w.r.t. ISO 15704.2 and need for better explanation of term use and meaning

Planned Work past IW

PLANNED ACTIVITIES

Support to SE Handbook and SE Body of Knowledge updates
Support to Tools Database initiative
Support to alignment and convergence of the various civil and military oriented architecture frameworks (i.e. NAF, UAF, TOGAF, Archimate, etc.)
Cross WG activity involving System Science and Architecture Working Groups
Support to standards documents in process – ISO/IEC/IEEE/WD 42010.2, ISO/IEC/IEEE 42020, ISO/IEC/IEEE 42030, ISO 15704.2, and ISO/IEC/NW 42021

PLANNED WORK PRODUCTS

Specific inputs to SE Handbook and SE Body of Knowledge, to be determined
Domain specific inputs to Architecting Styles initiative, to be determined
Production of International AWG introductory guide for System Architecting, based on work by UK and India Chapters

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Automotive

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Automotive

MEMBERS
~100

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INCOSE WEB PAGE
http://www.incose.org/docs/default-source/wgcharters/automotive.pdf?sfvrsn=8

Charter Summary

WG PURPOSE/MISSION

To promote the application and advance the practice of Systems Engineering in the automotive industry, encompassing OEMs, suppliers and service providers in the private, commercial and industrial vehicle sectors. Emphasis will be put on the current needs and future challenges of the industry, covering issues related to product development (complexity, safety and security, diversity, reuse) as well as to business and organizational aspects (new business models, new services and smart or multi?modal transportation systems).

WG GOAL(S)

Missions

To broaden and improve the application of Systems Engineering to the vehicle development process by tailoring standard SE processes and known best practices to the needs and specificities of the industry. To build a common, shared Systems Engineering expertise and body of knowledge for their application by actors across the automotive industry.

Objectives

To provide value?added services to our members through the production of quality deliverables, the organization of quality events and efficient administration of the group.
To grow the number of members of the group up to a level of self?sustainment an increase the diversity of the leadership team by:
o Performing outreach actions
o Helping members learn from each other and from the experience of INCOSE experts
o Making sure that the needs of the members are covered by activity plans and are taken into account by INCOSE.
To support INCOSE's strategy to establish collaborations and partnerships with professional associations by initiating connections between the group and the different associations of the automotive industry.

WG SCOPE

From a global perspective, the Automotive Working Group will address the challenges faced by the actors of the industry when trying to implement SE or improve their application of SE. Previous work conducted by the Automotive Interest Group identified a series of topics covering a large spectrum of automotive concerns. These topics were grouped into generic SE themes (see below): organizational, SE processes, MBSE, architecture frameworks, safety and security, links with specialty domains and systems of

systems. The products of the working group (deliverables, events, etc.) will address the needs of the whole automotive industry supply chain, comprising the private, commercial and industrial vehicles sectors. They are intended to be valuable, useful products for both beginners and established SE practitioners.

AWG Scope (initial survey):

ORGANIZATIONAL

Acquisition: Contract-based processes (enabled by Requirements)
Cooperation with suppliers in a MBSE scheme
Lessons learned in implementing SE
Lean Systems Engineering & Agility

MBSE & ARCHITECTURE FRAMEWORKS

State of the art in system modeling
Mapping of tools used in the industry
Link with Simulation
Link with Safety
Modeling for communication purposes
Common Automotive Architecture Framework
Ontologies & Formal methods
Standards : lobbying @ OMG

SYSTEMS ENGINEERING PROCESSES

Requirements Engineering “top to bottom”
Architecture-Driven design
Reuse / Integration of COTS in a SE approach / Towards an “Automotive Systems List”
Product Line Management
Eco-Design

OUTREACH, TRAINING & OTHER SPECIFICITIES

Connection between INCOSE and other Automotive Associations

Charter Summary

Link between Systems and SW Engineering
Electric/Electronic Architecture Management from a SE perspective
Ad-hoc Systems Engineering Training Supports

SAFETY AND SECURITY

Impacts of ISO 26262 on Systems Engineering and vice-versa
Systems and Safety/Security Engineering (unified) processes

SYSTEMS OF SYSTEMS

The automobile product in new mobility concepts and smart transportation systems
Engineering Systems and Services

IW Outcomes

IW Outcomes

We had several interesting meetings, that allowed to define an ambitious 2019 action plan (see next section).
No additional volunteers for transveral activities in the WG, but many volunteers for technical topics to be addressed during the next months. Among those topics, several will involve other Working groups: SoSWG, SaSIWG, TWG, IWG, CIPRWG and also CIDAWG from NDIA.

Planned Work past IW

PLANNED ACTIVITIES

Many actions to be started or followed-up:

- Finalize SE Automotive Vision document and build its Executive Summary
- Prepare SE Tayloring to Automotive paragrah for SE Handbook V5
- Intelligent Transportation System (ITS) : CVRIA-ARC-IT return of experiences
- Continuous Development within the Automotive Industry
- System - Software exchange about MBSE in the Automotive context (incl. System & software layer, best practices, cultural/organizational changes)
- support MOU between INCOSE and SAE
- System-Software exchanges about Adaptive Autosar and VFB++
- Electric vehicle participation to Mcrogrid - Cross WG activity CIPR and AWG
- Towards standardized vehicle architecture because of connected services
- Prepare EMEA WS (10-11/oct)

PLANNED WORK PRODUCTS

Vision document
Executive summary of Vision document
Other deliveries (tbd)

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Competency

www.incose.org/iw2019

Competency

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MEMBERS
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CO-CHAIR
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INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

The Competency Working Group was established to improve the practice of Systems Engineering through the development and adoption of competency definitions and associated assessments that address competency management resources that practitioners need.

WG GOAL(S)

- Develop a globally accepted role based competency framework that is tailorable to the needs of our customer organizations:
- Ensure that the competency framework is consistent with the INCOSE Certification Process and the SE Handbook as well as industry and government standards.
- Address SE Competencies as it relates to Soft Skills (Professional Competencies).
- Maintain and update the Competency Framework as additional competency areas are evaluated for inclusion in the framework.
- Develop an Assessment Guide that provides the competency framework user with a way to evaluate knowledge, skills and abilities of candidate SEs to perform a specific role.
- Collaborate with the Professional Development Initiative to ensure products support training needs analysis.
- Discuss, collaborate, and share in person and online with Working Group members that represent a wide diversity of interests and needs.
- Create products, present panels and or papers, develop and review international standards.
- Share information across Working Groups.
- Evaluate current products against new advancements in SE scope and methodologies such as Model Based SE to ensure that they maintain relevancy.

WG SCOPE

Our scope is focused on the development and continual improvement of the SE Role Based Competency Framework and

Charter Summary

Assessment Guide through collaboration with users, academia, industry and Working Groups as it relates to changes in SE processes and methods employed throughout a product or system lifecycle.

- Maintain a broad membership to enhance knowledge base.
- Evaluate competency alignment with other organizations/functions such as Program Management.
- Ensure consistency of product with INCOSE SE Handbook and Certification.
- Produce papers for publication.
- Provide training related to framework content and assessment capabilities.
- Collaborate with the INCOSE Professional Development Initiative with training needs assessments.

IW Outcomes

IW Outcomes

Succession Planning: Cliff Whitcomb is the new chair for the Competency Working Group
Competency Framework Assessment Guide Development:

- Determined format
- Established rules for the assessment guide development
- Trained participants in generating the expected content for the assessment guide
- Established writing assignments and team leads for generating the first draft of the assessment guide (version 0.5) to be available for review by July, 2019
- Ian Presland is the PoC for the Assessment Guide Development
- Developed milestones for the Assessment Guide to be submitted with the Product Plan

Collected comments from the published Framework and adjudicated and status comments for future updates to the Framework.
Lori Zipes is the PoC for Configuration Management of the Product

Planned Work past IW

PLANNED ACTIVITIES

Collaboration with the Professional Development Portal team to ensure the Assessment Guide meets the needs of the Portal

PLANNED WORK PRODUCTS

Develop and submit a Product Plan for the Assessment Guide
Generate a first draft of the Assessment Guide by July 2019 for review by members of INCOSE

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Complex Systems

www.incose.org/iw2019

Complex Systems

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https://connect.incose.org/WorkingGroups/ComplexSystems/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/analytic/complex-systems

Charter Summary

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WG PURPOSE/MISSION

The purpose of the Complex Systems Working Group is to enhance the ability of the systems engineering community to deal with phenomenology associated with complex and complex adaptive systems. The Complex Systems Working Group works at the intersection of complex systems sciences and systems engineering, focusing on systems beyond those for which traditional systems engineering approaches and methods were developed.

WG GOAL(S)

- Communicate complexity characteristics to systems engineering practitioners
- Provide knowledge and expertise on complex systems in support of other INCOSE working groups working in their systems engineering areas
- Facilitate the identification of tools and techniques to apply in the engineering of complex systems
- Provide a map of the current, diverse literature on complex systems to those interested in gaining an understanding of complexity.

WG SCOPE

The Complex Systems Working Group focuses on the challenges and opportunities presented by systems with rich interdependence among diverse components, non-linearity, open systems boundaries, networks of causality and influence (vice linear causal chains), emergence, varied and changing system goals, self-organization, and multi-level adaptation. These traits limit the utility of traditional systems engineering paradigms, which are generally centralized, goal oriented, requirements driven, and reductionist in approach. These traits, however, are increasingly the norm and not the exception. The Complex Systems Working Group collaborates with the Systems Sciences Working Group to define the scientific basis of these characteristics.

Further, complexity is a characteristic of more than just a technical system being developed. The socio-technical ecosystem in which a system under development will be employed exhibits these attributes, as does the environment that gave rise to the challenge or opportunity to which the system was developed in response. Further, the design and development of technical systems is a complex endeavor itself. It is critical for systems engineers to understand the nature of the systems with which they are working, and of which they are a part, to be effective.

IW Outcomes

IW Outcomes

- Provided WG information and context for new participants
- Briefed WG on complex systems contents from the *Complexity Primer for Systems Engineers* as an overview to key ideas relevant for the WG
- Received presentation from Mat French (Rolls Royce) on *Porous System Boundaries*
- Received presentation from Jim Moore (JM Technologies) on *The Computable Universe: A Case Study of the Model Based Approach*
- Met with Natural Systems WG to present and discuss collaborative project on *Complex Systems Exemplars*
- Met with Critical Infrastructure and Protection WG to discuss complexity considerations for CIPR
- Met with Systems Science WG for discussions of patterns, category theory, and system pathologies
- Developed candidate projects for work in 2019

Planned Work past IW

PLANNED ACTIVITIES

- Leverage insights from Complex Systems Exemplars project to inform revision to Complexity Primer
- Develop core INCOSE material for Managing Complexity in Systems Engineering (papers, prototypes/pilots, case studies, SEBoK contributions, SE Handbook contributions
- Develop guiding principles for modeling complexity – what do you have to do differently?
- Explore applicability of Cynefin framework in SE contexts
- Engage with Competency WG to develop needed competencies when working in contexts of complexity
- Complexity considerations for AI engineering and operation
- Complexity considerations for Enterprise Systems (with ESWG)
- Complexity considerations for Critical Infrastructure Protection and Recovery (with CIPR WG)
- Building simulations to illustrate and explore key complex systems concepts
- Webinars on complex systems topics for INCOSE members

PLANNED WORK PRODUCTS

- Complexity Primer for Systems Engineers, Version 2

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Configuration Management

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Configuration Management

MEMBERS
40

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INCOSE CONNECT ADDRESS
https://www.incose.org/incose-member-resources/working-groups/process/configuration-management

INCOSE WEB PAGE
TBD

Charter Summary

WG PURPOSE/MISSION

The main purpose of the Configuration Management Working Group (WG) is to ensure that the state of the art and the body of knowledge in CM be used to enhance the state of the art and the body of knowledge of SE; and vice versa. The CM WG will lead this effort within INCOSE; in liaison with external CM related experts, standardization bodies and other organizations and communities, as appropriate.

WG GOAL(S)

To grow and fully integrate the CM discipline within SE including all relevant areas of SE (e.g. modeling and simulation based approaches for SoS)

To develop a community of CM-specialists within INCOSE (pool of knowledge) through various efforts.

To promote, encourage, supervise and perform research to extend the CM scope for SE.

WG SCOPE

This WG will address processes, methods and tools; organizational aspects; business and information requirements; as well as human aspects (competencies) related to CM.
The WG will address the interdependencies between the CM process in accordance with ISO/IEC 15288 including:

- other Technical Management processes;
- Technical Processes;
- Organizational, project-enabling processes.

For IT aspects (like exchange standards, tools and data) collaboration with the WG Tool Integration and Model Lifecycle Management will be established.

Collaboration with other relevant WGs/Initiatives (e.g. related to Requirements, MBSE, Ontology for SE, Digital Artifacts, SoS, etc.) and with external experts and bodies or organizations will be explored and established as appropriate.

Charter Summary

The WG will also reach out to various industries, government and academia to widen their representation within the WG and secure exploration of CM aspects in these different application domains.

Furthermore, the WG will emphasize the supervision and other kinds of pro-active involvement in CM related research projects (including Ph.D. and Master level projects with universities) and report back to this WG on any such planned and on-going research and related outcomes (e.g. related to CM for SoS, MBSE, Software, Industry 4.0, etc.).

The WG will actively participate in reviewing and providing feedback including concrete inputs for the evolution of CM related standards (e.g. SAE 649, ISO 10007) and specifications/guidelines (e.g. CM2-500); and the INCOSE SE Handbook and SEBoK.

Finally, the WG will publish CM related practice and research papers (at conferences and in journals within various communities, e.g. INCOSE, CM2/IpX, CMPIC, IEEE, ITIL…); produce Guide(s) as INCOSE WG Products (e.g. similar to the Requirements WG's 'Guidelines for Writing Textual Requirements'); and continuously collect lessons learned (based on bad CM practice or "horror stories." communicated diplomatically; and good CM practice).

IW Outcomes

IW Outcomes

IW2019 discussions helped define possible work streams for the year:

- better define CM within the SE handbook - next edition
- work product relating to application of CM in VSME
- external standards (649C) support
- Use and utility of the ubiquitous "CM Plan" seen in many CDRLs
- Best Practices for low SE maturity sectors (i.e., Infrastructure & transportation)
- Tools discussion thread - OSLC, PLM, ALM use of CM with a lack of disparate tool integrations

Planned Work past IW

PLANNED ACTIVITIES

Monthly Meetings to keep a heartbeat going
define some specific deliverables that members can focus on/contribute to
Possibly do a "paperless presentation" for IS2019

PLANNED WORK PRODUCTS

New WG - Planning for these specific items is In-Process

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Critical Infrastructure Protection and Recovery

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Critical Infrastructure Protection and Recovery

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https://connect.incose.org/WorkingGroups/CriticalInrastructure/SitePages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups

Charter Summary

WG PURPOSE/MISSION

The purpose for the Critical Infrastructure Protection and Recovery (CIPR) Working Group (WG) is to provide a forum for the application, development and dissemination of systems engineering principles, practices and solutions relating to critical infrastructure protection and recovery against manmade and natural events causing physical infrastructure system disruption for periods of a month or more.
Critical infrastructures provide essential services underpinning modern societies. These infrastructures are networks forming a tightly coupled complex system cutting across multiple domains. They affect one another even if not physically connected. They are vulnerable to manmade and natural events that can cause disruption for extended periods, resulting in societal disruptions and loss of life.
The inability of critical infrastructures to withstand and recover from catastrophic events is a well-documented global issue. This is a complex systems problem needing immediate coordinated attention across traditional domain and governmental boundaries. For example, the US President issued Presidential Policy Directive PPD-21 that addresses "a national unity of effort to strengthen and maintain secure, functioning, and resilient critical infrastructure." This includes an imperative to "implement an integration and analysis function to inform planning and operations decisions regarding critical infrastructure." This working group will seek to support this and other policies with international reach.
INCOSE, as the premier professional society for systems engineering, can provide significant contributions toward critical infrastructure protection and recovery.

WG GOAL(S)

This WG will provide and support opportunities to exchange knowledge and systems engineering information and solutions within the scope of the CIPR WG, both within INCOSE and with external organizations sharing similar interests and goals. The opportunities include systems engineering products (e.g. architectures, requirements, IV&V, etc.). This information will be disseminated through publications (papers, articles, briefings) and supporting meetings, conferences, panels, and other means.

Charter Summary

Specific areas of knowledge include the following.
a) The events capable of causing infrastructure disruption for periods of a month or more, to include all aspects of their characteristics and impacts.
b) The socio-technical factors related to CIPR.
c) The overarching structure and inter-connectedness among the critical infrastructure domains.
d) The interaction among infrastructure systems under various degraded states of operation.
e) Possible conceptual and design solutions, and related information.
f) Strategies for verification and validation of solutions.
The CIPR WG will provide a collection of systems engineering and related products that provide understanding and solutions for domain stakeholders impacted by the events. This can include products developed by several working groups and initiatives, such as Architecture, Complex Systems, Model-Based Systems Engineering (MBSE), Decision Analysis, Enterprise Systems, Natural Systems, Resilient Systems, Risk Management, Cost Engineering, Human System Interaction, In-Service Systems, Reliability Engineering, Requirements, System of Systems, System Safety Integration, Automotive, Healthcare, Infrastructure, Power & Energy Systems, Transportation Systems, and Anti-terrorism. Other working groups also have knowledge to contribute as well.
The CIPR WG will endeavor to integrate and coordinate among standards, regulations and best practices of the impacted industries. It will also provide the organizing and development functions to establish new concepts and standards addressing CIPR.
Stakeholders with interest in CIPR are international and include all levels of government, defense and security agencies, critical infrastructure domain businesses and agencies, and society in general (e.g. regions, communities and citizens).

WG SCOPE

Certain manmade and natural events have a known potential to affect societies at a national, continental or even global scale. Such events can cause extreme harm well beyond those experienced from regional catastrophic events, especially when the effects will take longer than a month to recover. Three examples of events with the potential to cause critical infrastructure collapse include Solar Storms caused by Coronal Mass Ejections (CME), Electromagnetic Pulse (EMP) and Cyber Events (intentional and otherwise).
The CIPR WG will pursue its goals by addressing these three classes of events, and other classes of events with similar potential, when identified.
The CIPR WG will promote and apply systems engineering principles with emphasis on policy, analysis and concepts useful to understand, protect and recover existing operational infrastructure, and to provide strategies, standards and concepts for more resilient approaches. It will promote and perform activities supporting the stated goals.
This scope is synergistic with other INCOSE WGs identified above (e.g. MBSE, System of Systems, Resilient Systems, Power & Energy,

etc.). For example, the application of model-based approaches will be essential to analyze the problem and to communicate alternative conceptual solutions. Therefore, this WG will seek interest and participation from INCOSE members and the other INCOSE WGs. It will also reach out to engage international and governmental organizations, professional groups, critical infrastructure providers, and others stakeholders. MOUs, contracts and other kinds of agreements may be sought with external organizations as needed to further the effort. These agreements, if any, will be established according to INCOSE guidelines, processes and procedures.

The critical infrastructure domains addressed by the CIPR WG include the following. Other domains may be addressed as the need is identified.

1) Chemical and other industrial bases
2) Communications
3) Electrical & Energy production and distribution
4) Emergency Services
5) Financial Services
6) Food and Agriculture
7) Government Services & Facilities
8) Healthcare and Public Health
9) Information Technology
10) Nuclear Reactors, Materials, and Waste
11) Transportation
12) Water storage, treatment and distribution
13) Waste handling and disposal (water, refuse, hazardous)
14) Society at large

IW Outcomes

IW Outcomes

- Reviewed and accepted our current charter (no changes)
- Discussed process of engaging international community in projects
- Some projects have "sensitive" information and involvement from members outside of INCOSE. These members cannot work with foreign nationals.
- WG Chair is final authority in allowing membership in sub-WG teams
- International members can be engaged in many projects, but not all projects under the WG
- Reviewed and discussed current modeling efforts
- Microgrid modeling
- Initial work / base reference model completed by S. Friedenthal
- This effort to continue work by a sub-WG team
- Resilient Hospitals modeling
- Work is continuing with INCOSE and outside membership (SDMPH, JHU/APL, etc.)
- VSE WG attended discussion; may have products applicable to this area
- Lean Startup Method used to begin this modeling effort
- Publications Planning
- Discussed development of CIPR Primer and appendix (systems thinking based) for InfraGard"s *Powering Through 2.0*
- Inter-WG Collaboration
- John Brtis, Chair RSWG, presentation on Resilient Systems
- Jimmie McEver, Complex System WG, discussion of Complex Systems and interactions, anti-fragility principles, books and publications

Planned Work past IW

PLANNED ACTIVITIES

- Continue modeling efforts -- both Microgrid and Resilient Hospitals modeling efforts
- Continue publications development

PLANNED WORK PRODUCTS

To be published in 2019
InfraGard Publication: Powering Through 2.0
Submitting appendix concerning systems thinking / science / engineering view of CIPR
CIPR Primer (targeted publication before end of CY19)
Use PT 2.0 appendix as base document and modify to a primer
Future Publications
CIPR themed issue of INCOSE INSIGHT – planned for March 2020 issue
Possible document (4 to 5 pages) describing the Micogrid reference model and approach

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Defense Systems

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Defense Systems

CHAIR

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MEMBERS

4 active, 25 others

INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Meeting Purposes:
- Group Regeneration
- Participant's Brief introductions
- Working Group call for Topics
- Discussion of Next steps
- Plan Next Get together

WG GOAL(S)

Reorganize Working Group
Pick new topics:
· UAVs
· Cloud Computing (unique challenges for DoD systems)
· Agile software/systems development in defense systems (impact on reliability, availability, and maintainability)
· Impact of the 2018 AT&L split into two new groups – the undersecretaries of defense for research and engineering (R&E) and acquisition and sustainment (A&S) on DoD systems engineering
· Systems engineering in DoD biometrics
· Systems engineering in DoD Cyber-security

WG SCOPE

Reinitiate Leadership with Prospective Co-chairs:
Roger Rosewall, roger.m.rosewall@gmail.com
Kevin Devaney, kdevaney@srcinc.com
Mary Bridson, mary.bridson@us.thalesgroup.com

IW Outcomes

IW Outcomes

Discussed

- Working Group Strategy
- New Topics
- Expansion of Leadership
- Planning of

Planned Work past IW

PLANNED ACTIVITIES

- Next meeting - First Week in February 2019
- Interested persons should contact kgeist@md.metrocast.net or roger.m.rosewall@gmail.com
- Discuss Next Working Group Topic

PLANNED WORK PRODUCTS

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

Digital Engineering Information Exchange WG

www.incose.org/iw2019

Digital Engineering Information Exchange WG

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

CHAIR

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/DigitalArtifacts/SitePages/DEIXWG%20Home%20Page.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/digital-engineering-information-exchange

Charter Summary

WG PURPOSE/MISSION

DEIX WG aspires to ensure Digital Artifacts are transferable in ways that are useful to all stakeholders. The WG will leverage digital capabilities to identify standard ways to define, request, offer and exchange model-based engineering (MBE) information across disciplines and systems" life cycle. The successful fulfillment of this purpose allows the free flow of digital artifacts between buyers and suppliers throughout a global supply chain.

WG GOAL(S)

The DEIX WG primary goal is to establish a common set of digital viewpoints and consensus-based guidance for the exchange of digital artifacts within a Model-Based Engineering (MBE) digital ecosystem. The DEIX addresses the exchange of both graphical and non-graphical information found in model-centric digital artifacts. The intent is that these common viewpoints and consensus-based guidance on rules, formats, and protocols will allow acquiring organizations and their global supply chains to seamlessly request and exchange MBE digital artifacts created by diverse engineering disciplines.

WG SCOPE

The scope of DEIX includes "**The what**?" It will provide a functional characterization of the content, processes, protocols, and relationships involved in the exchange of MBE digital artifacts between stakeholders. DEIX does not include "**The technological means**?" or the mechanisms for exchanging digital artifacts.

IW Outcomes

IW Outcomes

The Digital Engineering Information Exchange (DEIX) Working Group has accomplished the following:

- Found general consensus on the topical encyclopedia entries for digital artifact, digital engineering ecosystem, authoritative source of truth, and digital engineering information exchange model. This forms the narrative to describe DEIX model.
- Developed the first draft of the Digital Information Exchange Model with concept for the creation of the Digital Viewpoint Model, and the construct for the DEIX Model.
- Identified standards and began the evaluation of standards and the cross pollination of other INCOSE working groups that are considering standards.
- Further enlisted help in the definition of common use cases to be supported by Digital Engineering information exchange.
- Began development of several use cases of model exchange between stakeholders as a mechanism to capture the standard and unique data required for effective exchange.

Planned Work past IW

PLANNED ACTIVITIES

- Begin writing the DEIX Primer based on the input to the DEIXPedia and develop the outline by March 1, 2019
- Complete the DVM Creation Concept model by March 1, 2019
- Create the Instances of DVM for 5 types of ISO 15288 Reviews by April 1, 2019
- Develop the Digital Viewpoint Model Catalog of DVM"s created by members of the DEIX Community
- Integrate Digital Viewpoint Model and DEIX Logical Architecture Model (creating integrated DEIX Model)
- Update the NDIA SE Division"s Model and Simulation subcommittee in Feb 7, 2019
- Inclusion of DEIX Encyclopedia topics or cross referencing in the SEBoK
- Stand up collaborative modeling environment for DEIWG modeling

PLANNED WORK PRODUCTS

- Digital Engineering Information Exchange (DEIX) Primer
- Digital Viewpoint Model Guidance
- Digital Viewpoint Model Catalog
- Digital Engineering Ecosystem Reference Model
- Digital Engineering Information Exchange Standards Framework

2019
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Empowering Women as Leaders in Systems Engineering

www.incose.org/iw2019

Empowering Women as Leaders in Systems Engineering

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

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INCOSE CONNECT ADDRESS

https://connect.incose.org/ProgramsProjects/EmpoweringWomen

INCOSE WEB PAGE

incose.org/ewlse

Charter Summary

WG PURPOSE/MISSION

EWLSE's vision is to live in a world where men and women are equally represented as leaders in systems engineering. Our mission is to create a systems engineering environment welcoming to all; promote the demonstrated value of women as systems engineers and leaders; engage women in engineering and systems engineering at all levels of education around the world; and enable increased participation and retention of women in systems engineering leadership. Our purpose is to increase participation of women in systems engineering and engineering leadership, broaden awareness of the current state of women in systems engineering and engineering leadership through research, remove obstacles for women seeking leadership roles in related engineering fields, enable success through collaboration with professional societies, industry, government, academia, and individual advocates, and to celebrate the benefits of diversity throughout our culture.

WG GOAL(S)

Our goals are to:

1. be the systems integrators of efforts to raise international awareness of the value of empowering women as leaders in engineering and systems engineering around the globe;
2. develop engaging content and delivery approaches for promoting successful strategies for women navigating the journey to systems engineering leadership across cultures, geographic locations, and domains; and
3. drive the evolution to an open welcoming professional environment that stimulates institutions to offer and interested, motivated, and qualified applicants to seek leadership opportunities in systems engineering.

WG SCOPE

Our scope is empowering leaders in systems engineering where all feel welcome and find systems engineering a place where they can belong, contribute, and change the world.

IW Outcomes

IW Outcomes

- Established an outline of IEEE WIE sponsored book on systems engineering as part of a series of books on engineering authored by women (per IEEE WIE requirements). We have an open inclusive team of reviewers and contributors and will be going through a process of identifying the author team.
- Updated list of "Women in the Workplace" Resources: added three key resources from Harvard Business Review Women at Work, United Nations Cracking the Code, and SciGirls How to Engage Girls in STEM. See Resources tab of incose.org/ewlse.
- Established a survey to collect input on those interested in being mentors or mentees or both, put online and established a QR code with the link https://bit.ly/2G6TJPL, Email incose-mentor@incose.org to find out more about the INCOSE mentorship matching program offered by EWLSE.
- EWLSE Pubs team completed next steps for INCOSE Insight themed edition on diversity and systems engineering targeted for 3Q 2019, and online product for "Letters To My Younger Self: How Systems Engineering Has Changed My Life" targeted for release in 2019/2020.
- Worked with TechOps on INCOSE best paper on diversity in systems engineering award, open to all.
- Planned in-reach and outreach activities for 2019 including an INCOSE EWLSE booth at SWE 2019.
- Compiled approaches for supporting the mentorship program; set up plan to meet with Marilyn Pineda about how to integrate the mentoring approach into the Professional Development Portal.
- Held a workshop on activities that support teaching girls science and engineering. Recognized the value of the strategies and the missing exposure to role models for many of us. Developed three student projects conducive to open, creative, collaboration and learning. Recalled events where we were empowered by another person such as receiving positive feedback about our potential and experience even when we were not necessary ready for a challenge and reminded ourselves about the experience through a short letter.

Planned Work past IW

PLANNED ACTIVITIES

- Support INCOSE / EWLSE booth at SWE 2019.
- Support INCOSE / EWLSE booth at IEEE ILC 2019 (if funded).
- Maintain list of active SE mentors/mentees, document guidance for mentors and mentees, develop relevant training through various venues.
- Publish quarterly in the INCOSE newsletters on activities, research, and lessons learned to raise awareness.
- Continue on publishing activities needed to support INCOSE Insight Diversity and SE edition and ebook on how SE changed our lives.

PLANNED WORK PRODUCTS

- IEEE WIE sponsored book on systems engineering with an open inclusive team of reviewers and contributors and a female author team.
- EWLSE Website - up to date news, events, resources - see tabs of incose.org/ewlse.
- INCOSE Insight themed edition on diversity and systems engineering targeted for 3Q 2019
- Online product for "Letters To My Younger Self: How Systems Engineering Has Changed My Life" targeted for release in 2019/2020.
- Approved diversity related Best Paper award.

2019
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Enterprise Systems

www.incose.org/iw2019

Enterprise Systems

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/EnterpriseSystems/Pages/Home.aspx

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

The purpose of the INCOSE Enterprise Systems Working Group (ESWG) is to advance and to promote the application of Systems Thinking, Systems Science and Systems Engineering to understanding and managing the enterprise as a system.

Enterprises are highly complex, sociotechnical systems of systems that depend on the intelligent interaction, creation, management and use of various forms of knowledge throughout their organizational policies, processes and structures. Failure to design, to operate and to remediate enterprises as systems, is the primary underlying cause of the gross inefficiencies, unintended consequences and systemic failures that routinely inflict substantial economic loss and societal harm.

Systems engineering (SE) is an interdisciplinary methodology for understanding, designing and enabling system solutions for complex problems, and as such it is uniquely suited to offer understanding and solutions in the domain of enterprises. However, as applied to sociotechnical systems such as enterprises, SE must include an understanding of basic social sciences, human factors and other “soft” disciplines that may be unfamiliar to systems engineers who are more accustomed to focusing on physical, electronic and technical systems.

WG GOAL(S)

The ESWG will work to build a generic understanding of the elements and sub-systems and their various roles comprising enterprises, and a set of systems engineering methodologies for applying this generic understanding to analyzing specific organizations and their problems. This will involve establishing cross disciplinary teams and consultations involving systems engineers, enterprise architects, people from the life and social sciences, and practitioners in areas such as management consulting, organizational knowledge management, business process reengineering, and change management, amongst others.

Over the short term, the ESWG will seek to assemble existing knowledge and theories relating to the enterprise as a system for inclusion in the SEBOK that is accessible to systems engineers. Over the intermediate term, the WG will collect and assess

methodologies and templates to guide systems engineering approaches for intangible and tacit aspects of the enterprise as a system.

Over the long term, the ESWG will compile a comprehensive Enterprise System Management addition to the INCOSE Handbook and training and certification packages for Enterprise Systems Management.

WG SCOPE

It is the intent of the ESWG to focus narrowly on the enterprise embodiment of SE and to work closely with other WGs that can and will inform this area – System Sciences WG, Complex Systems WG, System of Systems WG, Human Systems WG, Enterprise Architecture WG, and others.

The initial scope of the ESWG will be to survey relevant scientific foundations, to assess and prioritize concepts, and to match them with systems engineering concepts and principles for incorporation in an Enterprise Systems Management Body of Knowledge. Among others, the following scientific domains appear to be directly relevant.

Major disciplines:

- Business Management
- Organizational Behavior
- Psychology, Sociology, Gaming Theory
- Other Social Sciences, more generally
- Systems Engineering

Specialized fields

- Systems Thinking and Systems Analysis
- General systems theory
- Soft Systems Methodology
- Second order cybernetics

Charter Summary

- Social Systems Theory
- Complexity Science

This WG's scope is significant as it attempts to engage with issues from an emergent field of complex (adaptive) systems (social, technical and economic) focusing on the implementation of processes involved in this multi-disciplinary field. The skill set required is considerable due to an approach that includes social science, engineering, processes and management, practical and theoretical comprehension for an applied outcome. These are not commonly combined skills sets and no real formal training exists, yet the need for such combinations is known.

IW Outcomes

An Enterprise System is a conceptual model of any purpose-driven activity (enterprise) of two or more participants: a company, institution, professional society, working group, hospital, NGO; an industry, a government, or a society. Regardless of whether and how it employs systems engineering for its deliverables, an enterprise should be designed, implemented, and operated as a complex, adaptive, sociotechnical system of systems. Engineering such a system of people, process, and technology requires skill-sets beyond the "comfort-zone" of traditional engineering, but it relies heavily upon systems thinking, systems science, and systems engineering for holistic treatment.

Digital Engineering (DE) is a fundamental part of the ongoing Digital Transformation in industry, business, and society. In particular, Model-Based Engineering (MBE) is a key technological enabler for designing complex products and services. INCOSE places high strategic importance on cultivating awareness and actualizing its work-products (such as for MBE) into industrial organizations. Successful implementation of such strategic initiatives typically involves modeling of Enterprise Transformation (ET) outcomes and an Organizational Change Management (OCM) process, both of which are important elements of an enterprise. This was the subject of a joint session between ESWG and the SE Transformation WG.

Accordingly, the Enterprise Systems Working Group (ESWG) can be a strong venue and champion for Enterprise Transformation as a core facilitator of DE and MBE transformation -- within the larger scope and broader context of Enterprise Systems Engineering -- and ET can be an area of initial focus for ESWG.

Planned Work past IW

PLANNED ACTIVITIES

Encouragement of submission of paperless-presentation proposals for IS2019 on subject of Enterprise Systems Engineering;
Outreach to other WGs;
Webinars and virtual conferences
?

PLANNED WORK PRODUCTS

Model(s) of INCOSE as an Enterprise System, particularly with respect to facilitating Enterprise Transformation within INCOSE

2019
Annual INCOSE
international workshop
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Global Earth Observation System of Systems (GEOSS)

www.incose.org/iw2019

Global Earth Observation System of Systems (GEOSS)

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

CHAIR

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MEMBERS

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INCOSE CONNECT ADDRESS

geoss

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Demonstrate INCOSE"s continued commitment through direct application of System Engineering for GEO"s planned path.

WG GOAL(S)

- Continue modeling participation in GEOSS AIP (Architecture Implementation Plan) projects.
- Remain active in GEO M&E (Monitoring and Evaluation) Working Group.

WG SCOPE

- Continue UML and SysML model development for GEOSS AIP projects.
- Continue involvement with GEO M&E WG by providing understanding, experience, and participation in evaluation of active GEO Societal Benefit Areas.

IW Outcomes

IW Outcomes

- Prepare and provide INCOSE Testimonials at GEO Plenaries.
- Prepare status reports for GEOSS model developments - AIP-10 (Plankton*Net) web application project

Planned Work past IW

PLANNED ACTIVITIES

- Continue to represent INCOSE at GEO Plenaries.
- Seek new and extended locations to insert and engage Systems Engineering into GEO activities.
- Participate by participating in reviews and assessments with reactivated GEO M&E Working Group.

PLANNED WORK PRODUCTS

- Providing of modeling results at GEO Plenaries and in annual published GEO work results / products.
- Written results of GEO M&E assessments.

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

Healthcare

www.incose.org/iw2019

Healthcare

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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/Healthcare/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/Application/healthcare

Charter Summary

2019 Annual INCOSE international workshop
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WG PURPOSE/MISSION

To improve Healthcare delivery, medical devices and services development, and Healthcare SE education by bringing together systems engineers and systems thinkers to identify, develop, and tailor best practices for the Healthcare industry. We will achieve that by

- Articulating the value and application of systems engineering to Healthcare through simple examples and easily deployable guidelines, and
- Providing a forum for developing and sharing best practices, meeting world class experts in Systems Engineering and Healthcare (and across other industries).

The creation of our group was driven by the fact that many if not most of the organizations in the biomedical and Healthcare industries do not necessary recognize or understand the value of systems engineering and could thus benefit from the application of INCOSE principles.

WG GOAL(S)

Our five-year strategic objectives are to:

- Increase the systems engineering and systems thinking capabilities of the Healthcare delivery, medical devices manufacturers, and HCIT suppliers and users to enable improved Healthcare outcomes and value
- Increase individual & corporate INCOSE membership from the Healthcare industry
- Engage leaders in the Healthcare industry seek to raise the use of systems engineering practices by engaging INCOSE support and services
- Publish impactful information on systems engineering in the Healthcare industry and serve as the clearinghouse of Healthcare needs and systems engineering best practices
- Accelerate the transformation of Healthcare systems engineering to a model based discipline

5-year Vision
Systems Engineering for Medical Device Technology: HWG is the recognized 'clearinghouse' best practices for systems

engineering for Healthcare device and services development

- Capturing and documenting systems engineering theory customized to the Healthcare industry, as well as critical best practices (as captured in a Healthcare domain extension to SEBoK, among other places)
- Capturing and documenting 'state of the art' Agile, Lean Startup, and Iterative Development practices in Healthcare
- Healthcare specific guidance to ISO/IEC 29110 Systems and Software Engineering — Lifecycle Profiles for Very Small Entities (VSEs)

Systems Engineering for Healthcare Delivery: Build on the UK RAE/RCS systems thinking process and develop a strategy for broader deployment.

Systems Engineering Education for the Healthcare Industry: HWG is the recognized source for the definition of systems engineering competencies and methods in Healthcare and the source for a suite of Healthcare-related systems engineering education products for use by the community.

WG SCOPE

The scope of our working group covers

- Manufacturers of devices and providers of services (Clinical and Research use only devices, in-vitro and in-vivo products, pharmaceuticals, and biologics),
- All points-of-care through the entire Healthcare delivery life-cycle,
- Academic Medical Centers (AMCs),
- Regulatory agencies,
- Healthcare insurance providers, and
- Healthcare advocacy groups.

While these organizations may be served by other INCOSE working groups, it is believed that our working group will uniquely

address the breadth of their needs.

IW Outcomes

IW Outcomes

There were no specific accomplishments planned for IW other than outreach to INCOSE membership in general and to other working groups addressing healthcare relevant topics. The working group"s focus is on making progress at the HWG"s Healthcare Systems Engineering Conference, May 1-2, 2019 in Minneapolis.

Planned Work past IW

PLANNED ACTIVITIES

Execute the HWG"s 5th Annual Systems Engineering in Healthcare Conference (HWGSEC 2019) on May 1-2, 2019, in Minneapolis, MN (https://www.incose.org/hwg-conference-2019/home). The conference will have tracks addressing

- Agile systems engineering methods for medical devices
- Cybersecurity in healthcare
- Modeling for healthcare applications
- System engineering methods in healthcare delivery

PLANNED WORK PRODUCTS

- Publish the proceedings of the Systems Engineering in Healthcare Conference through the working group and through INCOSE TechOps.

- Complete the white paper tailoring the FDA"s model V&V methodology for application to V&V of control loop models and software in medical devices.

2019
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Human-Systems Integration

www.incose.org/iw2019

Human-Systems Integration

CHAIR

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MEMBERS

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INCOSE CONNECT ADDRESS

https://www.incose.org/incose-member-resources/working-groups/analytic/human-systems-integration

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Human Systems Integration: interdisciplinary technical and management processes for integrating human considerations within and across all system elements; an essential enabler to systems engineering practice. Systems are considered as representations of technology, organizations and people. Systems have structures and functions. They can be cognitive and/or physical.

Our mission is to facilitate embedding Human Systems Integration (HSI) within Systems Engineering (SE), and conversely SE within HSI, promoting the benefit of placing the proper focus on the role of people in the development and operations of systems. Our vision is to see HSI embedded in SE practices, leading to the efficient delivery of safe and effective systems.

WG GOAL(S)

Our goals are multiple:

1. Write up a new HSI section to replace the existing within INCOSE SE Handbook and integrate content with other working groups such as Systems Safety, Systems of Systems, Agile Development, Complexity Analysis, Modeling and Simulation (target 2020).
2. Organize meetings, teleconferences and workshops dealing with HSI.
3. Organize the first HSI conference on September 11-13, 2019 in Biarritz, France. This conference will be recurrent biannually.
4. Organize a workshop/sessions on HSI at IS2020 in South Africa.

WG SCOPE

HSI WG scope covers the shift from 20th century engineering leading to the concept of user interfaces to 21st century HSI where technology, organizations and people are concurrently considered during the whole life cycle of systems.

IW Outcomes

IW Outcomes

We had two sessions of 3 hours each during IW2019. Outcomes were multiple: (1) preparation of HSI2019 conference; (2) review latest work in progress in HSI; (3) elicit ideas and concepts useful for writing HSI part of INCOSE SE Handbook (target 2020). Still work in progress but very dense knowledge gathering and production; (4) plan a workshop/sessions for IS2020; (5) keep developing INCOSE HSI community.

Planned Work past IW

PLANNED ACTIVITIES

Planned activities are the fololoinwgs:

1. organize HSI2019 conference (submissions review, logistics, panels and keynotes);
2. cross-WG collaboration with Systems Safety WG;
3. produce a first draft of HSI SE Handbook part by September 2019, and a follow-up contribution by IW2020.

PLANNED WORK PRODUCTS

Planned Work Products are:

1. HSI2019 conference;
2. common understanding with Systems Safety WG;
3. HSI SE Handbook contribution by IW2020.

2019
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international workshop
Torrance, CA, USA
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Infrastructure

www.incose.org/iw2019

Infrastructure

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INCOSE CONNECT ADDRESS
https://connect.incose.org/workinggroups/infrastructure/pages/home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/Application/infrastructure

Charter Summary

WG PURPOSE/MISSION

The Infrastructure Working Group's Charter is to provide a forum for designers, builders, and operators of economic and physical infrastructure systems to advance the application of systems engineering

WG GOAL(S)

•International Outreach to public and private organizations involved in infrastructure delivery and operations
•SE product development to support the domain

WG SCOPE

Public and commercial facilities and networks necessary for the economic and physical well being of society (e.g., power generation and distribution, waterways and ports, industrial facilities, telecommunication networks, and transportation)

IW Outcomes

IW Outcomes

- Collaborated with TWG and AWG
- Reviewed and Updated Strategic Plan, including:
- Vision
- Plans
- Collaboration
- Product development
- Discussed Opportunities for collaboration and merger with other Working Groups
- Discussed strategies to progress the products under development

Planned Work past IW

PLANNED ACTIVITIES

•Communications/Outreach
•Overall Outreach Effort (within INCOSE, government agencies, supplier organizations, and professional organizations)
•Work with Ambassador, Chapter Leaders to increase outreach
•Papers in Insights and ENR
•Collaboration with AWG and TWG
•Webinars
•Joint Papers
•Papers in Insights
. Collaboration with INCOSE for the development of MOU with buildingSMART / BIM / MBSE
•Architectural Engineering Construction (AEC) Spin off

PLANNED WORK PRODUCTS

•Systems Engineering Leaflets
•Control of Change
•Configuration Management
•MBSE in Infrastructure
•Translation of the 5 completed Leaflets into Dutch, French, German, and Spanish
•MBSE Drawbridge Model (Final Product and Webinar)
•Version 2.0 of the Guide for the Application of Systems Engineering in Large Infrastructure Projects

2019
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IV&V

www.incose.org/iw2019

IV&V

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/IVV/SitePages/Home.aspx

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Development of best practices for integration, verification, and validation and support these disciplines in INCOSE activities.

WG GOAL(S)

Provide a source of expertise and guidance for integration,verification, and validation

WG SCOPE

Provide a center of knowledge within INCOSE for integration, verification and validation to address these topics in various INCOSE efforts.

IW Outcomes

IW Outcomes

Draft TPP for combined effort with Requirements Working Group on a Verification and Validation Guidebook
Took action to lead similar effort for an Integration Guidebook
Provided initial comments on SE Handbook for revision effort
Held discussions on test case generation and integration issues
Established initial WG membership

Planned Work past IW

PLANNED ACTIVITIES

Verification and Validation Guidebook - with Requirements Working Group
Integration Guidebook - with Requirements Working Group
Review of INCOSE SE Handbook

PLANNED WORK PRODUCTS

Verification and Validation Guidebook - with Requirements Working Group
Integration Guidebook - with Requirements Working Group

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Lean Systems Engineering

www.incose.org/iw2019

Lean Systems Engineering

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

CHAIR

Art Hyde (arthyde55@gmail.com)

MEMBERS

100

INCOSE CONNECT ADDRESS

350 Provencal road

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/lean-systems-engineering

Charter Summary

WG PURPOSE/MISSION

The Lean Systems Engineering Working Group provides a forum for discussion and information distribution of Lean Systems Engineering best practices, methods, tools and processes to promote the efficient concepting, designing, launching and Life Cycle Management of new products and services that are market leading and compelling to the Enterprise stakeholders and external experiencers.

WG GOAL(S)

It is our goal to strengthen the practice of Systems Engineering (SE) by exploring and capturing the synergy between traditional SE and Lean New Product Creation. To do this, we will advance the Body of Knowledge of Lean Thinking into SE practices to integrate people, processes, and tools for the most effective delivery of value to program stakeholders.

Our goal is 2019 is to progress the development of the Lean Systems Design framework to the point it can be implemented by Enterprises to efficiently develop human centered market leading products and services.

WG SCOPE

Present major effort is the development and documentation of a new Lean Product Creation framework built on the lean enablers previously published by this work group and added to by the addition of integrating Design Science and Agile Development methodologies.

IW Outcomes

IW Outcomes

Sandia National Labs Development Cyle Time Reduction (Compton/ Conroy)

- Input provided on the presentation in support of presentation at IS2019.
- A more detailed discussion on lean methods will be held with Sandia after the IW2019.

Lean Systems Engineering Product Creation Framework was presented and discussed.

- Monthly meetings to be set with the participants
- Initial Next Steps from the discussion to be brought into for the Monthly meetings are:
- Review of Work Group charter -- in recognition of the WG re-boot we started in 2018.
- Overall Framework clarification -- "New" IP needs to be clearly identified and examples beyond Automotive are needed
- Experiencer Empathy Cycle detail process review should be scheduled
- A review of the Scaled Agile SAFe process and adjacent INCOSE WGs should be scheduled to clarify differences to the Framework & specific new IP such as the Plan-Do-Check-Act Architecture and Subsystem Design processes.
- How does Conceptual Design discussed at the IW2019 compare to the Framework process
- A separate meeting with LAM Research will be scheduled to try and tailor the Framework to small Enterprise environment

Planned Work past IW

PLANNED ACTIVITIES

1. Monthly LSE Work Group meetings to resume.
2. Adjacent WGs need to be contacted to clarify interactions and overlaps.

PLANNED WORK PRODUCTS

- The LSE Work Group is not aligned on specific Products we will produce. The decision on this will be an outcome of the monthly WG meetings.

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MBSE Patterns

www.incose.org/iw2019

MBSE Patterns

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

CHAIR

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MEMBERS

25

CO-CHAIR

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INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns

Charter Summary

WG PURPOSE/MISSION

The purpose of the INCOSE MBSE Patterns Working Group is to advance the availability and awareness of practices and resources associated with the impactful creation, application, and continuous improvement of MBSE Patterns over multiple system life cycles. The practice of MBSE using System Patterns is also referred to as Pattern-Based Systems Engineering (PBSE).

WG GOAL(S)

Stakeholders and Their Measures of Success

The following summarizes types of stakeholders in the work of this group, and the general areas of impact that measure related successes. Attachment 2 provides further discussion of the state of these measures:

System Innovation / Development Teams: Enjoy the benefits of MBSE with lower per-project model-origination and refinement time, effort, skill load, and risk, by employing configured System Patterns as early draft models.

System Modelers: Extend the span of influence of skilled individual modelers by making their models effectively available, applicable, and impactful to more projects, systems, and products.

Product Line Managers, Platform Managers, Portfolio Managers: Improve the effectiveness of families-of-systems disciplines, measured in terms of economic leverage.

System Verification Teams: Improve the performance of system verification planning and execution in high risk or complexity systems.

System Life Cycle Groups: Improve satisfaction with the early fit of systems to the learned needs of system life cycle communities, including manufacturing, distribution, end user, operations, and maintenance, over a broad range of issues that should not be re-

discovered each generation (functionality, safety, many other aspects).

Tool Suppliers: Improve the ROI demonstrated by tools.

Enterprises: Improve organizational-level learning across individual people and projects, reducing occurrences of re-learning the same lessons and repeating the same mistakes.

WG SCOPE

As used here, System Patterns are configurable, re-usable System Models that would otherwise be like those expected and found in the practice of MBSE (not limited to, but including, OMG SysML models). Through the availability and use of System Patterns, the outcomes targeted by MBSE models are made more accessible, in terms of ease (and skill requirements) of generation and use, associated modeling cost, schedule, risk, completeness, and consistency, etc. Over time, System Patterns become points of accumulation of organizational learning and expertise. Because they are configurable and re-usable models of families or classes of systems, model-based System Patterns involve some additional methods and disciplines that extend the ideas of MBSE (e.g., Pattern Management, Configuration Rules, model minimality, etc.).

INCOSE has recognized the importance of model-based methods, in establishing the strategic objective to accelerate systems engineering transformation to a model-based discipline. The work of the MBSE Patterns Working Group increases the value, leverage, and applicability of system models as further described below.

The range and limitations on the scope of the work of this Working Group are closely associated with the range and limitations of scope of Pattern-Based Systems Engineering. Those scope boundaries are discussed at some length in http://www.omgwiki.org/MBSE/lib/exe/fetch.php?media=mbse:patterns:pbse_extension_of_mbse--methodology_summary_v1.5.5a.pdf , a product of the working group that compares and contrasts to a number of other related subjects and activities that are joint work opportunities with other INCOSE Working Groups.

Charter Summary

Although some background in MBSE may be helpful, this working group also provides a path for member learning about MBSE, so it is not a pre-requisite. Background in a specific domain (e.g., medicine, aerospace, etc.) or special enabling subject (e.g., agile systems, verification, etc.) are not required pre-requisites, but may add perspective for members wishing to apply PBSE on an impactful basis in their enterprises. Good collaboration skills and teamwork, along with interest in learning and willingness to share experience are valued skills and traits for this working group. An understanding the of breadth of system life cycles (as in ISO 15288, INCOSE Handbook, etc.) and the needs and challenges found there will likewise inform the member with a perspective on the impactful application of MBSE Patterns. An understanding of the essential nature of systems and the information used to describe them is likewise helpful, however this foundational knowledge is also detailed within the WG products and activities and can be acquired or improved by participation in this working group. PBSE provides a strong foundational metamodel and ontology to underpin and enable MBSE.

IW Outcomes

IW Outcomes

Reviewed status of existing projects underway with other working groups and external entities.
Identified future projects of interest to IW2019 attendees

- **ASELCM/System of Innovation Pattern, Links to Learning, VVUQ, and Future of SE**
- **S3 Pattern and INCOSE OCM—Enterprise WG collaboration**
- **Progress in Model VVUQ Reference Pattern / Model Wrapper (with ASME Stds Committee)**
- **V4 Institute Collaboration on Virtual Verification**
- **Medical Device Model VVUQ Application**
- **Mappings to Frameworks and Tools (suggested by members at IS2018 meeting)**
- **Semantic Technologies for SE (ST4SE) Collaboration**
- **Patterns in the Public Square: Regulated Innovation**
- **IFSR Conversation Product: An MBE Manifesto**
- **Augmented Intelligence Challenge Team Collaboration**
- **Interface Patterns Project**
- **Agile Patterns Project and WG Collaboration, IS 2019 Report Paper**

- **SysSciWG and ISSS Collaboration**

Planned Work past IW

PLANNED ACTIVITIES

Continue current projects with INCOSE WGs and external entities.
Structure mappings project planning
Model Trust Pattern project planning

PLANNED WORK PRODUCTS

MBSE Penetration Planning and Analysis Aid
Model Planning, Analysis, and Metadata Wrapper Pattern

2019
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Measurement

www.incose.org/iw2019

Measurement

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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/Measurement/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/process/measurement

Charter Summary

WG PURPOSE/MISSION

Promote shared understanding, education and advancement of measures, measurement practices, measurement tools/support, and the overall measurement process as applied to systems engineering

WG GOAL(S)

The measurement working group supports a wide variety of measurement initiatives including supporting INCOSE measurement products (Measurement Primer, Metrics Guidebook, Technical Measurement Guide, SE Handbook) as well as joint measurement products (SE Leading Indicators Guide, PSM Guide).

WG SCOPE

The Measurement Working Group supports a wide variety of measurement initiatives including supporting INCOSE measurement products (Measurement Primer, Metrics Guidebook, Technical Measurement Guide, SE Handbook) as well as joint measurement products (SE Leading Indicators Guide, PSM Guide).

IW Outcomes

IW Outcomes

Planned 2019 - 2020 Measurement Efforts

Planned Work past IW

PLANNED ACTIVITIES

1. Reach out to Donna Rhodes on Leading indicators Guide V3
2. Conduct MBSE Measurement survey to gain insight in recommended measurements for MBSE efforts

PLANNED WORK PRODUCTS

MWG has the following planned work for 2019

1. Develop Measurement Tutorial by IS2019 on how to use Measurement Products

2. Develop Measurement Tutorial based on Systems Engineering Measurement for Program Management for Project Success

3. Review SEHBK section 5.7 and provide initial input to authors

4. Review SEBOK Measurement page and provide input to authors

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Model-Based Conceptual Design

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Model-Based Conceptual Design

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50

INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/MBCD/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/model-based-conceptual-design

Charter Summary

WG PURPOSE/MISSION

With most of the cost for a design committed in the concept phase, the Model Based Conceptual Design (MBCD) Working Group is focused on feeding the right selected concept to reduce risk, cost and development time of the total program. This in done by:

1. Understand the problem
2. Define the problem
3. Identify the concepts
4. Model the concepts
5. Evaluate the concepts
6. Deliver the selected concept for further development.

The MBCD working group is still finalizing the charter and clarifying the mission of the group.

WG GOAL(S)

1. Understand the problem domain
2. Model and Evaluate the concepts
3. Communicate with the stakeholders effectively
4. Deliver clear understanding of risks, limitations, and rational for the concepts.
5. Deliver selected concept with quantified assessment of why it is selected concept

Charter Summary

WG SCOPE

Scope is in progress.

IW Outcomes

IW Outcomes

1. Identified the importance of defining what Concept Development is and what that means to different industries
2. Identified the need to leverage what the other working groups are doing, assigned members to work with 10 other working groups.
3. Collect Stakeholder Needs
4. Collect Examples/Research Data
5. Understand Interaction Points between groups
6. Identified the need for translations of information from MBCD to different industries to get better adoption and easier transition to MBCD.
7. Identified several gaps that need to be addressed in where MBCD fits, what is the boundaries of MBCD, and what are the interaction points of MBCD with other aspects of design and development.
8. Added significant updates to the MBCD System Model
9. Reviewed Proposed MBCD Domain structure that breaks down MBCD into 4 domains
10. Problem Domain - What the system must address, the reason for developing the system. Also known as business case, Mission engineering, etc...
11. Concept Domain - pulling all of the concepts to address the problem into one space that would allow for modelling to some level of fidelity as well as comparing of the different concepts and testing against the need from the problem domain
12. Solution Domain - Delivering a selected solution based on the work of the concept domain, this is where traditional MBSE would start and the model would grow to a higher fidelity.
13. Project Domain - Interface with the organization, identify resources, define the stakeholders, and manage the communication between the different stakeholders.

Planned Work past IW

PLANNED ACTIVITIES

1. Working with several other working groups to understand different industries lexicon and needs (application domain working groups) as well as what tools, methods and means can be leveraged in MBCD (application, process and transformation enablers)
2. Monthly Group Meetings will be setup, with breakdown into further smaller focused groups for specific aspects of MBCD.
3. Assembling data that has been gathered at IW into a proposed Charter and deliverable.
4. Continue to evolve and define the MBCD system model.

PLANNED WORK PRODUCTS

Charter and Proposed deliverable for this cycle (2019-2020).

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NAFEMS-INCOSE System Modeling and Simulation

www.incose.org/iw2019

NAFEMS-INCOSE System Modeling and Simulation

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

CHAIR

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MEMBERS

200

INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/NAFEMS/SitePages/Home.aspx

INCOSE WEB PAGE

http://wiki.omg.org/MBSE/doku.php?id=mbse:smswg

Charter Summary

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WG PURPOSE/MISSION

To 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 an 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; 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 both communities with the identification of benchmarks and major strategic issues.

WG GOAL(S)

1. Share information through both INCOSE and NAFEMS events and at monthly online meetings, including speakers, panels, and publications.
2. Share Best Practices by both end users and tool suppliers in the integration of Systems Engineering with Engineering Analysis.
3. Establish consensus and publish standardized Terms & Definitions used by various groups.
4. Communicate needs for Emerging Standards in the scope of Systems Modeling and Simulation.

WG SCOPE

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

IW Outcomes

IW Outcomes

Overview of WG and its current activities presented at MBSE Workshop.

Held half-day meeting to:

1. Plan roadmap of 2019 activities.
2. Begin work of Terms & Definitions subteam.
3. Discuss standards-based interoperability through a panel of multiple standard groups that address elements of the SMSWG scope.

Began planning of a special session for INCOSE at NAFEMS World Congress (June 17-20, 2019 in Quebec City).

Planned Work past IW

PLANNED ACTIVITIES

Monthly telecons for updates and information sharing with WG members.

Three parallel subteams:

1. Roadmap and Sharing of Best Practices
2. Terms & Definitions
3. Standards Ecosystem

Participation and special sessions at upcoming events of both NAFEMS and INCOSE.

PLANNED WORK PRODUCTS

Flyer on What is Systems Modeling and Simulation?
Flyer on What is Functional Mockup Interface (FMI)?

Online compilation of Terms & Definitions across multiple groups.

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Natural Systems

www.incose.org/iw2019

Natural Systems

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INCOSE CONNECT ADDRESS
https://www.incose.org/incose-member-resources/working-groups/analytic/natural-systems

INCOSE WEB PAGE
https://sites.google.com/site/incosenswg/

Charter Summary

WG PURPOSE/MISSION

Evaluate changes to Systems Eng. processes & communications to take advantage of Natural Systems, including broader relationships between SE---Science--Tech.

WG GOAL(S)

1. Assess State-of-the-Discipline regularly.
2. Cultivate a NS Community of Practice.
3. Share Best Practices & Success Stories.
4. Better understand SE interactions with Natural Systems.
5. Investigate enhancements to SE processes and practices.
6. Grow in numbers and scope.

WG SCOPE

The Natural Systems Working Group includes members from industry, academia, and government. Our work focuses on systematic approaches to Natural Systems inquiry in SE and tools for bio-inspired design and their application to the SE process.

IW Outcomes

IW Outcomes

- Delivered 6 substantive programs
- Identified 4 areas of inquiry for activities in 2019 and beyond
- Outlined potential project areas in each area of inquiry
- Initiated conversations with prospective project contributors
- Developed connections with process enablers
- Discussed concepts and planning for project outputs

Planned Work past IW

PLANNED ACTIVITIES

- Working group planning session
- Update WG Charter and Website
- Pursue and plan joint activities with multiple working groups
- Discussions
- Webinars
- White Papers
- Conferences
- Outreach

PLANNED WORK PRODUCTS

- Increase familiarity with architectures
- Improve ability to analyze and model natural and engineered domains
- Increase familiarity with modules from living systems
- Recommendations for stakeholder requirements and concept of operations processes
- Recommendations for validation, verification, and systems failure/pathology processes
- Increase familiarity with MBSE and Architecture Standards and Natural Systems aspects
- Collect cases pertinent to NS and SE interactions
- Document systematic approaches to NS in SE
- Support SE design practices considering NS

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Object-Oriented Systems Engineering Method (OOSEM)

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Object-Oriented Systems Engineering Method (OOSEM)

2019 Annual INCOSE international workshop
Torrance, CA, USA
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CHAIR

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30

CO-CHAIR

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/OOSEM/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/object-oriented-se-method

Charter Summary

WG PURPOSE/MISSION

The INCOSE Chesapeake Chapter Object-Oriented Systems Engineering Method (OOSEM) Working Group (WG) strives to continuously improve upon Object-Oriented Analysis and Design (OOA/D) applied to Model-Based Systems Engineering (MBSE) through research into Object-Oriented (OO) MBSE concepts, notations, and methods.
Group members are practitioners of Systems Engineering and related disciplines who apply their experience to maintaining and improving the Object-Oriented Systems Engineering Method (OOSEM).

WG GOAL(S)

Goals for the OOSEM WG include:
-- Collaborate with other INCOSE Working Groups, such as Critical Infrastructure Protection and Recovery (CIPR).
-- Collaborate with OO organizations external to INCOSE, such the Object Management Group (OMG) and IEEE.

WG SCOPE

The OOSEM WG serves as a resource to the Systems Engineering community by:

-- Supporting the capture, analysis, synthesis, and understanding of complex architectures, systems specifications, technologies, and designs.

-- Facilitating Family/Systems of Systems (FoS/SoS), system-, element-, and component-level reuse and design evolution.

-- Enhancing integration between engineering disciplines including but not limited to systems, human(s), software, hardware, test, environment, and logistics.

-- Focusing on enhanced and improved integration between Systems Engineering and OOA/D Software Engineering.

Charter Summary

-- Advancing integration between MBSE and modern management practices such as the Lean Startup Method (LSM) and Agile (Systems Engineering, Software Engineering, and Project Management).

-- Investigating, learning, employing, advocating, and teaching OOSEM-related aspects of the new Object-Process Methodology (OPM) specification.

IW Outcomes

IW Outcomes

International Workshop (IW) OOSEM WG Outcomes include:
-- Make available OOSEM Working Group history and background information, as well as near and long term product planning insights to all IW attendees in an OOSEM Working Group Orientation Session.
-- Share information and lessons learned from 2015, 2016, 2017, and 2018 educational workshops on using Lean Startup Method (LSM) and Agile for Initial Project Planning (IPP) of OOSEM-related MBSE projects.

Planned Work past IW

PLANNED ACTIVITIES

Planned Activities for the OOSEM WG include:

-- Discuss and outline future OOSEM inputs to the next planned version of the INCOSE Systems Engineering Handbook.

-- Discuss and outline future OOSEM inputs to refinements of the OMG Systems Modeling Language (SysML) Specification.

-- Incorporate the Object-Process Methodology (OPM) specification into OOSEM WG research, study, experimentation, and technical product development.
-- Discover and discuss potential interactions between the OOSEM WG and other Working Groups.

-- Refinement of the existing Object-Oriented Systems Engineering Method (OOSEM) Introductory Course.

PLANNED WORK PRODUCTS

Planned Work Products for the OOSEM WG include:
-- Updated, "OOSEM Introductory Practitioners Course".
-- "LSM/Agile for IPP Facilitator"s Guide", for facilitating and using the Lean Startup Method (LSM) and Agile for Initial Project Planning (IPP) of any system solution project.

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Oil & Gas

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Oil & Gas

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40

CO-CHAIRS
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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/Oil-and-Gas/SitePages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/Application/oil-and-gas

Charter Summary

WG PURPOSE/MISSION

To advance Systems Engineering into the Oil and Gas sector in order to enhance the sector's ability to adapt to rapidly changing environments.

WG GOAL(S)

Create guidelines and best practices for applying Systems Engineering in the Oil and Gas sector.

WG SCOPE

The entire Oil and Gas supply chain, from owner operators through to EPCs, service providers, equipment suppliers and standards bodies.

IW Outcomes

IW Outcomes

Welcomed new attendees
Held a combined working session that covered working group overview, current subgroup status (SE Value, Requirements, Standards, SE Competencies) and all 2018 achievements
Presentation and engagement from ASTM regarding industry standards and systems engineering integration
Open floor and thinking session to discuss 2019 focus, objectives, challenges

- Proposal for new subgroup (Tools Trade Studies)
- Requirement Quality Tools
- Standard data format for requirement transference
- Suggestions for future topics in the O&G SE Competencies and Value of SE subgroups

Shared vision about O&G WG participation within EMEA region
Developed content for O&G WG SharePoint site
Connected with other Working Groups

Planned Work past IW

PLANNED ACTIVITIES

- Develop Case for Change to incorporate into SE Value Tool
- Continue pilot for requirements coaching tools
- Continue work with API to convert standards from prose to requirements
- Advance transformation of standards from prose to requirements with more Standards Bodies (IOGP, ASTM, DNV)
- Review justification for SE Competencies frameworks for O&G Industry
- Establish new ReqIF Subgroup
- Develop method to learn, compare and evaluate tools (Requirements Grading Tools and Requirements Database Tools) in partnership with Standards Development Tools and others
- Outreach with established O&G industry organizations (SPE, IADC, API, IOPG, etc.)
- Produce Systems Engineering session at the Offshore Technology Conference
- Co-host SE Conference with Aerospace INCOSE TGCC
- Strengthen O&G WG participation in EMEA Region

PLANNED WORK PRODUCTS

- Support Systems Engineering Session at the Offshore Technology Conference by presenting ten SE papers
- Updated SE Value Tool
- Tool evaluation white paper

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PM-SE Integration

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PM-SE Integration

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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/pm-se%20integration/SitePages/Home.aspx

INCOSE WEB PAGE
http://www.incose.org/ChaptersGroups/WorkingGroups/process/pm-se-integration

Charter Summary

WG PURPOSE/MISSION

Identify and promote opportunities associated with the effective integration of the Systems Engineering and Project/Program Management disciplines.

- Explore the linkages necessary to create effective integration and collaboration between systems engineers and program managers.
- Be the intersection point where systems engineers, program/project managers collaborate and integrate their efforts.

WG GOAL(S)

- Facilitate collaboration between systems engineering and program management communities.
- Demonstrate the value of integrating systems engineering and program management to develop better solutions that drive strategic business results and outcomes.
- Produce useful deliverables that support effective integration and practice of collaborative systems engineering and program management.
- Provide thought leadership on open integration challenges between program management and systems engineering.
- Bring external thinking into the systems engineering and program management communities to facilitate thinking outside of the box.
- Represent a think tank for free thinking and engagement around critical issues associated with program management and systems engineering.
- Draft guidelines and/or influence existing ones (e.g. PMBok,SEBoK, etc.) based on experience and exchanges on PM/SE integration and collaboration.

WG SCOPE

Our scope encompasses activities relating to defining, capturing, evolving, and communicating PM/SE integration best practices. This may include training material, guideline material, recommendations for industry best practices and standards, and shared output with industry working groups from other organizations.
Additionally, also in scope is joining efforts with other INCOSE working groups such as Requirements, Risks, Leans SE, Agile SE, etc... where appropriate, to ensure subject matter expertise is seamlessly integrated into various aspects of the systems engineering process. Exploration of common problems and/or practices also falls within scope.

IW Outcomes

IW Outcomes

37 members attended our meeting at IW, out of which 26 were new members to our working group. We reviewed the charter, goals, and scope of our working group, as well as our current initiatives. Members volunteers to join existing initiatives and identified new initiatives to explore specific case studies and provide system project management material to academic programs on systems engineering. Dave Walden also talked to the working group about providing suggestions for SE handbook updates in topics relevant to PM.

Planned Work past IW

PLANNED ACTIVITIES

- Compare PM BoK and SEBoK: identify commonalities and differences
- Project Breakdown Structures: Establish consistencies between different breakdown structures (FBS, PBS, WBS,...) all along the life cycle
- Provide feedback and input to INCOSE-PMI-INCOSE Alliance: identification of influencers, development of presentation materials
- Meeting planned on PM-SE at the EMEA Workshop in Utrecht (NL) on 10th/11th October 2019 (JC and John as leaders of this meeting)
- One virtual meeting organized for each initiative between next physical meeting at IS or IW.

PLANNED WORK PRODUCTS

Provide suggestions for inputs for SE Handbook and PMBok update

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Process Improvement

www.incose.org/iw2019

Process Improvement

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MEMBERS

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/ProcessImprovement/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/process-improvement

Charter Summary

WG PURPOSE/MISSION

The purpose of the Process Improvement Working Group (PIWG) is to:

- Identify SE Process improvement opportunities
- Facilitate improvement of the SE Process thru expansion of current SE processes, activities, steps, and practices
- Coordinate SE Process improvement mechanisms throughout INCOSE
- Provide improved SE processes, activities, steps, and practices to INCOSE members

The reason for initiating this Process Improvement WG is because there is no organized SE process improvement method provided to INCOSE members by other members. This Process Improvement WG will provide that opportunity and will support the mission, vision, and goals of INCOSE identified at http://www.incose.org/about/index.aspx.

WG GOAL(S)

The specific goals for the Process Improvement WG are to:

· Capture the purpose, output, and description of the SE Process as identified in ISO/IEC/IEEE 15288, ISO/IEC TR 24748, the INCOSE SE Handbook, and other SE Process sources

· Identify, develop, solicit, coordinate, and schedule proposed improvements for the future SE Process.

· Recommend standardized approaches for SE Process improvement and definition.

· Enhance the WG members' knowledge of process improvement methods.

· Develop an integrated approach for an organization?level strategy for SE Process improvement that would encompass the concept and application of continual improvement of the SE Process tailored to the organization.

· Provide support for the INCOSE Quick Review Process for applications such as maturity models.

· Provide INCOSE representation in Capability Maturity Model Integration (CMMI) administration activities to provide consistent SE Process application.

· Develop or solicit SE Process improvements

Charter Summary

- Solicit SE Process improvement volunteers
- Provide SE Process improvement as a benefit to INCOSE members
- Coordinate SE Process improvement throughout INCOSE
- Provide representatives to other INCOSE WGs to obtain and provide consistent SE Process improvement application
- 2008 International Workshop SE Process Improvement Summary Presentation Size: 200K

- Contact SE Process Improvement and Capability Evaluation Working Group for additional information or to join this group.

The vision of the Process Improvement WG is to be the acknowledged leader in advancing the overall continual improvement of the SE Process throughout the SE community. The mission is to:

- Elicit stakeholders' needs and real?world constraints
- Provide direction for continual improvement of the SE process
- Provide value?added SE Process improvements for the SE practitioners of the future.

WG SCOPE

This Process Improvement WG will address SE Process improvement as it relates to SE throughout the system life?cycle. This effort will be a free volunteer effort provided as a benefit to all members. This effort will exclude identification of actual US DoD projects because of ITAR regulations, copyrighted material unless authorized in writing by the author, and labor financial compensation.

IW Outcomes

IW Outcomes

New WG Chair, Cdr Jeff Brown
New Co-Chair being recruited
Four new members attended the WG session

Planned Work past IW

PLANNED ACTIVITIES

Recruit new Co-Chair
Conduct monthly telecons
Determine what processes may need to be improved.
Review IS2019 paper: "SE Quick Check"

PLANNED WORK PRODUCTS

Comments on "SE Quick Check" paper
Revised Charter
Ideas for projects
Draft Technical Project Plan (TPP) for potential project
Develop and conduct survey using Survey Monkey

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Product Line Engineering

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Product Line Engineering

MEMBERS
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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/ProductLines/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/analytic/product-lines

Charter Summary

WG PURPOSE/MISSION

- Promote PLE (Product Line Engineering) and related SE (Systems Engineering) best practices
- Coordinate activities around PLE at INCOSE level and share results

WG GOAL(S)

- Help our members acquire Know?How:
- Compare to the State?of?Art
- Share concerns, experiences, good practices, and traps to avoid
- Provide guidelines to set up and evolve PLE in organizations

WG SCOPE

- All types of Systems, Markets, & Organizations
- All the SE Processes (needs, requirements, architecture, integration and tests, ...)
- All maturity levels of PLE, from opportunistic to completely Integrated and anticipated strategies

IW Outcomes

IW Outcomes

- Joint project with the systems security working group
- ISO 26580 Standard new work items to be submitted on Feb 9th 2019

Planned Work past IW

PLANNED ACTIVITIES

- SE Handbook updates
- SEBOK updates planned

PLANNED WORK PRODUCTS

- INSIGNT theme issue on security and PLE
- PLE Primer for awareness and outreach

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)

MEMBERS

8

CO-CHAIRS

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Conrad Bock (conrad.bock@nist.gov)

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

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

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

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

PLANNED ACTIVITIES

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

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

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

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Requirements

www.incose.org/iw2019

Requirements

CHAIR

Lou Wheatcraft (louw@reqexperts.com)

MEMBERS

526 (392 last IW) Largest INCOSE WG

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/Requirements/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/process/requirements

Charter Summary

WG PURPOSE/MISSION

The purpose of the Requirements Working Group (RWG) is to advance the practices, education and theory of requirements development and management and the relationship of requirements to other systems engineering functions.

WG GOAL(S)

Expand and promote the body of knowledge of requirements and its benefits within the systems engineering community.

WG SCOPE

Activities relating to best practices for requirements development and management throughout the product life cycle including:

Elicitation	Analysis	Allocation	Traceability
Elaboration	Management	Change Management	
Expression	Verification	Validation	

IW Outcomes

IW Outcomes

RWG IW2019 Theme: "The role of requirements in an MBSE world"

- Welcomed new members
- Presented an overview to the RWG "*Guide for Writing Requirements*" and the whitepaper "*Integrated Data as a Foundation of SE*".
- Developed and submitted the TPP for the new "*Guide to Developing & Managing Requirements*"
- Developed and submitted the TPP for the new "*Guide to Verification & Validation??*" in coordination with the proposed Integration, Verification, and Validation WG
- Developed and submitted the TPP for the update to "*Guide for Writing Requirements*"?
- Discussed updates to the "*Guide for Writing Requirements*"? - Mike Ryan
- Participated in joint WG meeting with the TIMLM WG on the SE Tools Database (SETDB) Tool Vendor Questionnaire
- Participated in a joint WG meeting with the Oil&Gas WG
- Facilitated several sessions: Ask the experts to address issues/questions that RWG session attendees had concerning requirements development and management
- Supported IW MarketPlace
- Hosted the following presentations & group discussions:
- "Key Insights into Developing Requirements for the 21stCentury?" – Lou Wheatcraft (MBSE Related)?
- "Augmenting Requirements with Models" – Stéphane Bonnet? (MBSE Related)
- "Managing the Risks of Requirement Uncertainty" -- Robert Bordley?
- "Applying MBSE to Reduce Development Time" – Mary Compton, Marissa Conroy, (MBSE Related)
- "Actionable Requirements Definition Using an EARS OOPM"– Brenan Hall? (MBSE Related)?
- "Requirements Efficiency: External Questionnaire Results" – Celeste Drewien? (MBSE Related)
- "Model-Based Requirements Engineering" – Jose Fuentes ?(MBSE Related)
- "Sharing Requirements – a Case Study using REQIF"?? – Ray Climacosa (MBSE Related)?
- "Managing Structured Requirement Content – Use Case" - Pawel Chadzynski?? (MBSE Related)?
- "Improving Requirement Quality using MBSE" - Matsuaki Kato? (MBSE Related)

Planned Work past IW

PLANNED ACTIVITIES

- Active participation in IS 2019
- Maintain the RWG public and Connect web sites
- Support the SE Tools Database development efforts
- Support the update to the INCOSE SE Handbook

PLANNED WORK PRODUCTS

- Publish RWG Whitepaper: "Integrated Data is a Foundation of Systems Engineering"
- Update the INCOSE "*Guide for Writing Requirements*"
- Develop draft "*Guide for Managing Requirements*"
- Develop draft "*Guide to Verification and Validation*"
- Update current webinar-based training for the *Guide for WR* with new on-demand training

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Risk Mgmt

www.incose.org/iw2019

Risk Mgmt

MEMBERS
188

CO-CHAIRS
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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/RiskManagement/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/process/risk-management

Charter Summary

WG PURPOSE/MISSION

The purpose of the INCOSE Risk Management Working Group (RMWG) is to advance knowledge, common understanding, and quality of practice of risk and opportunity management in the systems engineering community worldwide. Our mission is to develop value-added technical products and participative activities which help INCOSE members effectively and efficiently implement risk and opportunity management.

WG GOAL(S)

The goals and initiatives of the RMWG are to:

A. Provide a forum for INCOSE risk management practitioners to present research and analysis results, discuss problems, and put forth improvement ideas.

B. Establish and maintain a process for collecting and consolidating input to be used for updating the INCOSE Handbook risk and opportunity management sections

C. Generate specific work products for consideration as input to the INCOSE Handbook, SEBoK, International Standards, and others.

D. Develop and maintain a presentation explaining the benefits of risk and opportunity management, which can be used by members for promoting the application of risk and opportunity management practices.

WG SCOPE

Risk (and Opportunity) Management for Systems Engineering.

IW Outcomes

IW Outcomes

The Risk Mgmt WG held a 2 hour open session 1-3pm, Sunday, Jan. 27. This meeting was attended by 10 people.
An overview of the WG was provided, and attendees participated in a round-table discussion about wants and needs with respect to risk management in their industry, organization and their work personally.
Issues discussed included (a) bias in the application of risk management, and how to reduce it, (b) variation in the practice of risk management depending on the scope and context, e.g., between financial, technical domains, very small (vs large) entities, and how to handle, and (c) differences in how risk management is viewed and performed in different engineering field, e.g., medical devices, cybersecurity, etc.
The primary outcome/decision was to schedule and hold webinars throughout the year so that INCOSE members could benefit exchange of knowledge and practices.

Planned Work past IW

PLANNED ACTIVITIES

Webinars.
Standards support.

PLANNED WORK PRODUCTS

Webinars.
ISO/IEC/IEEE 16085 3rd Ed.

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SE Quality Management

www.incose.org/iw2019

SE Quality Management

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MEMBERS

80

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INCOSE CONNECT ADDRESS

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INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Quality Management is one of the six *Organizational Project-Enabling Processes* described in the INCOSE Handbook v4 (Section 7.5) and in ISO/IEC/IEEE 15288:2015.

The overall purpose of the Systems Engineering Quality Management Working Group is to **foster the definition, understanding and practice of quality management in the systems engineering profession.**

This purpose will be achieved by the establishment of quality management as a cornerstone of professional development that adds value to the systems engineering profession, and engineering in general, through the following initiatives:

- Developing and elaborating systems engineering as a leadership discipline with quality management as a foundational competency,
- Enabling systems engineers to develop and expand the skills to manage process quality and increase profitability,
- Considering the organization as a system, fully integrating the process, the person and the job description, and
- Raising the level of professionalism, corporate and technical influence, job satisfaction and the career path trajectory.

WG GOAL(S)

The purpose of the working group will be realized through the accomplishment of the following goals. Where appropriate, these goals will be further elaborated and planned using Technical Program Plans.

a) Initial publication of a key definitional article on systems engineering quality management (submitted to IS 2019)
b) Training SEQM Working Group leaders in quality management (begun Q3 2018 and continuing)
c) Delivery of regular webinars and tutorials on SEQM (starting Q1 2019 and ongoing)
d) Development of SEQM leadership training for the INCOSE members. The Training WG will be informed of the training offered by SEQM so that is may be included on any INCOSE-wide training plans (begun Q1 2019 and continuing)
e) Enable and encourage SEQM WG leadership to achieve certification as SE Quality Managers (SEQM) from the Quality Management Institute (at no cost) (begun Q3 2018 and continuing)
f) Launch of research projects to further develop SEQM and document quantitative results from the application of quality management in systems engineering (Q2 2019)

g) Build a continuing presence of SEQM thought at the INCOSE IW and IS, through submitted papers, panels and tracks (IS2019 and continuing)
h) Developing SE-QM leadership descriptions and overview material, targeted for inclusion in key INCOSE publications such the handbook and SEBok (Q3 2019)
i) Collaboration where appropriate with other INCOSE Working Groups including the Competency WG to include SEQM in their frameworks, the Process Improvement WG to include SEQM in processes and the Enterprise Systems WG on the paradigm of "organization as system" (Q3 2019)

WG SCOPE

Quality management, as addressed in this working group, is distinct from other aspects of quality such as quality assurance, quality control and acceptable quality levels. Quality management is also distinct from the SE disciplines of verification and validation of systems.

This working group aims to address quality management as a leadership and management discipline, as applied within systems engineering. This follows the approach to quality management described in the works of Deming, Crosby and Juran, but limits the application to the engineering and systems engineering disciplines.

The working group will also address the connections of quality management to other areas of systems engineering, notably systems thinking and organizational leadership.

IW Outcomes

Review of WG Charter and Goals
Began review of QM overview article, "Transforming the Engineering Organization with Systems Engineering and Quality Management" submitted to IS2019 as paper
Reviewed panel session for IS2019: 50 years ago we went to the moon; where have we been since?

Lightning Talks presented:

QM Paper (Bill Scheible)

QM Topic (Kim Stansfield)

QM Symposium Paper (Jorg Largent)

Loving Errors (Barclay Brown)

Hackers vs. Slackers (Jack Ring)

Planned Work past IW

PLANNED ACTIVITIES

Continue training of WG members using Quality Management Institute curriculum (see http://qualitymanagementinstitute.com/INCOSE/default.aspx)
Review and refine WG goals, especially for work products
Plan for possible QM track at IS2020

PLANNED WORK PRODUCTS

Tentative Products being considered:
Overview Article on QM
Introductory sessions on QM for INCOSE member audiences
SEBok article(s) on QM
Revise/contribute to Handbook sections on QM

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Space Systems

www.incose.org/iw2019

Space Systems

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

MEMBERS

Approximately 30 active and semi-active

CO-CHAIRS

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Alejandro Levi (alejandro.g.levi@ieee.org)

INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/SpaceSystems/Pages/Home.aspx

INCOSE WEB PAGE

http://www.incose.org/ChaptersGroups/WorkingGroups/government/space-systems

Charter Summary

WG PURPOSE/MISSION

To expand the body of knowledge of systems engineering as it is applied to space systems

WG GOAL(S)

To increase the quality and scope of the technical and professional information available to its members and to enhance the interchange of that information between its members

WG SCOPE

The application of systems engineering to space systems in government, industry, and academia

IW Outcomes

IW Outcomes

The SSWG meeting on Sunday morning:

Presented overview of current activity - CubeSat System Reference Model (CSRM)
The CSRM is being submitted to OMG as a specification in response to their RFP

Solicit ideas for follow-on activities / outreach
Several ideas were discussed. Others are expected via email. A kickoff report will be generated.

Planned Work past IW

PLANNED ACTIVITIES

CubeSat System Reference Model

PLANNED WORK PRODUCTS

Recent papers:
2018 IEEE Aerospace Conf - MBSE Approach for Technical Measurement with Application to a CubeSat
2018 AIAA Space Forum - Developing a CubeSat MBSE Reference Model - Interim Status #4
2017 IEEE Aerospace Conf - MBSE) Approach for Defining the Behaviors of CubeSats

Application and evaluation by several university teams

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Standards Department

www.incose.org/iw2019

Standards Department

2019 Annual INCOSE international workshop
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CHAIR

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MEMBERS

INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

INCOSE shall participate in the development of national, international, and other standards, where such participation is deemed to be of benefit to INCOSE and its members. (TEC-103 Standards)

WG GOAL(S)

To influence the content of published standards to apply systems thinking and promote consistency in the application of System Engineering principles.

WG SCOPE

Support development of national, international, and other standards that are of benefit to INCOSE and its members htrough direct and indirect participation.

IW Outcomes

IW Outcomes

Met with various working groups to discuss status of standards development and their potential role in contributing to them.

Presented 2019 plans to Tech Ops director on planned engagement with Standards Organizations on new and emerging technologies not previously participated in.

Coordinated efforts to engage SAE in staqndardization activities

Planned Work past IW

PLANNED ACTIVITIES

Support planned standards organization activities (ISO, SAE, ASME, etc)

PLANNED WORK PRODUCTS

2019
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System Safety

www.incose.org/iw2019

System Safety

MEMBERS
85

CO-CHAIRS
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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/SystemSafety/SitePages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups

Charter Summary

WG PURPOSE/MISSION

The purpose of the INCOSE System Safety Working Group (SSWG) is to accelerate the maturity of the practice of system safety engineering as part of the wider systems engineering practice.

WG GOAL(S)

The goals of the SSWG are to:

- Understand the state of the art and state of the practice in system safety management in different sectors and geographies
- Understand the implications of the changing nature of systems from a safety perspective
- Understand the overall relationship and coupling between different players in the supply chain, including regulators, asset owner operators and product/service suppliers
- Identify ways to make the practice more effective, efficient and timely
- Build a network of system safety experts, enabling them to share experience
- Collaborate with related external organizations

WG SCOPE

This WG will address activities relating to best practices for systems safety engineering throughout the systems lifecycle. Including:

- A whole range of system types – including products, services, capabilities and systems of systems
- Practice across multiple sectors
- Perspectives from a range of different players in the supply chain

IW Outcomes

IW Outcomes

Reviewed the draft C suite "Guide to system safety leadership, management and engineering". Developed a high level narrative structure for the guide and agreed the changes to make.

Held a kick-off workshop for the System Safety Perspectives work. Used Checkland"s soft systems to understand different perspectives on System Safety across the system lifecycle and in different industries

Held a joint session with SoS and System Security on integrated assurance. Identified ongoing work and agreed to monitor this work.

Help business meeting to agree work priorities for the year.

Planned Work past IW

PLANNED ACTIVITIES

Potential panel at the HSI conference in Biarritz in September

Initiate System Safety Webinar series

Safety Session at EMEA Workshop in October

Present at annual STPA conference

Safety Culture Survey

PLANNED WORK PRODUCTS

Publish C suite Guide

Develop conference paper on System Safety perspectives

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Systems and Software Interface

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Systems and Software Interface

2019 Annual INCOSE international workshop
Torrance, CA, USA
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CHAIR

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MEMBERS

52 (25 core members)

CO-CHAIRS

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/systems%20and%20software/SitePages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/docs/default-source /wgcharters/sysswif_wgcharter.pdf?sfvrsn=4

Charter Summary

WG PURPOSE/MISSION

To understand, clarify, and work to resolve issues with the systems-software interface that challenge our ability to engineer today's and tomorrow's systems. These interfaces include physical, logical, data, and human aspects.

WG GOAL(S)

Develop a set of principles and/or guidance for identifying and reducing system-software interface risk

WG SCOPE

Address, at a high level, the process and technical interfaces between systems and software

IW Outcomes

IW Outcomes

· Discussed Systems and Software Interface issues and approaches in industry and government

Both of the SaSIWG sessions opened with a roundtable discussion from the ~20 participants on their experiences and concerns with Systems and Software Interfaces.

Discussions concerned different SE and SW development approaches including waterfall, Agile, DevOps, MBSE development approaches.

From these discussions, the team extracted assets to add to our Work in Process, and discussion topics for future telecons.

· Reviewed SaSIWG (System and Software Interfaces Working Group) Survey

The purpose of this survey is to understand, clarify, and work to resolve issues with the systems-software interface that challenge our ability to engineer today's and tomorrow's systems. These interfaces include physical, logical, data, and human aspects. (This effort is focused on software-intensive systems, which defines many 21st century systems.)

Goal: (Capture the current state of practice; methodology and approach that defines system and software interfaces. Identify pain points based on current state of practice.) Develop (and recommend) a set of principles and/or guidance for identifying and reducing system-software interface risk

This effort has been led by Sally Muscarella at Stevens Institute and Macaulay Osaisai from Harris Corp. They have conducted 19 interviews to date.

At the IW2019, Macaulay Osaisai reviewed the survey and discussed preliminary findings. The IW2019 attendees were asked to identify additional interview subjects.

· Reviewed and updated table of Systems and Software "Unifying" asset materials and links.

This table of 18 assets has been compiled by the SaSIWG and identifies assets that address the Systems Software Interface, a short description, strengths and weaknesses of the asset as it pertains to Systems and Software, and a link to the asset where possible. At the IW2019, the table was reviewed and updated with additional assets.

· Drafted a table of interactions from Systems to Software perspectives and Software to Systems.

This was initiated and presented by George Sawyer, BAE Systems to provide a perspective from both directions of process flow:

IW Outcomes

from Systems Engineering to Software Engineering and from Software Engineering to Systems Engineering.

· Provided review copies and briefly discussed the SaSIWG 2019 International Symposium paper: "Systems Engineering–Software Engineering Interface for Cyber-Physical Systems"

· Participated in the INCOSE Automotive Working Group for the Systems and Software discussions. Gary Ruston, Chair, invited our participation.
· Autosar and Systems Engineering/AWG à Rick Flores
o This appears to be a good case study for a Software process interface to SE.
· Continuous Integration for Automotive à Yann Chazal, Yann Argot
This presentation offered synergy with the SaSIWG.
We had discussions also with the NDIA Iterative development working group, and Joe Elm, NDIA Chair
· MBSE for Systems and Software Layers à David Hetherington

Planned Work past IW

PLANNED ACTIVITIES

INCOSE IS2019 – Orlando – paper presentation, WG meeting
Monthly telecons of SaSIWG members.
Webinars: What SE's need to know about SWE (One webinar held and one scheduled)

Cross-WG collaborations

- Agile SE Working Group – continuing to discuss Agile SW and Agile SE methods – and interfaces between the two.
- Automotive Working Group – Continuous Integration discussions
- Architecture Working Group – Systems Architecture to Software Architecture discussions.

Industry collaborations

- NDIA Iterative Development WG – continuous integration approach.

PLANNED WORK PRODUCTS

- INCOSE IS 2019 paper ""Systems Engineering–Software Engineering Interface for Cyber-Physical Systems"
- SaSIWG (System and Software Interfaces Working Group) Survey
- Table of Systems and Software "Unifying" asset materials and links.
- Table of interactions from Systems to Software perspectives and Software to Systems.

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Systems Engineering in Early Stage Research & Development

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Systems Engineering in Early Stage Research & Development

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CHAIR

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MEMBERS

32

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INCOSE CONNECT ADDRESS

TBD

INCOSE WEB PAGE

TBD

Charter Summary

WG PURPOSE/MISSION

Working group charter is in development. The charter will address purpose, mission, goals and objectives, and scope.

Overall purpose of meeting at the IW was to assess the need for and interest in a working group addressing this topic.

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WG GOAL(S)

WG SCOPE

IW Outcomes

IW Outcomes

- Polled the WG meeting attendees on their thoughts concerning need, purpose, and goals of this WG.
- Used an agile round-table method allowing attendees 2 minutes each to discuss their thoughts without interruption.
- We were able to generate a raw data listing of these thoughts by capturing the purpose and goals.
- Group leaders and key participants for further group work have self-identified.

Planned Work past IW

PLANNED ACTIVITIES

- Review and analyze raw data from attendees.
- Generate draft charter.
- Send out charter to attendees for review and update as necessary.
- Send charter to INCOSE TechOps leadership for review and approval as a new WG.
- Target date for completion / approval of new WG is INCOSE IS 2019.

PLANNED WORK PRODUCTS

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Systems of Systems Engineering

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Systems of Systems Engineering

MEMBERS

12 Core, 30 Regular

CO-CHAIRS

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/SystemofSystems/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/analytic/system-of-systems

Charter Summary

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WG PURPOSE/MISSION

The purpose of the working group is to advance and promote the application of Systems Engineering to Systems of Systems (SoS), often referred to as SoS Engineering (SoSE).

BKCASE describes SoS Engineering as *"an opportunity for the systems engineering community to define the complex systems of the 21st Century. While systems engineering is a fairly established field, SoSE represents a challenge for the present systems engineers at the global level. In general, SoSE requires considerations beyond those usually associated with engineering to include socio-technical and sometimes socio-economic phenomena."*

SoS and SoSE are topics that interest a significant number of INCOSE members globally, both individuals and organizations. Therefore we believe that a WG forum to share understanding of SoS and SoSE issues, good practice and background, and contribute to maturing BKCASE will provide a service to the wider INCOSE community.

WG GOAL(S)

The goal of the working group is to expand and promote the body of knowledge of SoS and SoSE its benefits within the Systems Engineering community.

WG SCOPE

This WG addresses the application of Systems Engineering to all types of Systems of Systems (SOS) in all domains. We see diversity as particularly important in this knowledge area, as do the WG members.

Activities will generally cover the following:

- Understand and share what we mean by SoS in our various contexts
- Develop guidance and advice
- Inform and up-skill practitioners

Charter Summary

- Exert influence on BKCASE, Standards, SE Vision 2025, FUSE, etc.
    - Develop the practice of SE for SoS.
    - Work in partnership with other groups addressing aspects of SoS (e.g. INCOSE WGs, IEEE, NDIA).
    - Understanding and applying insights from relevant research

IW Outcomes

IW Outcomes

Held working sessions and discussion on

- SEBOK Update
- SoS WG Value to INCOSE
- Collaboration - Cooperation with Automotive Working Group
- Standards
- Case Studies
- SE Handbook Update
- Follow-up on SoS Primer
- SoS Competencies
- Integrated Assurance
- SoS Ontologies

Planned Work past IW

PLANNED ACTIVITIES

Plans for followup sessions/discussions at IS 2019 on

- SEBOK Update - Proposed new sections (jdahmann@mitre.org)
- Collaboration - Continued cooperation with Automotive, Safety, Security and Case Studies WGs, Engage Space WG
- Standards -Update on ISO Standards and Mock- up of SoSE Standards Product (mike.r.yokell@lmco.com)
- Case Studies - Update on call for recommendations for existing SoS Case Studies (wilsondrbeth@aol.com)
- SoS WG Value to INCOSE - Review of WG inputs to draft (alandharding@gmail.com)
- Follow-up on SoS Primer - Conduct survey for feedback on Primer and need for added SoS material (jdahmann@mitre.org)
- SoS Competencies - Review framework wrt SoSE roles, Pain Points and ISO 21840 (alandharding@gmail.com)
- SoS Ontologies - Continue development (robert.nilsson.2@volvocars.com)
- Integrated Assurance (IA) - Share references and include IA research in IS SoSE Research Roundtable (duncan@17media.co.uk)
- Conduct SoSE Research Roundtable at IS 2019 (jdahmann@mitre.org)

PLANNED WORK PRODUCTS

Introduction to ISO SoS Standards

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

Systems Science

www.incose.org/iw2019

Systems Science

CHAIR

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MEMBERS

250

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Swaminathan Natarajan (swami.n.natarajan@gmail.com)

INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/SystemsScience/Pages/Home.aspx

INCOSE WEB PAGE

https://sites.google.com/site/syssciwg/

Charter Summary

WG PURPOSE/MISSION

Promote the advancement and understanding of Systems Science and its application of Systems Theories to SE.

WG GOAL(S)

1. Encourage advancement of Systems Science principles and concepts as they apply to Systems Engineering.
2. Promote awareness of Systems Science as a foundation for Systems Engineering.
3. Highlight linkages between Systems Science theories and empirical practices of Systems Engineering.

WG SCOPE

1. Systems science
2. Systems philosophy
3. Systems thinking
4. Systems theories and research
5. Systems laws and principles

IW Outcomes

IW Outcomes

Twenty sessions with 25-35 people per day, overall 65 people in attendance.

Planned Work past IW

PLANNED ACTIVITIES

Plan for workshop at IS on Systems Literacy.
Plan for workshop at EMEA Workshop.
Plan for support to ISSS Conference in June.

PLANNED WORK PRODUCTS

Systemology Primer.
Systems Thinking Primer.
Several journal articles.
Eight chapters in Systems Science Handbook (Springer).
Systems Processes database.

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

Systems Security Engineering

www.incose.org/iw2019

Systems Security Engineering

CHAIR

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MEMBERS

138

CO-CHAIRS

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Keith Willett (keith@kwillett.com)
Beth Wilson (wilsondrbeth@aol.com)

INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/SystemsSecurityEngineering/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/analytic/systems-security-engineering

Charter Summary

WG PURPOSE/MISSION

Identify effective system security principles consistent with new reality, and integrate responsibility into the SE community.

WG GOAL(S)

- SE responsibility for system security.
- SE influence on security and standards.
- SE concepts for next gen security.
- International engagement.

WG SCOPE

System Engineering enablement of next generation system security strategies: adaptive, resilient, evolutionary.

IW Outcomes

IW Outcomes

- Attendance was 15 people in person and five people on line through GlobalMeet.
- Five attendees were first-timers to the working group, three new to INCOSE.
- All past, open, and new projects were reviewed.
- Co-chair Keith Willett announced his acceptance to attend school as ABET program evaluator.
- Initiated new project to produce a short video on the working group, as requested by TechOps.
- Initiated new project to work on SE Hand Book revisions in appropriate sections.
- Met with Hand Book revision editors for planning guidance.

Planned Work past IW

PLANNED ACTIVITIES

- INSIGHT Theme issue project for 2020Q2 will issue call-for-articles right after IS19. POC: Beth Wilson.
- Collaboration wit NDIA project on Continuouse Iterative Development security needs has started. POC: Beth Wilson.
- Planning for a joint NDIA/IEEE/INCOSE SSE symposium for March 2020 is in process. POC: Beth Wilson.
- With ABET undergraduate curriculum criteria approved, this working group will provide Keith Willett as curriculum evaluator. POC: Keith Willett.
- Collaboration with Resilience working group plans to produce
- Hand Book revision will be in planning phase during 2019 to add SE Roles & Responsibilities to section 10.11 and to sprinkle security attention needs throughout various processes in the Hand Book. POC: Perri Nejib and Dawn Beyer.
- Active involvement in security standards work continues. POC: Ken Kepchar.
- A joint project for security in Product Line Engineering with the PLE WG continues, with intentions to produce various articles for the planned/scheduled INSIGHT 2020Q2 issue. POC: Beth Wilson.
- Book Chapter in collaboration with Resilient Systems WG in process. POC: Keith Willett.
- SEBOK revisions on Resilient Systems in collaboration with Resilient Systems WG in process:. POC: Keith Willett,
- Project to produce a short video on the SSE WG was opened and will be attended to in 2019. POC: Bruce Hecht.

PLANNED WORK PRODUCTS

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

Telecommunications Working Group

www.incose.org/iw2019

Telecommunications Working Group

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

CHAIR
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MEMBERS
17

CO-CHAIR
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INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

The main purpose of the Telecommunications Working Group (WG) is to improve telecommunications services by developing a body of knowledge that advances systems engineering of telecommunications solutions.
The Telecommunications WG will lead this effort within INCOSE; in liaison with external telecommunications experts, standardization bodies, organizations and communities.

WG GOAL(S)

To improve delivery of telecommunications services and solution by demonstrating practical application of systems engineering best practices.

To develop a community of telecommunications specialists within INCOSE (pool of knowledge) through various efforts including, but not limited to:

- Developing papers to be presented during International Symposia
- Establishing project specific working relations with telecommunications experts, standardization bodies, organizations and communities; a living N^2 document shall be maintained to show these relationships
- Enhancing the INCOSE Systems Engineering Book of Knowledge (SEBoK) and the INCOSE Systems Engineering Handbook to show how systems engineering improves delivery of telecommunications services and solutions
- Initializing project specific working relationships with other INCOSE WGs; a living N^2 document shall be maintained to show interaction with other INCOSE WGs.

To promote, encourage, supervise and perform research where it specifically improves practice of systems engineering for telecommunications.

WG SCOPE

This WG will address processes, methods and tools; organizational aspects; business and information requirements; as well as human aspects (competencies) related to engineering of telecommunications systems.
The WG aims to support telecommunications systems providers and major users, such as:

Charter Summary

- Large communications network providers
- Critical and emergency services telecommunications networks
- Defense, transportation and other government telecommunications networks

The WG will focus on collaboration with other relevant WGs/Initiatives and with external experts and bodies or organizations will be explored and established as appropriate.
The WG will also reach out to various industries, government and academia to widen their representation within the WG. (non-goal: duplicate other WGs in this forum. The goal is to keep this WG group very small to minimize duplication and maximize influence).

IW Outcomes

IW Outcomes

Working Group Session 1:

- 17 attendees in total (10 in Torrance; 7 remote), with 9 from Australia, and 8 from the US.
- Introduction of Working Group achievements in last 12 months (as Australian-based), and plans for INCOSE WG
- Review of a "Guide for the Application of Systems Engineering to Communications Systems" with aim to publish as INCOSE product; with many actions to update.
- Update key working group associations based on more recent contacts and ideas (CIPR, Resilience, Agile, Systems Security, MBSE, SoS)
- System-of-Systems consideration (for "ad-hoc" networks etc.)

Working Group Session 2:

- Review of Draft WG Charter
- Further review of Guide
- Develop plans for 2019 projects

Planned Work past IW

PLANNED ACTIVITIES

Planned Formalization of WG:

- INCOSE TechOps agreement on plan for formal establishment of INCOSE Telecommunications WG by end Feb 2019, including INCOSE Technical Director approval on Charter
- INCOSE Telecoms WG plan reviewed, with an agreed plan by have it published on the INCOSE WG site by end Mar 2019

Project Proposals:

- (1H2019) – Model Based Systems Engineering for Telecommunications (deliverable paper & presentation at SETE2019 / presentation at IS2019, formal paper for subsequent IW, IS, ASEW, SETE)
- Security Systems Engineering for Telecommunications (2H2019)
- Resilience of Critical Telecommunications Infrastructure (2H2019)
- Agile SE for Telecommunications (2H2019)

Opportunities for ongoing engagement:

- WG meetings, International Telecommunications WG meeting established by Feb 2019 (weekly meeting rhythm, time, place, mailing lists); INCOSE WG page set up.

PLANNED WORK PRODUCTS

- INCOSE Telecoms Guide to the Application of Systems Engineering for Communications Systems reviewed, with an agreed plan for its publication as INCOSE Technical Publication by end March 2019
- Reference Model for MBSE of Telecommunications Network Systems

2019
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Tool Integration and Model Lifecycle Management

www.incose.org/iw2019

Tool Integration and Model Lifecycle Management

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

CHAIR

John Nallon (jfnallon@outlook.com)

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125

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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/TIMLM/Pages/Home.aspx

INCOSE WEB PAGE

https://www.incose.org/incose-member-resources/working-groups/transformational/tools-integration-interoperability

Charter Summary

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

WG PURPOSE/MISSION

The Tool Integration and Model Lifecyle Managament Working Group provides a forum for discussion and information dissemination on best practices, methods and processes that promote the development, validation and deployment of standards to advance data exchange capability of standard document based or digital data created during the product development lifecycle.

WG GOAL(S)

- To characterize systems engineering tool integration and interoperability requirements.
- To specify requirements and assess solutions for model life cycle management and data exchange.
- To provide forums for discussion and information dissemination regarding tool integration, process implementation and effectiveness of data exchange standards.
- To promote the development, validation and deployment of standards that advance the interoperability of systems engineering tool sets.
- To address model lifecycle management concerns and to establish scenarios and best practices that address the needs of the community.
- To determine efficient modeling structures to use including the repository, the models, and data within the models.

WG SCOPE

Our scope is focused on the integration and interoperability of tools, data exchange, and model lifecycle management of models as they relate to Systems Engineering processes and methods throughout a product or system lifecycle.

- The TIMLM WG collaborates with PDES Inc. to discuss, research, validate and promote the development of data exchange standards to incorporate digital artifacts and data exchange standards modernization. Standards include data exchange standards such as ISO10303-AP233, AP239, AP242, AP243, LOTAR, and various OMG and OSLC standards.
- The TIMLM WG also collaborating with Product Performance International and all INCOSE Working Groups to develop, support and maintain a Systems Engineering Tools Database for the systems engineering community. The SETDB will be available from the INCOSE Website to all members.

IW Outcomes

IW Outcomes

- Systems Engineering Tools Database Operational Concept Document reviewed, comments and recommendations to be incorporated for formal release by February 15, 2019.

- SETDB System Model reviewed and areas for expansion were identified and several members offered to help with the model and metadata.

- SETDB Capability System Requirements Specification initial review conducted. Several stakeholders committd to doing markups and returning the comments for inclusion. Considerable notes with new capabilities and input to refine capabilities were taken for resolution into the final draft. SETDB development team is incorporating suggestions and comments into the specification for formal release by March 1, 2019

- Joint RM WG Collaboration meeting conducted to discuss SETDB Tool Survey Development for vendor supplier data. RM WG took an action to develop the questions and research their existing products for topics and categories.

- Mr. Gregory Pollari (Collins Aerospace), Co-chair of the MoSSEC Standards team, conducted a briefing of the ISO 10303-Ap233 MoSSEC standard for MBSE data exchange. Significant interest and discussion on this important data exchange standard for MBSE.

- The INCOSE/PDES project team led by Mark Williams (Boeing) presented for discussion the analysis results of studies focused on data exchange standards, industry and other organization testing results and the impact of MBSE on Long Range Archival and Retrieval of digital artifacts. Attendees were very active with questions, participation and were asked to determine who in their companies they could work with to provide industry input to OMG, ISO, OSLC (Oasis) and other standards organizations.

IW Outcomes

- The SETDB Team held a project planning meeting with the INCOSE CIO regading the IT support that can be provided, budgeting, time frame, prototyping and testing were discussed and resolved. The program plan and TPP update will be completed as soon as possible.

- The SETDB Team wrapped up the IW with a Operations and Maintenance and a System Test Planning session on Tuesday morning January 29, 2019.

- Updates for meeting results wil be forthcoming in newsletters, on the TIMLM and SETDB Connect Sites and INCOSE communications publications.

Planned Work past IW

PLANNED ACTIVITIES

- Cross collaboration formally initiated with the DEIX WG. Standards information will be shared and identification of digital artifacts will assist the MBSE for LOTAR standards development.
- Continue the collaboration with the RM Working Group on the SETDB requirements tool survey.
- Bi-weekly meeting with PDES Inc. to provide direction and discusss standards updates, LOTAR and MoSSEC standards development will continue in 2019.
- Weekly SETDB meetings for the development team and working groups engaged in the development and use of the SETDB will continue in 2019.
- Continue discussion and development with the Architecture and Configuration Management Working groups on survey develment.

PLANNED WORK PRODUCTS

- SETDB OCD Release in February 2019
- SETDB CapSyRS Release in March 2019
- SETDB Architecture modeling and prototype development in April 2019
- SETDB Tool Vendor Surveys for RM WG and Architecture WG to be developed by IS 2019
- SETDB Categories and Taxonomy completed and released at IS2019
- Use Case development for the LOTAR and ISO standards updates and development
- Working Group articlaes for the INCOSE electronic publictions
- Increased use of social media to ommunicate tools database progress and information on standards

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Training

www.incose.org/iw2019

Training

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CO-CHAIR
John Clark (clarkjo713@gmail.com)

INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/Training/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/analytic/training

Charter Summary

WG PURPOSE/MISSION

The purpose of the Training Working Group (TWG) is to provide Systems Engineering (SE) training to INCOSE members and others if needed. This Training WG will provide that opportunity and will support the mission, vision, and goals of INCOSE.

WG GOAL(S)

The specific goals for the Training WG are to:

- Determine our member's needs
- Develop or solicit training modules
- Solicit training volunteer instructors
- Provide training as a benefit to INCOSE members
- Coordinate training throughout INCOSE to expand training opportunities

The objectives of the Training WG are to:

- Identify, develop, solicit, coordinate, schedule, and present SE training based on ISO 15288, ISO TR 24748, INCOSE SE Handbook, and other SE sources.
- Recommend standardized approaches for SE training.
- Enhance the working group members' knowledge of SE training.
- Develop an integrated approach and strategy for continuous improvement of SE training to the organization.
- Provide representatives to other INCOSE WGs to obtain and provide consistent SE training application.
- Investigate training system development for SEs (e.g., how to develop training within an SE environment, how to develop a recommended set of SE activities to support the use of MIL-HDBK-29612 training system development procedures)
- Develop various training delivery infrastructures such as video, web, and in-company training
- Provide training for members in INCOSE governance roles

Charter Summary

The vision of the Training WG is to be the acknowledged leader in advancing INCOSE SE training throughout the SE community. The mission is to elicit stakeholders' needs and provide value-added training solutions for the INCOSE members.

WG SCOPE

The Training WG will address SE training as it relates to SE throughout the system life-cycle. SE training will be a free volunteer effort provided as a benefit to all members. This training will exclude actual US DoD projects because of ITAR regulations, copyrighted material unless authorized in writing by the author, and labor financial compensation. Other training within scope includes, but is not limited to, Working Group leadership.

IW Outcomes

IW Outcomes

Two WG meetings.
Seven new members.
Informed attendees about the TWG site on Connect and how to access and use the training materials.
Obtained one potential volunteer instructor.

Planned Work past IW

PLANNED ACTIVITIES

Follow up with potential new instructor.
Coordinate webinar sessions.
Conduct survey for training needs and instructors.

PLANNED WORK PRODUCTS

Webinars

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

Transportation

www.incose.org/iw2019

Transportation

MEMBERS
200

CO-CHAIRS
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Denis Simpson (Denis.Simpson@networkrail.co.uk)
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INCOSE CONNECT ADDRESS

https://connect.incose.org/WorkingGroups/Transportation/Pages/Home.aspx

INCOSE WEB PAGE

http://www.incose.org/ChaptersGroups/WorkingGroups/Application/transportation

Charter Summary

WG PURPOSE/MISSION

To promote and grow the application of systems awareness, thinking and engineering within ground transportation.

WG GOAL(S)

Systems engineering is used to deliver complex systems in the transportation sector, and a broad and deep community of systems engineers is present throughout the supply chain.

WG SCOPE

Ground transportation systems and their supporting technical and business infrastructures (with emphasis on highways, bus, rail and transit).

IW Outcomes

IW Outcomes

Re-evaluation of the mission and scope of the TWG. Collaboration with Infrastructure and Automotive working groups has been good this past year with shared webinars. There is a LOT of overlap between these three working groups and a limited number of volunteer resources.
We are looking at the group scope statement and reconsidering our mission in an effort to bring some excitement/fresh ideas in to the group.

•assess membership value proposition•Refresh membership lists – validate!
•Possible WG scope adjustment – all modes of transportation - collaboration
•Annual Plan finalized and adopted
•IS Planning – continued focused efforts
•Updated Org Chart and Charter as needed

Planned Work past IW

PLANNED ACTIVITIES

- Collaborative Webinar scheme (with AWG, IWG)
- Collaborative papers and publications
- IS2018 planning
- Additional Case Studies

PLANNED WORK PRODUCTS

- Newsletter (2-3 per year)
- Case Study Library (15+ cases)
- Z-Fold SE 100 series guides
- Annual Operating Plan
- Charter and Strategic Plan
- Org Chart
- Webinar recordings, Meeting Minutes, Presentations

2019
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Torrance, CA, USA
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Value Proposition Initiative

www.incose.org/iw2019

Value Proposition Initiative

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

CHAIR

Juan Amenabar (juan.p.amenabar@leidos.com)

MEMBERS

8

INCOSE CONNECT ADDRESS

INCOSE WEB PAGE

Charter Summary

WG PURPOSE/MISSION

Value propositions for systems engineering, corporate and individual INCOSE membership, and INCOSE certification are key elements of growing and attracting membership. This was identified as one of the top priorities outlined by the INCOSE Corporate Advisory Board (CAB) in 2017 leading to an initiative to solicit video inputs from the INCOSE community on these values which was completed in 2018. A more concentrated, longer duration effort is required to determine the best characteristics of a value proposition and how these characteristics should map to INCOSE and systems engineering. The rationale for this initiative is derived from a strategic need to better articulate these benefits and values in the operation and management of INCOSE as a more effective service delivery enterprise.

The Value Proposition Initiative (VPI) seeks to distill the characteristics of value propositions from the points of view of an audience consisting of providers and customers and to create value propositions for systems engineering and the INCOSE professional society.

- Provider point of view includes engineers, engineering and program managers, and engineering organizations involved in the implementation of systems engineering. It also includes academic institutions teaching systems engineering.
- Customer point of view includes consumers of products associated with systems engineering, education and professional growth as well as those that acquire systems and services for an other consumers. This includes engineers, engineering and program managers, engineering organizations, INCOSE individual members and Corporate Advisory Board (CAB) member corporations, and the general public.

WG GOAL(S)

The VPI will develop products in a 3-dimensional space consisting of the value proposition areas, the target industries and the respective audience. Value proposition areas include systems engineering, INCOSE membership, INCOSE certification and CAB membership. Core value propositions will be developed and tailored for the industries outlined in section 2. Each of these will in

turn be developed from a provider and customer point of view.

VPI products include

- A value proposition guide outlining the main characteristics of value propositions and what makes a value proposition successful
- A survey of previous value proposition efforts, their strengths and weaknesses
- Potentially a community survey to gather information on value proposition community needs outside of the CAB
- Core value statements for each value proposition area
- Tailored value statements that can be used to justify and measure the performance/practice of Systems Engineering for the outlined audiences outlined above from both a consumer and a provider point of view
- A project plan guideline for continuous improvement of the developed propositions

WG SCOPE

Industries include;
Commercial (electronics, communications, transportation); Commercial Aerospace; Government (defense, space, emergency response, Infrastructure); Healthcare (equipment, medicine); Energy (oil, gas, renewable); Civil (infrastructure); Non-profit and Academia (research, education, education provider)

Charter Summary

Value Proposition Area	Characteristics / Needs
Individual Membership	• Why should I join INCOSE and/or maintain my membership
CAB Membership	• Why should my corporation join INCOSE and how will it benefit my bottom business line • Why should my non-profit or academic organization join INCOSE and how will it benefit my mission
INCOSE **Certification**	• Why should I become certified • Why should I maintain and upgrade my certification
Systems Engineering	• What are the benefits of systems engineering to my project and how does it affect my ability to deliver the right product on time and on budget

IW Outcomes

IW Outcomes

Briefed CAB on current status; held team meeting to coordinate upcoming activities; started coordination with Systems Engineering of the Future (FuSE) activity which will also consider value proposition of future SE.

Planned Work past IW

PLANNED ACTIVITIES

Coordination with FuSE

PLANNED WORK PRODUCTS

- A value proposition guide outlining the main characteristics of value propositions and what makes a value proposition successful
- A survey of previous value proposition efforts, their strengths and weaknesses
- Potentially a community survey to gather information on value proposition community needs outside of the CAB
- Core value statements for each value proposition area
- Tailored value statements that can be used to justify and measure the performance/practice of Systems Engineering for the outlined audiences outlined above from both a consumer and a provider point of view
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Very Small Entities

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Very Small Entities

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INCOSE CONNECT ADDRESS
https://connect.incose.org/WorkingGroups/VSE/Pages/Home.aspx

INCOSE WEB PAGE
https://www.incose.org/incose-member-resources/working-groups/transformational/VSE

Charter Summary

WG PURPOSE/MISSION

The VSE WG Purpose

- Systems Engineering concepts have been adopted and adapted by most industries.
- In the context of Very Small Entities (VSE) and small projects, these concepts can be tailored to improve:
- Product development efficiency
- Product Quality
- Contribute to Standardization

WG GOAL(S)

The VSE WG Goal

- Systems engineering concepts have been adopted and adapted by many industries in various domains for the development of product and services.
- In the context of VSEs, these concepts can be used or tailored to improve:
- Product development and service delivery efficiency (including costs and delays)
- Product Quality and Deployment to meet stakeholder needs

The VSE WG Exists:

- To improve and make product development within VSEs more efficient by using Systems Engineering concepts, standards and proven practices
- To elaborate tailored guidance to apply, in the context of either a prime or subcontractor role, to VSEs
- To provide the best of Systems Engineering techniques, methods and processes for the betterment of the broad scope of domains around the globe
- To support the transformation of Systems Engineering to a model based discipline

Charter Summary

WG SCOPE

This working group has the same scope as INCOSE and the ISO 15288 as it pertains to organizations of up to twenty-five (25) persons.

IW Outcomes

IW Outcomes

The name of the Workinggroup has been changed to *Small Business System Engineering*.
After thorough discussion the WG decided to change the WG"s name into ***Small Business System Engineering WG (SBSE WG)***. The reason for this decision was that the current name is too abstract. It required frequently explanation to the general INCOSE community and made it hard for the WG to reach out to the INCOSE members. The new name reflects much better on the largest group of stakeholders in the world and in INCOSE.

Academic Deployment Framework
Purpose of this Package: This package is designed for classroom instruction on Systems Engineering using the VSE WG work product in a controlled environment for Beta testing before submission for publication. It is based on the Rover Project done in collaboration with the INCOSE VSE Working Group and the Autonomous Rover Case Study defined by the Eclipse Foundation Polarsys Project9. The VSE Working Group partnered with the Polarsys project and developed a version of the Autonomous Rover Case Study that would serve as a project demonstration that is in the public domain. The **VSE Basic Profile Guide V0.00** is based on the **TECHNICAL REPORT ISO/IEC TR 29110-5-6-2 First edition 2014-08-15.**

VSME ConnectSite Folder: Academic Deployment Framework
A. Top Level Files:

- VSE Basic Profile Guide V0.00
- **ISO/IEC TR 29110-5-6-2**_2014

B. Deployment Packages
C. Document Templates
D. Rover Engineering Requirements

Planned Work past IW

PLANNED ACTIVITIES

A Call for Participation will be drafted and finalised. It will be sent to select academic institutions to solicit validation of the deployment packages. The packages shall be used in student projects and in cases where start up companies are coached and their suitability to the purpose shall be scientifically examined. To further this the Academic Deployment Framework has been created. Collaboration with INCOSE WG to develop domain specific work products.

PLANNED WORK PRODUCTS

In conjunction with the Academic Deployment Framework, this WG seeks to add MBSE capability to the nine (9) Deployment Packages (DP) integrated through the **Basic Profile Guide**.

INCOSE FuSE

Future of Systems Engineering

A Systems Community Initiative

Market Place

INCOSE 2019 International Symposium

Torrance, CA, US

28 January 2019

William Miller

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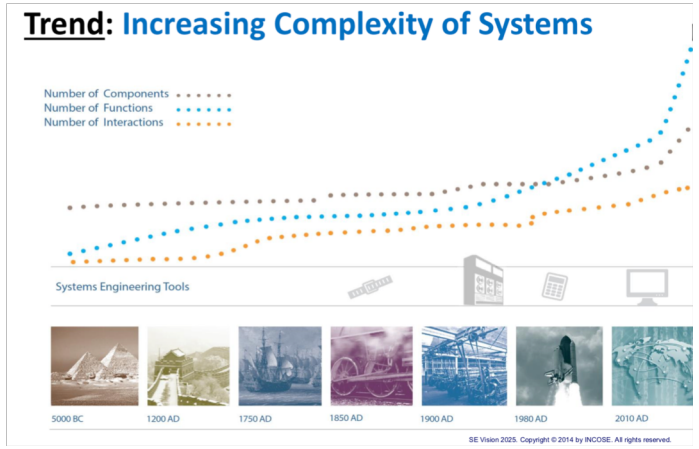
Emerging Challenges and Technologies

- The future environment is becoming:
  - More dynamic and nondeterministic
  - Increasingly evolutionary, with an accelerating rate of change
  - Resource constrained driving a need for sustainability
  - Highly interactive among individuals, communities, organizations, and systems
- There are growing expectations for systems engineering solutions:
  - Increased level of functionality providing more comprehensive solutions
  - Higher order of intelligence and adaptability augmenting human performance
  - Greater level of connectivity and interoperability across and between systems
  - Trust, safety, and cybersecurity of digital representations
  - Increased inclusivity, growing the scale and scope of solutions



- Emerging technologies provide opportunities to enhance the practice of systems engineering:
  - Machine Learning
  - Autonomous Physical Systems
  - 3D Printing, Genomics
  - Quantum and Nano Technology
  - Biomimicry
  - Complexity Science
  - Systems Sciences
  - Data Science (Big Data)
  - Smart Everything
  - Connected Everything (IoT)
  - Artificial Intelligence
  - Cybersecurity

Charter

Purpose: Evolve the practice, instruction and perception of systems engineering to:

1) Position systems engineering to leverage new technologies in collaboration with allied fields
2) Enhance the systems engineer's ability to solve the emerging challenges
3) Promote systems engineering as essential for achieving success and delivering value

Goal: Create a road map that drives the evolution of systems engineering to:

1) be increasingly *adaptable, evolvable and fit for purpose*
2) account for human abilities, needs as an integral system element and their interactions with a system
3) be more responsive in resolving increasingly challenging societal needs
4) realize and enhance Systems Engineering Vision 2025 and other visionary inputs

Scope: Identify the needs, priorities and means for transforming systems engineering including:

1) underlying foundations, systems theory and principles
2) people, methods, tools, processes, education and training
3) the future social and ethical duties, contributions, and responsibilities of future systems engineers

Imperative

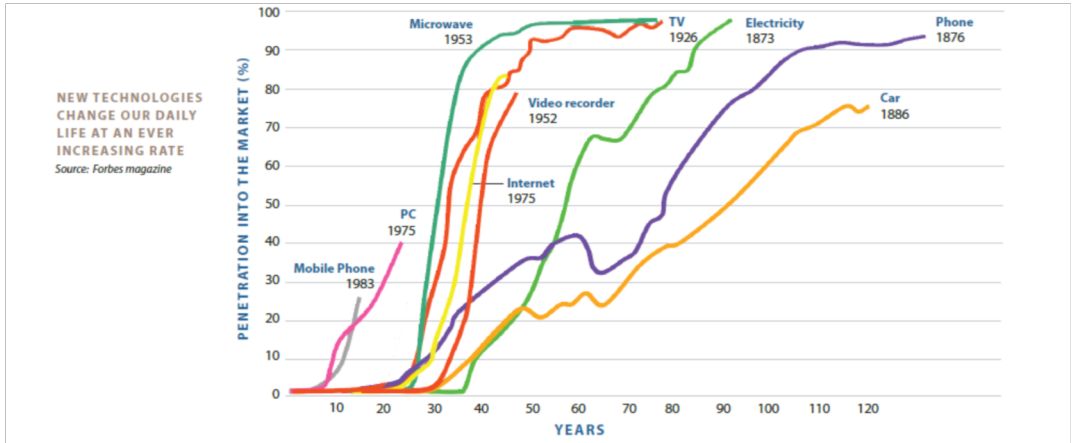
"If the rate of change on the outside exceeds the rate of change on the inside, the end is near." - Jack Welch

Why: Our customer's pace of change is exceeding our ability to respond to their needs on their timelines.

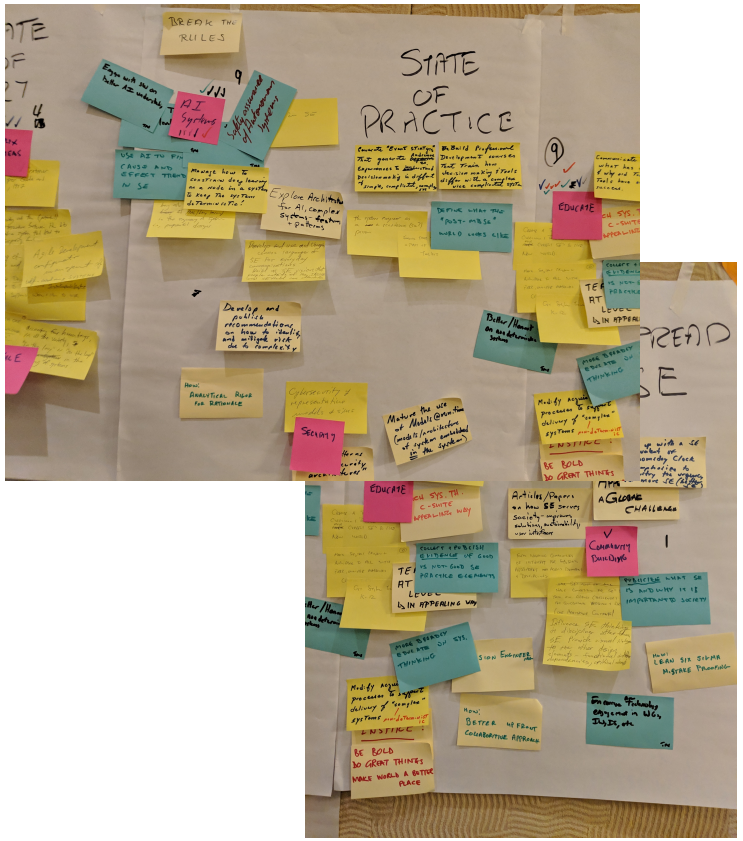
The mission of Systems Engineering is to ensure that we are able to accommodate the customer's needs.

We realize that traditional systems engineering practices are limited with respect to their speed and ability to accommodate increasing complexity, and that there is dramatic growth in systems in which these practices are inadequate.

We are looking to work with a diverse range of communities to address the challenges to ensure that SE can evolve to meet these challenges.



From idea picking to action plans



- Credibility & Value
- AI Systems (Machine Learning, Deep Learning, Autonomy)
- Theoretical Foundations
- Complex Systems
- Agile Methods (in Development, in Operation, Continuous Evolution)
- Digital Engineering
- Systems engineering as an expanding field to include new frontiers of knowledge than what we conceive of today
- Lifecycles
- Security

INCOSE FuSE

Future of Systems Engineering

Credit: Steve Jurvetson, 2012.

Title: Safety Critical Autonomous Systems | **Owner:** Susan Calvin

What will good look when we have used FUSE to deliver systems?
Safety critical autonomous systems will be in everyday use with higher levels of safety than traditional systems.
Methods, processes and tools to develop assurance cases for autonomous systems will be part of the standard systems engineers toolkit.
The public is happy to use safety critical autonomous systems.

What is stopping us from doing this now?
No methods exist to develop assurance cases for systems containing AI (see York Uni website)
Regulators assurance processes require system developers to describe how the system will behave in hazardous situations – this is challenging with autonomous systems
There is growing media and public concern about the safety of autonomous systems
The legal position on product liability on autonomous systems is unclear

What will good look like in 3-5 years?
A clear, consistent approach to safety assurance of Autonomous Systems exists and has been used on simple autonomous systems
INCOSE has worked with other interested bodies (including pressure groups, asset owner-operators, academia, lawyers and governments) to agree the principles for assuring safety critical autonomous systems.
Key people in the INCOSE group are sought out by Government, the media and other bodies on this topic

What will good look like in 6 months?
A 1 day summit with interested parties has been run to understand the issues and concerns from different stakeholders perspectives.
The parties have agreed to collaborate to develop methods, processes and tools to assure safety of autonomous systems.

Action	Who	When
1. Undertake stakeholder analysis to understand who we should involve in the summit (which geographies, which types of organisations, potential invitees)	Susan Calvin	Mid Feb
2. Develop messages as to why each person should want to be part of this work	Susan Calvin	End Feb
3. Agree business case for funding of the summit	Greg Powell	Mid Feb
4. Identify the right person to approach people to attend the summit	Mike Donovan	Mid Feb
5. Approach attendees informally	TBC	End March
6. Book location and sort out domestics	Mike Donovan	End March
7. Send out formal invitations	Susan Calvin	End April
8. Plan summit approach	Greg Powell	Mid June
9. Run summit	Susan Calvin	July

Next Steps

1. Collaborate with groups inside and outside the system community to develop:
   a. Theoretical Foundations including Ontology, Principles, and General Theory (David Rousseau)
   b. Methods, Processes, Tools for AI including Autonomous Systems and ML (Tom Shortell)
   c. Methods, Processes, Tools for the acquisition, support and use of data
   d. Methods, Processes, Tools for Complexity
   e. Methods, Processes, Tools for Agility
2. Evolving Systems Expertise
   a. Create roadmap of emerging systems engineering Methods, Processes, Tools (Duncan Kemp)
   b. Create a body of knowledge for evolving, adaptive systems
   c. Develop a set of heuristics and guidelines relevant to these evolving systems and variable environments
3. Workforce
   a. Create an Education/Training capability to educate the evolving system workforce
4. Broadly apply
   a. Evangelize the credibility & value of systems engineering and a systems approach (Mike or Juan?)
   b. Develop in our community the understanding that complicated/deterministic systems are a special case and that different MPTs are required for complex/non-deterministic systems.
   c. Build community and expansion of boundaries of systems engineering use (John Artus)

The INCOSE Institute for Technical Leadership

"A development program for active INCOSE members seeking to improve their leadership skills in an open, collaborative environment."

For further information, please contact
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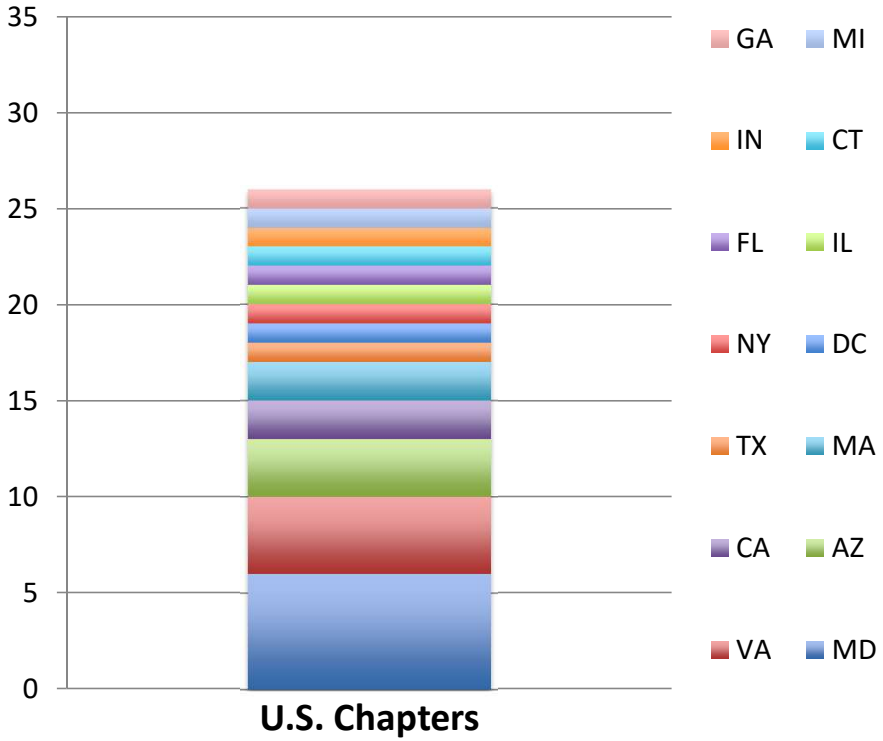
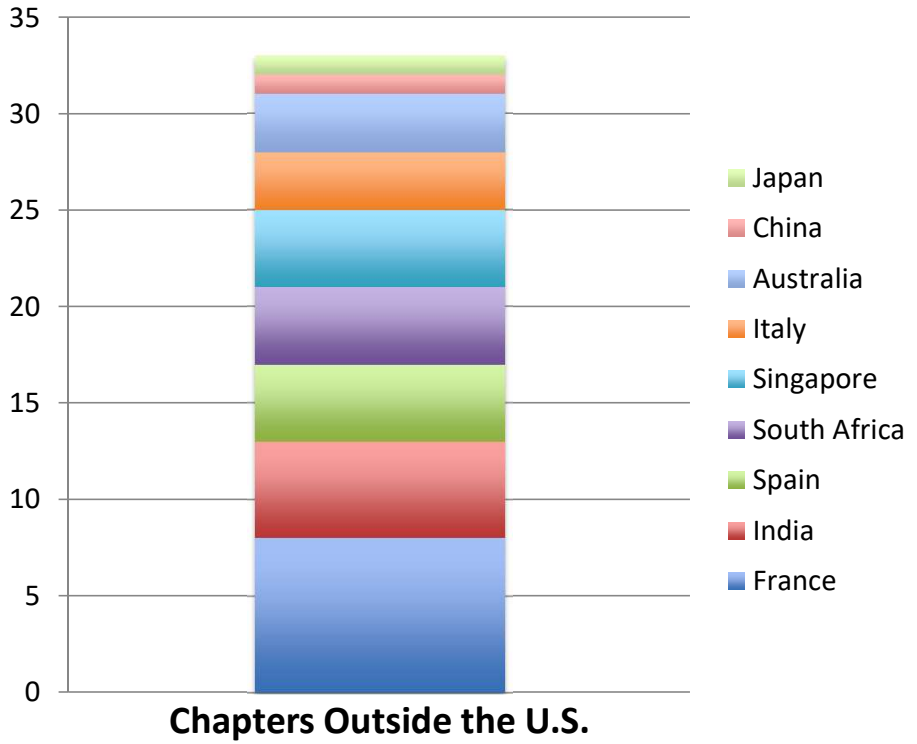
TLI Vision

- **INCOSE** has a growing pool of leaders to draw on and an enhanced international reputation for SE leadership
- **Individual members** become more capable leaders and join an international network of systems engineering leaders
- **Sponsoring organizations** obtain non-proprietary, tuition-free technical leadership training for future SE leaders

A Growing Network of Technical Leaders

59 members, 5 continents, 9 countries and 14 U.S. states!





Cohort 1
Formed: IS 2015; Inducted: IS 2017

SE Technical Leadership Model

Ref: Godfrey, "Building a Technical Leadership Model," Invited Paper, IS 2016

- Hold the vision
- Think strategically
- Foster collaboration
- Communicate effectively
- Enable others to be successful
- Demonstrate emotional intelligence

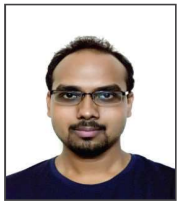
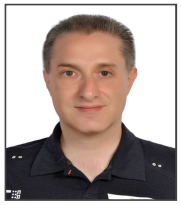
Cohort 2

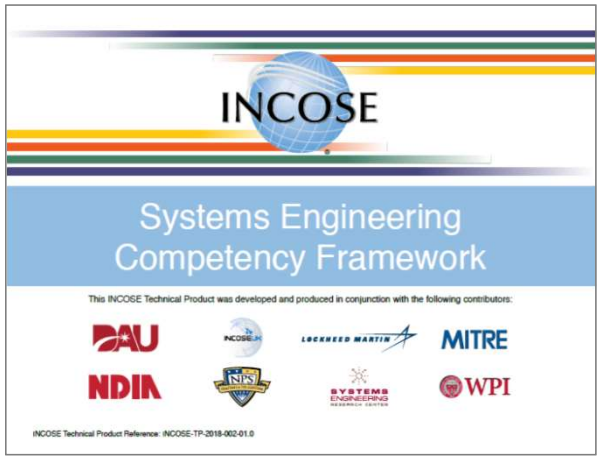
Formed: IS 2016; Inducted: IS 2018

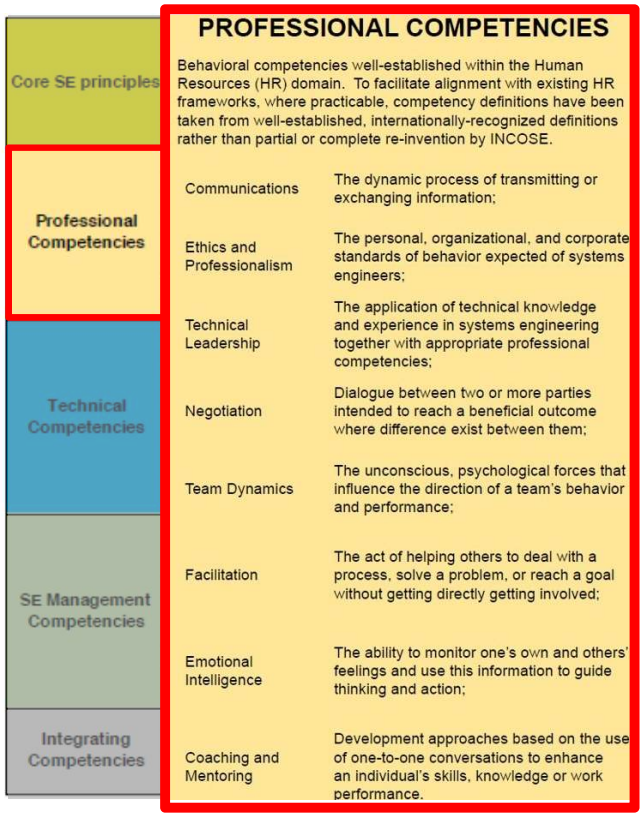




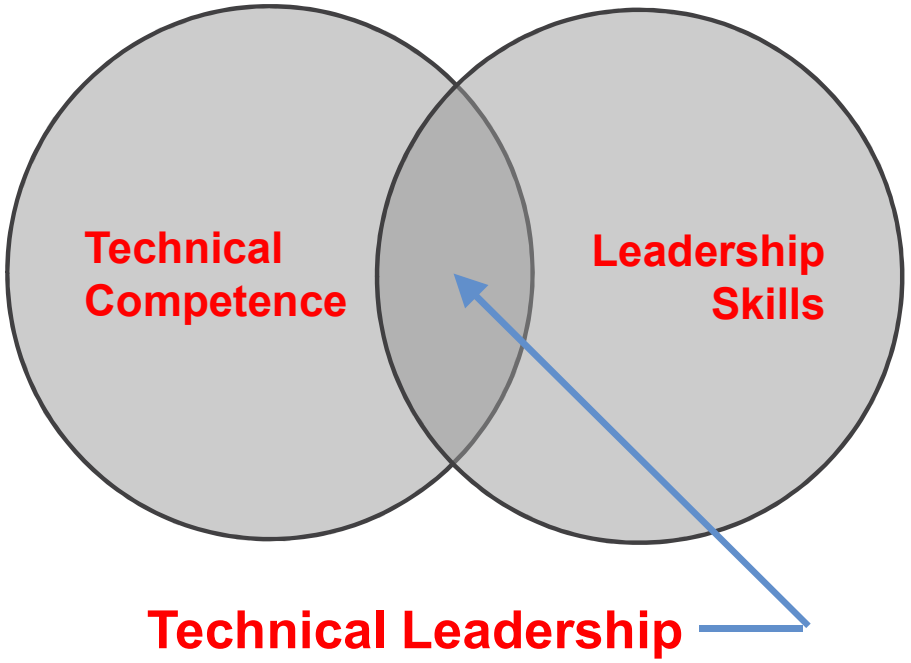




Cohort 3
Formed: IS 2017…



Cohort 4
Formed: IS 2018…

Experiments in Leading through Influence

Five Types of Power

- **Physical power** is the self-evidently primitive and, unfortunately, often ultimate power, as expressed in fighting and in war.
- **Resource power** is that which derives from one person having a resource that the other wants or needs – usually but not always money.
- **Positional power** is an authority awarded to a person by the organisation.
- **Expert power** is that which derives because you have knowledge or a skill that is needed.
- **Personal power** is that which derives from the personality of an individual.