A Better World Through a Systems Approach

International Council on Systems Engineering
Crossroads of America Chapter

Presentation at Westgate
4 April 2023

Chris Hoffman, Cummins Inc. / Chapter Director
Ray Deno, Undersea Sensor Systems Inc. / Chapter President
Freddie Rastede, SAIC / Chapter Director

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Today's Discussion

Do you want to learn more about how Digital Engineering (DoD and more) is interdependent with Model Based Systems Engineering, MBSE Patterns, Systems Engineering Standards, Architecting, ISO/IEC/IEEE 15288, Systems Engineering Competencies & Assessment Guide, and how local systems engineering practitioners apply these skills, products, and methods to problems and opportunities daily? Did you know that your local INCOSE Crossroads of America chapter has many of the authors of these publications and the working group leaders as active members?

Join us on 4 April to have a conversation with the recent Technical Director of INCOSE Chris Hoffman as he will share a brief overview of the International Council on Systems Engineering (INCOSE), the premier choice of systems engineers for professional development. INCOSE provides the opportunity for life-long learning in systems approaches through a community of peers, resources for your career, the ability to increase your professional stature with the INCOSE Systems Engineering Professional certification, and a place to be a leader.

Chapter President Ray Deno and Director Freddy Rastede will then share specifics on the benefits of the local INCOSE Crossroads of America chapter, through monthly networking meetings and technical presentations given by leaders in Systems Engineering. Many members within our chapter are industry-recognized Systems Engineering experts and are highly accessible, sharing their knowledge across individuals, domains, and companies to advance systems engineering and the world.

We will reserve time for discussion, building networks for making a better world through a systems approach!

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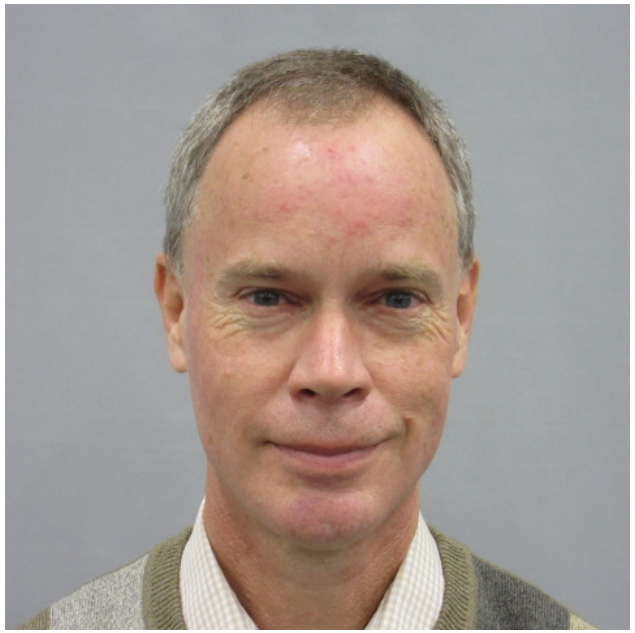
Chris Hoffman

Greenwood (South Indy) & Columbus Area

Chris manages the strategy and portfolio planning of over 1300 software tools and applications that enable product design & development within Cummins Inc. where he has over 25 years of experience across various electro-mechanical engineering roles. He is an INCOSE Certified Systems Engineering Professional, is the immediate past INCOSE Technical Director, and currently leads the Future of Systems Engineering Methodologies (www.incose.org/fuse) stream, helping to realize the Systems Engineering Vision 2035.

https://www.linkedin.com/in/christopherdhoffman/

Ray Deno



Fort Wayne Area

Ray is a Program Manager at Ultra Maritime near Fort Wayne, Indiana. In his role, Ray manages multiple development and IRaD projects that support Navy Anti-Submarine Warfare sensor needs. Ray has over 30 years of experience in electrical, software, systems, and project management roles and is a Certified Systems Engineering Professional. Ray is also the President of the INCOSE Crossroads of America chapter in Indiana.

https://www.linkedin.com/in/ray-deno-618bb1b0/

Freddy Rastede

Indianapolis Area

Freddy serves as a Principle Systems Engineer for SAIC's Naval Combat and Strategic Systems division leading the Digital Infrastructure and Digital Engineering Enablement activities supporting Army/Navy Hypersonic program. Freddy has over 10 years of experience in Electrical Circuit Design and Model Based Systems Engineering. He is an INCOSE Certified Systems Engineering Professional, received his MSE from Johns Hopkins University in Systems Engineering, BS from Purdue in Electrical Engineering and BS in Physics from Butler University.

https://www.linkedin.com/in/frederick-rastede-b5799740/

Why INCOSE?

INCOSE

International Council on Systems Engineering
The professional society for Systems Engineering

INCOSE

International Council on Systems Engineering

A better world through a systems approach

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PROSPER

INCOSE is the premier choice of systems engineers for professional development. With over 30 years of experience, we are shaping the future of systems engineering. We interact with systems engineers across the globe on a daily basis to set standards.

21,000

Members and CAB Associates

126

Corporate Members

52

Working Groups

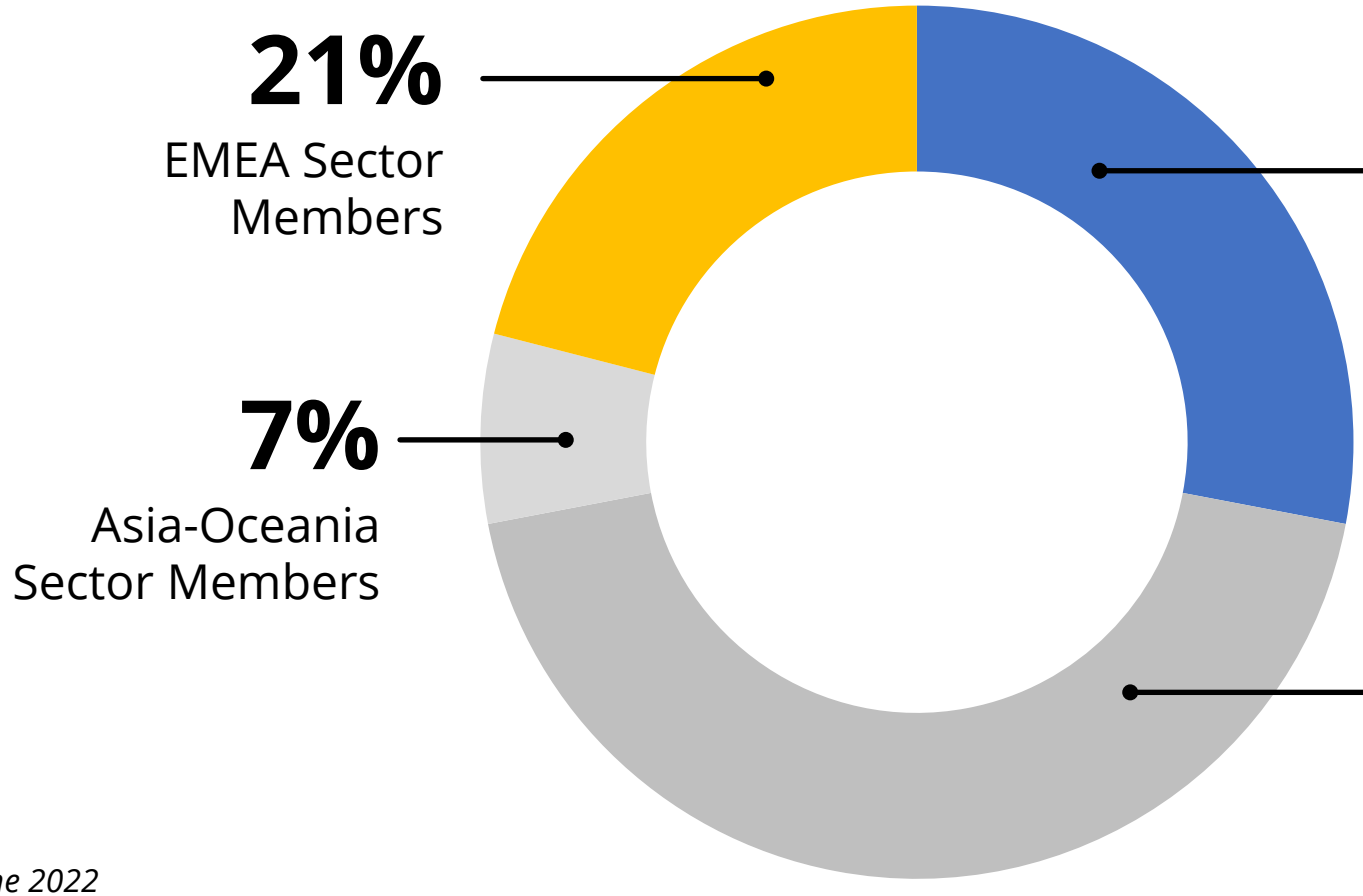
65

Chapters Worldwide

75

Countries with Active Members

INCOSE Member Breakdown



21%
EMEA Sector Members

28%
Americas Sector Members

7%
Asia-Oceania Sector Members

44%
CAB Associates

Stats from June 2022

Why Join INCOSE?

- INCOSE is the global Systems Engineering professional society – providing the **opportunity for life-long learning** in systems approaches.
- A community of peers, **resources** for your **career**, and a place to be a **leader.**
- INCOSE members stand out and are often sought after as **experts**. INCOSE members share practices and learn from each other.
- INCOSE members create **products**, produce **events** and represent the organization in international forums.
- INCOSE members increase the body of knowledge and **advance the practice** of systems engineering.
- **Network** with over 21,000 members in 75 countries.
- Increase your professional stature with the INCOSE Systems Engineering Professional **Certification.**

Mission and Vision

VISION: A better world through a systems approach.

MISSION: To address complex societal and technical challenges by enabling, promoting, and advancing Systems Engineering and systems approaches.

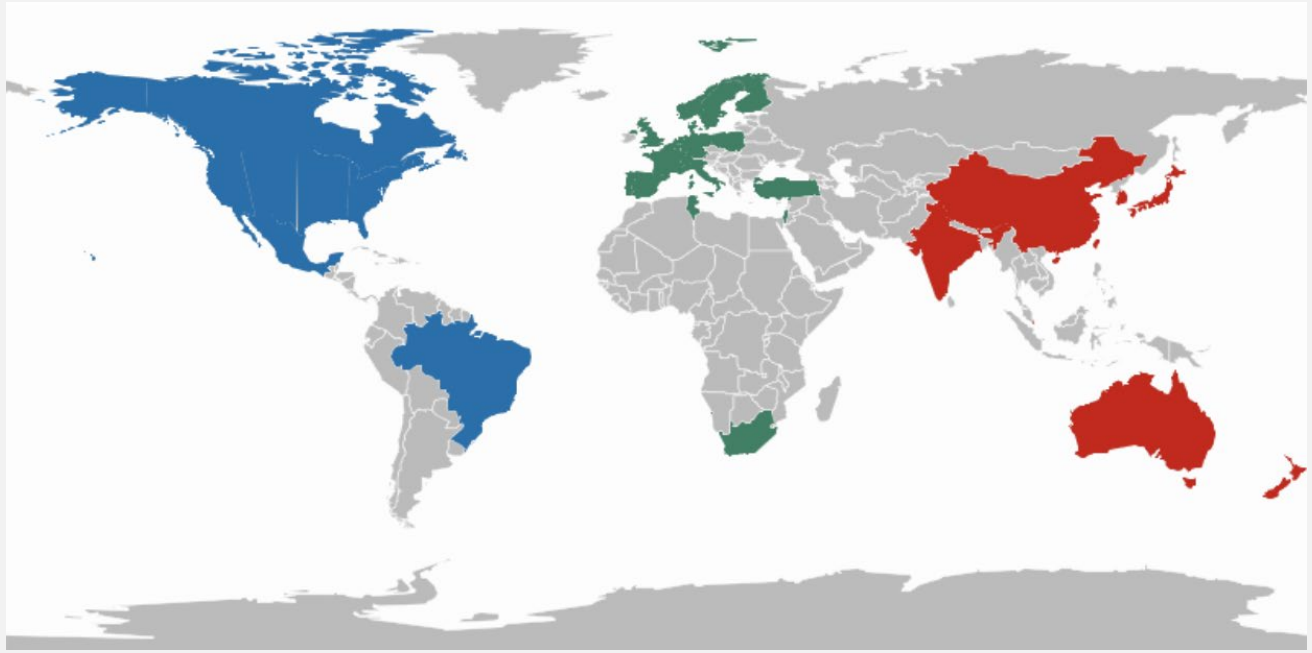
OBJECTIVE: Global leader for systems engineering professionals for career development.

FUTURE: Lead the future of systems engineering, academically, in emerging domains, and in practice.

65 Chapters Worldwide

Chapters play an essential role in the achievement of INCOSE's goals and objectives:

- Organizing a multitude of professional and social programs
- Attracting new members from industry, government and academia
- Supporting technical activities striving to advance the state and art of systems engineering
- Showcasing INCOSE as the international authoritative body on systems engineering that it is.



LEARN MORE
Incose.org/chapters

INCOSE

Working Groups

INCOSE has over 50 active Working Groups. Some of the Working Groups are:

- Artificial Intelligence Systems
- Automotive
- Human Systems Integration
- MBSE Initiative
- Natural Systems
- PM-SE Integration
- Requirements
- Smart Cities
- Social Systems

Working groups are the resource practitioners need.

Discuss, collaborate, share in person, and online with a wide diversity of interests.

Create products to advance the state, art and practice of systems engineering.

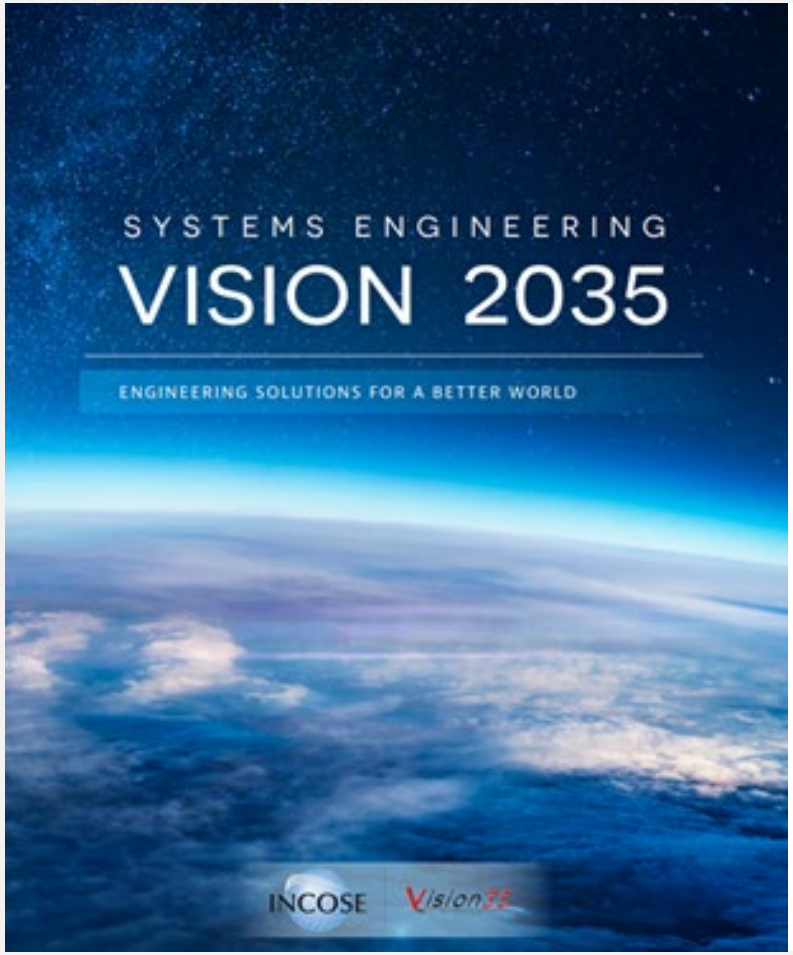
Help develop and review international standards

Bring value to other INCOSE stakeholders in your interest area

WGs run events, workshops, panels and much more

LEARN MORE: incose.org/workinggroups

Systems Engineering Vision 2035



This Systems Engineering Vision was sponsored by INCOSE and produced by a team of leaders from the systems community, with inputs from across industry, academia, and government. The Systems Engineering Vision 2035 addresses:

- The **Global Context for Systems** Engineering
- The **Current State of Systems Engineering**
- The **Future State of Systems Engineering**
- **Realizing the Vision**

We encourage you to work with INCOSE to help realize this vision.

The complete **Systems Engineering Vision 2035** is available as a website and PDF

LEARN MORE: incose.org/sevision

FuSE Program
Vision / Mission Statement

FuSE
Future of Systems Engineering

Future of Systems Engineering Program
FuSE, our vision is:
www.incose.org/fuse

Inspire the global community to realize the Vision of SE

FuSE refines and evolves the SE Vision 2035 across competencies, research, tools & environment, practices, and applications.

FuSE identifies critical gaps towards the vision realization and initiates & supports relevant actions

FuSE fosters involvement and collaboration within and outside of INCOSE.

FuSE educates, shares success, and expands.

Initiatives: TLI and SySTEAM

The Technical Leadership Institute (TLI) is a global network of INCOSE members committed to improving technical leadership skills to better address the complex sociotechnical challenges of the twenty-first century. TLI members come from a wide range of countries.

LEARN MORE:
incose.org/tli

SySTEAM aims to promote a more just, equitable, and transparent approach to education in general, and interdisciplinary systems thinking/systems engineering competencies in particular, aimed at reducing disparities in educational quality, access, and competency attainment.

LEARN MORE:
incose.org/systeam

Initiatives: Diversity, Equity and Inclusion & EWLSE

Policy DEI-100 was established for the Diversity, Equity, and Inclusion (DE&I) initiative as an imperative effort within INCOSE to ensure that structures and mechanisms are in place to make INCOSE an organization where everyone can comfortably be their authentic self, recognize themselves in other members, and have an equal voice and opportunity in their interactions within the organization.

Strategic Goals of DEI:

- Goal #1: Affirming greater inclusion and diversity within INCOSE membership.
- Goal #2: Recruitment of more members from diverse backgrounds. Work is already underway to achieve Goal #2. New Membership Engagement (NMET) Diversity Equity & Inclusion (DEI)

LEARN MORE: incose.org/dei

EWLSE's mission is to create an open 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.

LEARN MORE: incose.org/ewlse

MBSE

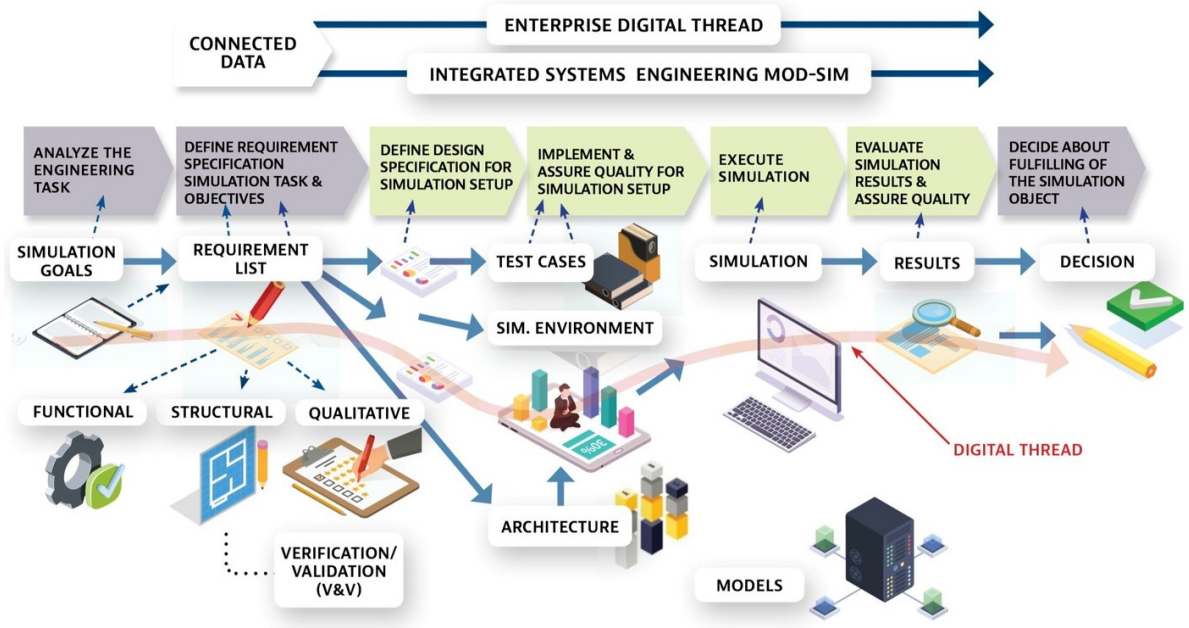
The future of systems engineering is predominantly Model-Based (MBSE)

FROM:

- The adoption of MBSE is uneven across industry sectors and within organizations.
- Custom, one-off simulations are used for each project, and there is still limited reuse of models especially during critical early phases of systems architecting and design validation.

TO:

- Systems engineers routinely compose task-specific virtual models using ontologically linked, digital twin-based model-assets.
- These connected models are updated in real-time providing a virtual reality-based, immersive design and exploration space. This virtual global collaboration space is cloud- based, enabled by modelling as a service and supports massive simulation leveraging cloud-based high-capacity compute infrastructure.
- Families of unified ModSim frameworks exist enabling small and medium businesses along with Government agencies to collaborate.



INCOSE Certification

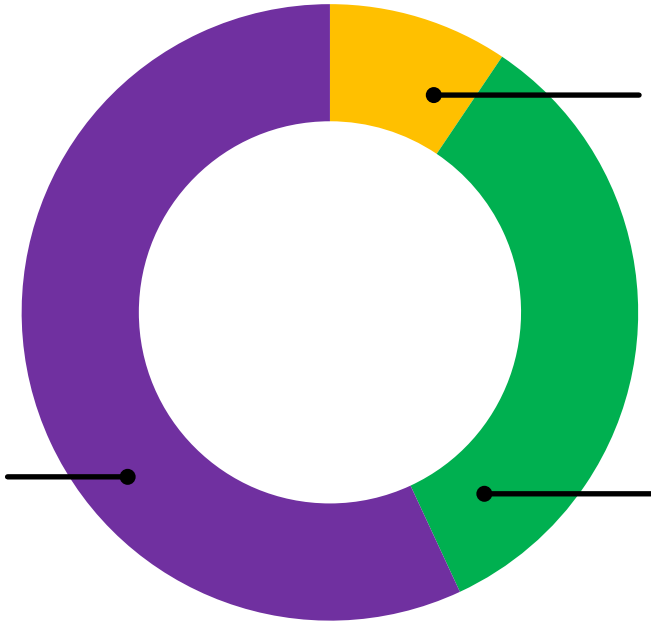
The Certification Program offers internationally recognized systems engineering qualification at three levels; confirming an individual's competency through demonstrated knowledge, education and experience.

- Systems Engineering Professional (SEP) certification formally recognizes an individual's progress through their career as they develop and apply systems engineering knowledge and practices.
- INCOSE offers three levels of certification ASEP, CSEP and ESEP.

4,033

Current Active Certifications

LEARN MORE: incose.org/certification



371 (ESEP)

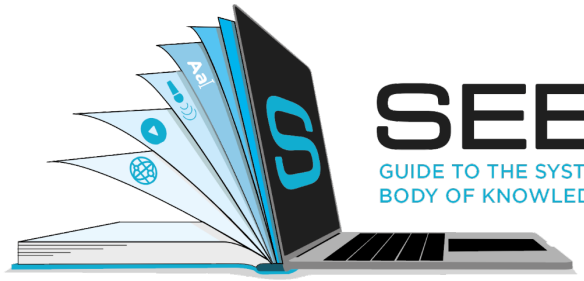
2,239 (CSEP)

1,323 (ASEP)

Stats from June 2022

Resources

PDP
INCOSE
PROFESSIONAL DEVELOPMENT PORTAL



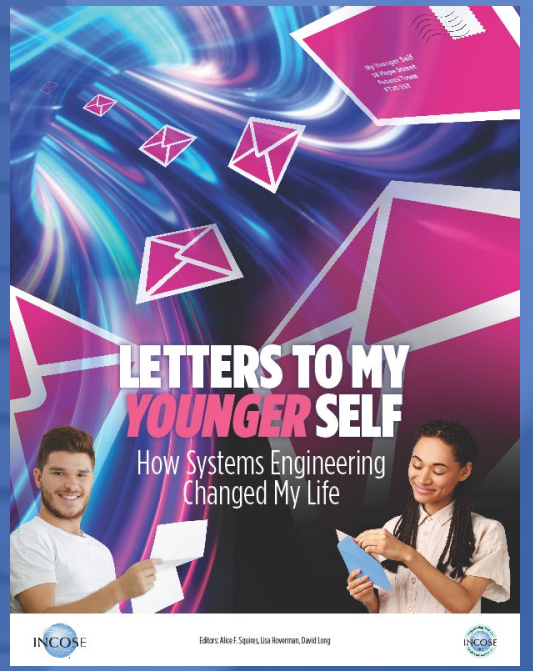
SEBoK
GUIDE TO THE SYSTEMS ENGINEERING BODY OF KNOWLEDGE

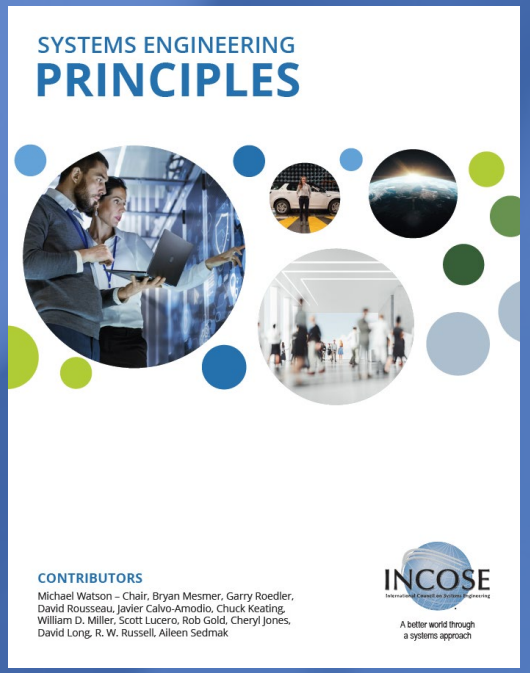
INCOSE VIRTUAL COMMUNITY

INCOSE Systems Engineering HANDBOOK

SETDB
SYSTEMS ENGINEERING TOOLS DATABASE

Publications





LEARN MORE:

http://connect.incose.org/store

Conferences and Events

March 16-17	May 15-19	July 15-20	October
CSER	**NAFEMS World Congress**	**International Symposium**	**AOSEC**

EMEA WSEC	**SoSE**	**WSRC**
April 24-26	June 14-16	September 14-17

LEARN MORE:
incose.org/events-and-news

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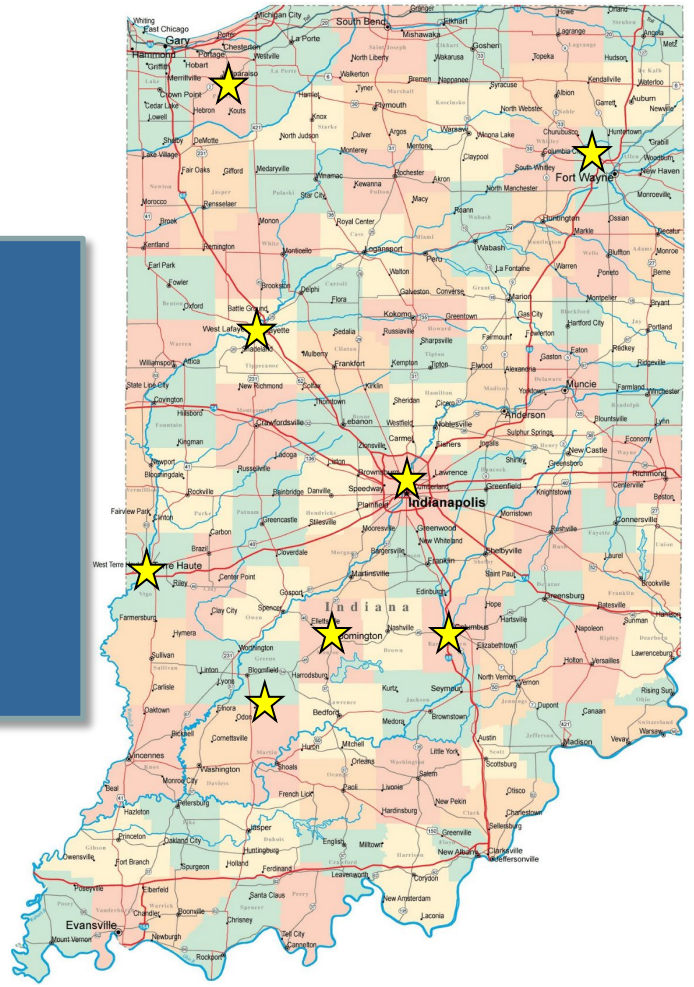
Members Representing our Local Institutes & Industries

- Beckman Coulter, Inc.
- Carbon Motors Corp.
- Eli Lilly & Company
- ICTT System Sciences
- Roche Diagnostics Corp.
- Rolls-Royce Corporation
- Rose-Hulman Institute of Technology
- Vertex



- Delphi Corporation
- Purdue University Fort Wayne
- ITT Exelis
- Logikos, Inc.
- Northrup Grumman
- Purdue University
- Raytheon
- Ultra Electronics-Undersea Sensor Systems, Inc

- Crane Division, Naval Surface Warfare Center
- Cummins Inc.
- Hill-Rom, Inc.
- Indiana University
- Tinwisle Corp.
- US Navy [Including American Society of Naval Engineers]

Crossroads of America has a good mix of industry, academia and government representing our Chapter, covering most of Indiana

Crossroads of America Chapter

Founded in 2002, currently covering State of Indiana

Enrolled Members: 87
Professional / Retired: 79
Student: 8

Companies represented:
- Advanced manufacturing
- Automotive & off-road equipment
- Defense & Aerospace
- Energy
- Logistics
- Medical & Healthcare

Universities - SE Programs:
- Purdue University – West Lafayette
- Purdue University – Fort Wayne
- Rose-Hulman – Terre Haute

Activities:
- Monthly networking & presentations
- Hosts of the GLRC 2013, 2018

Chapter Role	Name	Company
President	Ray Deno	Undersea Sensor Systems, Inc
VP of Chapter Programs	Bill Bihlman	Aerolytics
VP for Outreach	Bob Kenley	Purdue University
Secretary	Joe Rayes	Eli Lilly
Treasurer	Paul DeMond	Undersea Sensor Systems, Inc
Director	Chris Hoffman	Cummins Inc.
Director	Everett Lewis	Rolls-Royce
Director	Bill Schindel	ICTT System Sciences
Director	Ajay Thukral	Vertex
Director	Clay Watkins	Beckman Coulter
Director	Freddie Rastede	SAIC
Director	Dhiman Chatterjee	MISO Energy

INCOSE®

Home to local Systems Engineering Community

Crossroads of America Chapter

- Ten meetings each year
  - 60-minute technical program
  - Second Tuesday of the month, except January & July
- Topics of interest and benefit to our membership
  - SE-related technical presentations (local & remote)
  - “State of the xxxx” presentations
  - Panel discussions

August 2019 - Stéphane Lacrampe

Open Source MBSE Solution

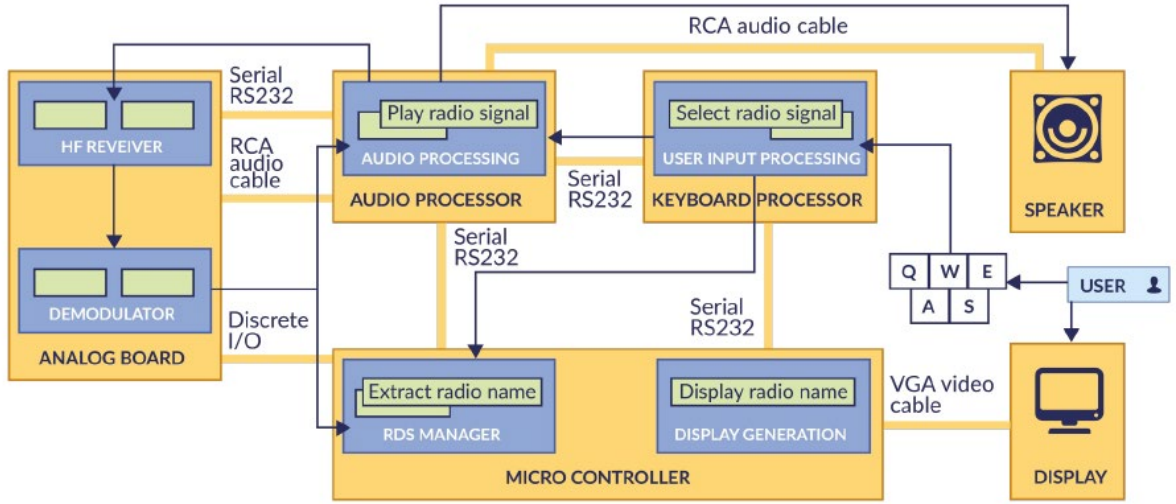
"Democratizing" MBSE with the open source tool Capella

Stéphane Lacrampe – Obeo Canada

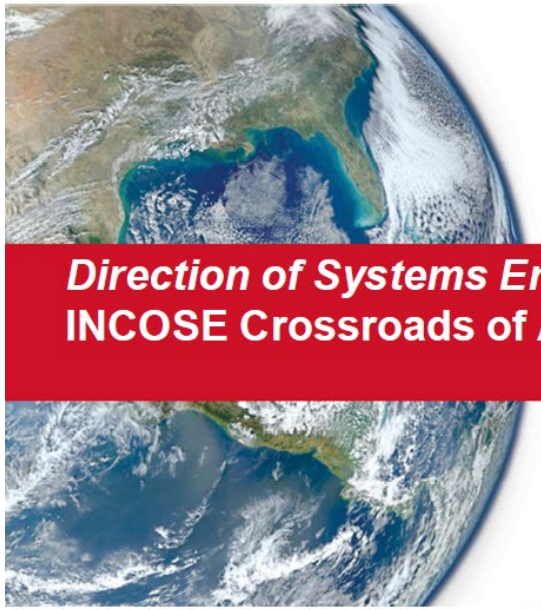
Finalized Architecture

HOW THE SYSTEM WILL BE DEVELOPED AND BUILT

Implementation constraints, reuse, refined trade-offs, M/T/B strategy, finalized detailed interfaces



February 2020 – Scott Sobczak



Raytheon

Direction of Systems Engineering in Defense
INCOSE Crossroads of America Chapter Meeting

Scott Sobczak

Systems Engineering Department Manager

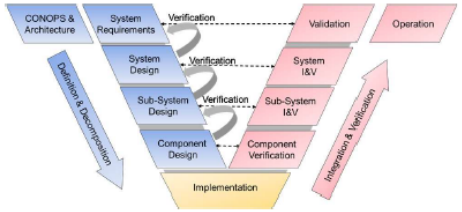
February 11, 2020

Raytheon

Where does Systems Engineering need to go?

Model-Based Approach

- Object-oriented
- Model-Driven
- Model-Based Engineering (MBE)



Increased System Complexity

- Systems are now more complex than ever
- Need to manage and deal with these increased level of complexity and the uncertainty that goes along with it

Document Based → *Model Based*

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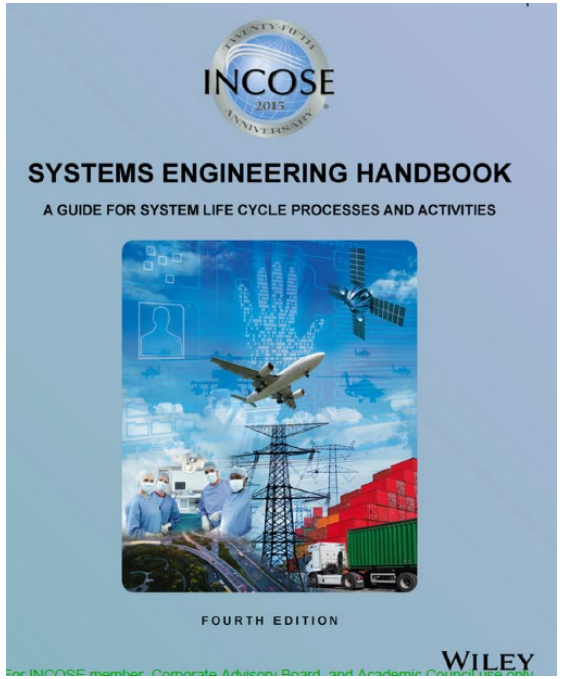
December 2020 – Dave Walden

- Dave Walden, ESEP
- Co-author of INCOSE Systems Engineering Handbook



BROWNFIELD SYSTEMS DEVELOPMENT: MOVING FROM THE VEE MODEL TO THE N MODEL FOR LEGACY SYSTEMS

By

David D. Walden, ESEP

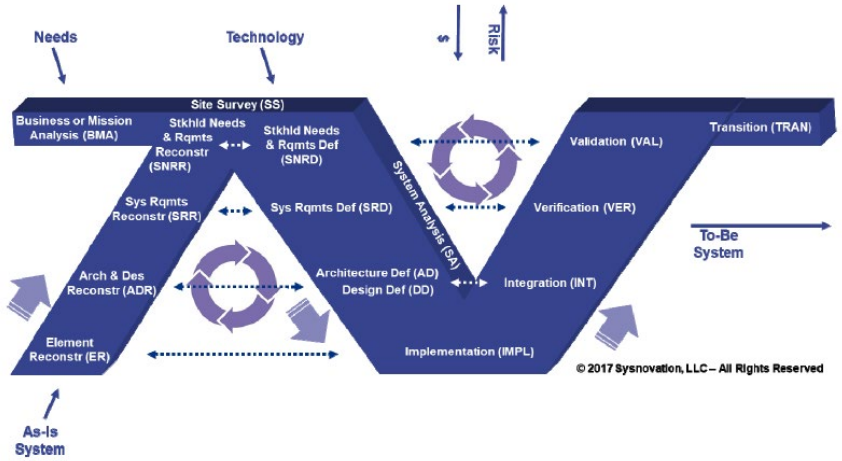
29th Annual

International Symposium

of the

International Council on Systems Engineering

July 20-25, 2019



Chapter Benefits

- Contact with other local Systems Engineers
  - "yea, we had that problem too"
  - "we tried it that way and had good results"
- Many industry-recognized Systems Engineering experts in our Chapter

Chapter Benefits (cont'd)

- Influence technical programs
  - Feedback from the membership drives program topics

- Present your ideas and work to other Systems Engineers

Questions?

Thank you!