

hybrid event

Detroit, MI, USA June 25 - 30, 2022

# PROGRAM DIRECTORY

The Power of Connection

# Symposium 2022 Sponsors

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# Welcome to the 32<sup>nd</sup> Annual INCOSE International Symposium

Held annually since 1991, the INCOSE International Symposium has a rich history of delivering high-quality content focused on the future of systems engineering.

INCOSE's International Symposium is the largest worldwide annual gathering of people who do systems engineering. The program comprised of presentations, case studies, workshops, tutorials, and panel discussions attracts an international mix of professionals at all levels, and includes practitioners in government and industry, as well as educators and researchers. The benefits of attending the Symposium include the opportunity to share ideas, network, build competency, pursue certification, contribute to the advancement of the profession through collaboration on tools, processes, and methodologies, learn about new offerings in training and education, and forge new partnerships.

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www.incose.org/youtube

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# Why INCOSE?

INCOSE is the premier choice of systems engineers across the globe creating a better world through a systems approach



# CONNECT

Network and Engage with the Systems Engineering Community

# **LEARN**

Enhance your knowledge through collaboration, research, and education





# **LEAD**

Serve as an expert and thought leader to influence products and standards

# **PROSPER**

Find career resources and improve your professional status



For additional information about INCOSE,
Please come to our INCOSE Village in the Exhibit Hall
or visit our website www.incose.org
or contact us at info@incose.net

# **INCOSE Mission**

# Overview

The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization that promotes international collaboration in systems engineering practice, education and research.

# 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.

# Strategic Objectives

**Premier.** INCOSE is the premier choice of systems engineers everywhere for their professional development needs.

**Future.** INCOSE leads the community in shaping the future of systems engineering.

**Value.** INCOSE delivers ever greater value to a growing and increasingly diverse membership.

20,200 Members and CAB Associates

126 Corporate Members

52 Working Groups

65 Chapters Worldwide 75 Countries with Active Members

# **INCOSE Values**

1

# **Systems Thinking**

Thinking and acting to apply systems approaches to address complex challenges and thus to realize successful sustainable solutions.

2

# **Pioneering and Innovation**

Taking opportunities ourselves or with partners to evolve systems approaches to meet future challenges.

3

# **Learning and Development**

Life-long learning with a changing world through education and continuing professional development, covering both technical and leadership competencies

4

# Respect, Diversity, Collaboration

Building and maintaining respectful relationships internally and externally in order to enable effective collaboration across the diverse community.

5

# **Individuals**

The importance of people, their intellect and influencing skill, to support complex decisions and to deliver enduring change.

6

# Volunteerism

Volunteers and staff working together to achieve our objectives and to deliver benefit to our members, individuals and society.

# **INCOSE Principles**

Our values represent who we are. Our vision and mission represent what we are trying to achieve. Our principles represent **how** we pursue our vision / mission within the bounds of our values.

# **Impact**

INCOSE assesses its impact based on the delivery of value to members and other stakeholders.

# **Partnership**

INCOSE builds and disseminates products and services jointly with others to maximize our impact.

# Holism

INCOSE emphasizes the whole over the individual parts in our creation of an integrated global technical network.

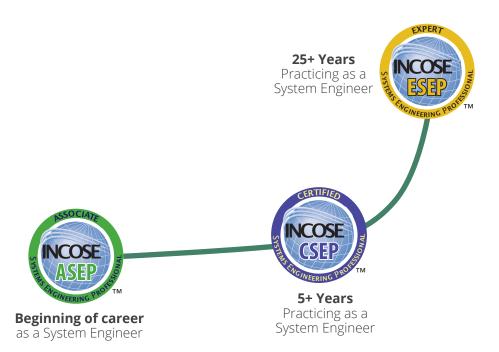
**Differentiation**INCOSE recognizes the unique value of those who choose to affiliate with us, prioritizing direct affiliation and active participation over indirect or passive connection.

# Volunteers

INCOSE is led by volunteers who set our fundamental direction.

# Systems Engineering Professional Certification

# Offering three levels of internationally recognized systems engineering certification



# What is Certification?

Certification is a formal process whereby a community of knowledgeable, experienced, and skilled representatives of an organization, such as INCOSE, provides confirmation of an individual's competency (demonstrated knowledge, education, and experience) in a specified profession.

# SYSTEMS ENGINEERING

# VISION 2035

**ENGINEERING SOLUTIONS FOR A BETTER WORLD** 

The purpose of the Systems Engineering Vision 2035 is to inspire and guide the strategic direction of systems engineering across diverse stakeholder communities, which include:

- ENGINEERING AND EXECUTIVE LEADERSHIP
- ENGINEERING PRACTITIONERS
- PROFESSIONAL ORGANIZATIONS
- RESEARCHERS, EDUCATORS, AND STUDENTS
- STANDARDS BODIES
  - TOOL VENDORS
- POLICY MAKERS

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

- Charles Darwin

"As for the future, your task is not to foresee it, but to enable it."

- Antoine de Saint Exupéry





Visit the Systems Engineering Vision 2035 website and download a PDF www.incose.org/sevision

# Notes

# General Information

PLEASE WEAR YOUR NAME BADGE AT ALL TIMES. IT IS REQUIRED FOR ENTRY TO ALL SESSIONS, EVENTS, AND MEALS.

### Symposium Venue

The Symposium venue, registration, technical sessions, business meetings, exhibits, receptions and lunches are all held at the:

### **Huntington Place**

1 Washington Blvd. - Detroit, MI 48226, USA

### Messages

Messages will be posted regularly on a board near the Registration Desk. The daily modifications of the schedule are announced at plenary sessions and will be posted ontheinformation boards near the Registration Desk.

### **Badges**

Green	Speakers
Orange	Exhibitors
White	Full Registration
Yellow	Day attendance
Purple	Guests

### APP

Flash the QR code below or connect to the symposium website with your smartphone or tablet and you will receive instructions on how to download the app for Apple or Android devices.

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### **Registration & Information Hours**

Grand Riverview Ballroo	m Pre-function – Level 2
Friday	1400 - 1700
Saturday - Wednesday	0700 – 1700
Thursday	0700 - 1630

### **QR** Code

All badges will contain a QR Code.

Definition: A QR Code (quick response code) is a type of 2D bar code that is used to provide easy access to information through a smartphone or tablet. The QR Code may be used as a way to quickly and easily share your contact information with our exhibitors and follow delegates. Your QR Code includes your name, company, state and country and the email address that you entered during the registration process. You may share your contact information with others, but at no time are you obliged to do so.

### Internet Access

A free Wireless Internet network is available in the Exhibition and Lunch areas.

Connect to Wireless Network : **Huntington Place free**.

### Speaker and Session Chair Breakfast

Location: Room 141 – Level 1
Saturday to Thursday0700 – 0745

### Speaker Ready Room Hours

Location: Room 141 – Level 1	
Saturday to Wednesday0745 – 1	1700
Thursday	1330

### **Exhibit Hall Hours**

Grand Riverview Ballroom B -	Level 2
Monday	0930 – 1930
Tuesday	0930 – 1800
Wednesday	0930 – 1700
Thursday	0930 – 1330

# General Information

### Meals

Continuing the long tradition of lunch in the Exhibit Hall, this year lunches Monday - Thursday will consist of food items that you can easily eat while strolling through the Hall. Plan to enjoy this extra opportunity to learn more about symposium exhibitors and sponsors.

### **Tickets**

Additional tickets can be purchased, at the registration desk for the following (subject to availability).

- Ice Breaker Reception for guests and day attendees
- Exhibitors' Reception for guests and day attendees
- INCOSE After Dark

### eProceedings

Connect to the e-proceedings using Symposium URL:

### conference.conflr.com/IS2022

Enter the email address used to register to the Symposium and the confirmation number included in your confirmation e-mail. Then you can navigate through the program to download individual papers or all papers.

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# SAIC.

### **INCOSE Business Meetings**

Working groups and other committees also meet during the symposium. The room assignments and information about these meetings can be found on the APP, and website, under Business Meetings. Announcements about additional meetings or room changes will be posted on the information boards. This is an opportunity to learn about or become more involved in the business of INCOSE.

### **Key Reserve Papers**

All posters will be available to view all week in the **Exhibit Hall area**. Papers for all key reserve papers can be found in the symposium proceedings.

### **INCOSE Village**

Learn more about the services and products provided by INCOSE at the village. Meet members of the support team and discover ways to get more involved.

### **New Products**

Be the first to get copies of the newest INCOSE products by visiting the village. As an added bonus, Meet the experts who developed those new products!

### **Upcoming Events**

Learn more about upcoming events from the event organizers at the INCOSE Village.

### Website

Do you have questions about the new website? Get your questions answered at the village.

# Award Announcements and Presentations

Best papers were selected by Technical Operations prior to the Symposium and are indicated in the program.

### Monday – June 27

Awards for Best Symposium Papers \*
Brian Mar Award for Best Student Paper \*

### Tuesday – June 28

Pioneer Award \*

INCOSE Fellows \*

Founders Award \*

### Wednesday - June 29

SE Influencer Award \*

Annual SE Journal Best Paper

Annual INSIGHT Best Paper

ISEF Prize

INCOSE Foundation Stevens Doctoral Award for Promising Research in Systems Engineering and Integration

INCOSE Foundation JHU Alexander Kossiakoff Award for Promising Applied Systems Engineering Research

The Chapter Circle Awards

The Director's Award for the Most Improved Chapter

The President's Award for the Most Outstanding Chapter

Institute for Technical Leadership Induction
OSAS (SE Influencer First)\*

<sup>\*</sup> Presented during plenary

# Social Events

### Corporate Advisory Board Dinner

(By invitation only)

Saturday, June 25 ......1900-2200

The Whitney -

4421 Woodward Avenue - Detroit, MI 4820

### IS2022 C@fé

Monday, June 27 to Thursday June 30.......1215-1315 140E – Level 1

INCOSE has been running café style events to allow Systems Engineers to catch up with each other informally for the past two years, including at the two virtual conferences. We intend to continue with that at our first hybrid international symposium. At each lunch break grab a meal and either come to the room in person or virtually and catch up.

This gives an opportunity to catch up with each other (in person and virtual) and discuss the material from the conference, general systems engineering issues or anything else of general interest. There will be a host there to help facilitate and enable the conversations. This is an opportunity for the in-person and virtual attendees to meet and talk generally and share perspectives and questions.

We hope to see you there!

### Welcome Lunch for New Members

New to INCOSE? Find out how to make the most of INCOSE and the symposium as you enjoy lunch. Take advantage of this special opportunity and have some fun as you make new connections across the systems engineering community. Learn from INCOSE leaders and seasoned systems practitioners who will share how INCOSE can help advance your career.

### Ice Breaker Reception

Recharge and reconnect at the annual Ice Breaker Reception! Enjoy beverages and canapés while you connect with new acquaintances and those you may see only occasionally during the year. This evening provides a chance to gather with your colleagues in a relaxed setting in our elegant Exhibit Hall.

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### **Certification Luncheon**

(ASEP, CSEP, ESEP only)

Tuesday, June 28...... 1215 – 1315

Riverfront Salon West - Level 1

### The Exhibitors' Reception

Mix business with pleasure as you meet exhibitors, chat with friends, and sample drinks with light snacks in an informal reception surrounded by the latest in technology, poster papers, and research.

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### **INCOSE After Dark**

Wednesday, June 29 Grand Riverview Terrace – Level 2

Enjoy the view on the Detroit River while sampling food, reconnecting with the INCOSE family and making new friends. Music at sunset.

Dress is casual. Reception is outdoors.

### **Networking Reception**

This event is the moment for the final networking, exchange of business cards, arrangements for the next meeting, or just a relaxing respite at the end of the symposium.

# Notes

# Keynote Speakers



Dr. Christopher J. Scolese Director, National Reconnaissance Office (NRO)

### Keynote Title: Architecting the Future: The Role of SE and DE at the NRO

**TUESDAY** 



Carla Bailo President & CEO, Center for Automotive Research (CAR)

Keynote Title: Mobility and System Engineering Integration

**NEDNESDAY** 



Laura Doughty Director Peakfield Consultancy Ltd and currently Head of Culture and Engagement, Project Delivery Directorate, Sellafield Ltd

### Keynote Title: The Power of connection: The power of influencing and how to do



Christopher Davey

Global R&A Senior Global Manager for Systems Engineering, System Safety, Modelling & Simulation and Senior Technical Leader in Software & Control Systems Engineering, Ford Motor Company

### Keynote Title:

Ford's Connected, Agile, Model Based Systems Engineering and Simulation Journey....so far.

# Invited Panels

Exhibit Hall, Grand Riverview Ballroom A - Level 2

### Moderator(s):

Kerry Lunney (Thales Australia)

Duncan Kemp (UK Ministry of Defence)

### Panellist(s):

Brian Collins (*UCL*) Michael Watson (*Systems Thinking*) Erika Palmer Meaghan O'Neil

**Abstract.** The Royal Academy of Engineering and the Lloyd's Register Foundation entered into a strategic partnership to deliver a 5-year programme to realise the "Safer Complex Systems Mission" to improve safety of the design, management and operation of complex systems globally. Two years into the programme a series of case studies across multiple industries and technologies has been compiled into a report, soon to be published.

Each case study attempts to provide clarity around safety and its complex system; to develop an understanding on the existing methods available for the design, management and governance of systems depicted in its case study; and to outline emerging challenges and opportunities with significant disruptive potential (negative or positive) with respect to the safety of complex systems.

The development of this report was guided initially through a technical advisory group and later through a steering committee, with members from different backgrounds, dispersed across the world. In addition, the steering committee members also acted as mentors and reviewers for each case study author. INCOSE representatives actively took part in both these groups, including mentoring.

At IS2022, a subset of these case studies will be presented:

- The 2005 THORP Internal Leak
- Social Innovators as a Human Sensing Network Solving Humanitarian Challenges
- Delivering a Seasonally Agnostic Railway
- Beyond the Limits of Knowledge: Navigating Uncertainty in Complex Systems

Following this presentation, a panel will critique what they heard, and the question on "what happens next" will be discussed. The panel will be seeking to engage the audience to collect a diverse set of inputs to help guide the next phase of the 5-year programme.

Based on the symposium theme of "The Power of Connection" this session will provide the means to connect experts, industries, working groups and other interested parties to deliver safer complex systems in the future.

# Invited Panels

Exhibit Hall, Grand Riverview Ballroom A - Level 2

Moderator(s):

Ralf Hartmann (INCOSE President-elect)

### Panellist(s):

Stephanie L. Possehl (Secretary of Defense for Research and Engineering) Christopher Davey (Ford Motor Company)

Tom Strandberg (Syntell AB)

**Abstract.** SE Vision 2035 has been published in January this year as a major evolution of its predecessor Vision 2025. It takes a much broader view into the future and has much broader interpretation to which global challenges system approaches need to contribute.

The document is intended to guide and inspire the global SE community to cope with the ambitions addressed.

INCOSE has implemented a major initiative on the "Future of Systems Engineering" (FuSE), which is strongly oriented towards the evolution of the discipline to be able to "realize the vision".

This panel shall collect the views and expectations from government, academia, and industry to help shaping our activities during the next decade.

Marilee J. Wheaton (Systems Engineering Fellow, The Aerospace Corporation and INCOSE President)

### Panellist(s):

Tamara Hambrick (*Director of Systems Engineering, Integration, and Test (SEIT) Capability, Boeing Defense and Space*)

Alan Harding (Head of Information Systems Engineering, BAE Systems - Air)
Gary Johansen (Vice-President of Power Systems Engineering, Cummins, Inc.)

Rosalind Lewis (General Manager, Space Systems Group, The Aerospace Corporation)

**Abstract.** This panel features corporate executives who will share their lessons learned, best practices and practical suggestions for allyship and advocacy in support of Diversity, Equity, and Inclusion (DEI) goals. Each of us can commit to action to support our DEI goals within our companies and within INCOSE. Individuals who serve as allies become collaborators who fight injustice and promote equity in the workplace through supportive personal relationships and public acts of sponsorship and advocacy. Advocacy uses our resources to include time and talent to honor, support, and partner with people, institutions, and policies that align with our values and vision for a world of equity and justice.

Within INCOSE, we have an imperative to ensure that structures and mechanisms are in place to ensure that INCOSE is an organization where everyone can comfortably be their authentic self, recognizes themselves in other members, and has an equal voice and opportunity in their interactions within the organization. The definitions from the Accreditation Board for Engineering and Technology (ABET) provide a reference point for conversations and materials about diversity, equity, and inclusion.

- Diversity is the range of human differences, encompassing the characteristics that make one individual or group different from another.
- Equity is the fair treatment, access, opportunity, and advancement for all people, achieved by intentional focus on their disparate needs, conditions and abilities.
- Inclusion is the intentional, proactive, and continuing efforts and practices in which all members respect, support, and value others.

# Invited Panels

Exhibit Hall, Grand Riverview Ballroom A - Level 2

Research enabling the discipline of System Engineering .. *Thu, 1000-1210* Moderator(s):

Dinesh Verma (Stevens Institute of Technology)

### Panellist(s):

Dr. Martin Törngren (*KTH*) Dr. Jacco Wesselius (*ESI (TNO)*) Tom McDermott (*SERC*)

Abstract. A number of convergent developments – digital engineering, ubiquitous software, computational technologies, Al/ML, Autonomy, micro and nano sensors – are leading to increasingly complex systems in all aspects of society – healthcare, energy, transformation, and national security. Today's systems engineering toolkit seems increasingly in need of an upgrade. On the other hand, this is truly a period of renaissance in systems engineering research. This panel will focus on research priorities and challenges at a number of research centers in the US and Europe – and continue the engagement between systems engineering stakeholders in industry, government and academia.

# Technical Operations Invited Content

Room 260 - Level 2

### Moderator(s):

Carla Bailo (Center for Automotive Research (CAR))

Anne O'Neil (AOC Systems Consortium)

Abstract. Mobility sectors are currently undergoing a tremendous evolution – from electrification to advancing connected and autonomous vehicles. There have been new market entrants, supply chain challenges alongside trends for software defined vehicles, digitization and enhancing sustainability and cybersecurity.

Facing substantive levels of integration and complexity while innovating on multiple fronts – its timely to consider how and where tailored Systems practices and approaches can both shape and respond to these challenges and changes.

While hosted in the Motor City, we'll convene automotive executives to exchange perspectives on these industry dynamics, emerging Systems challenges and where Systems Engineering can play a greater role.

# Technical Operations Invited Content

Room 260 - Level 2

### Moderator(s):

Jimmie McEver (INCOSE - Technical Operations)

### Panellist(s):

Rick Dove Tom McDermott Stephen Sutton Erika Palmer Alan Harding

Abstract. One of the challenges – perhaps the fundamental challenge – in developing effective approaches to ensuring that our enterprises and their activities can succeed in a contested cyber environment is the transdisciplinary nature of the relevant ecosystem. The resilience of our missions and business activities is a complex function of considerations that manifest at different scales and from different perspectives, and that interact and influence each other in non-trivial ways. These considerations involve physical, information, cognitive/behavioral and social elements, and often result in fundamental tensions between diverse stakeholders that can only be identified and addressed through methods that cut across disciplines. The INCOSE community has articulated a systems engineering vision that is well-suited to enhance the ability of the community to address this challenge, and is developing an initiative to identify and synthesize key insights from INCOSE working groups to explore systems engineering for (and in) a contested cyber environment.

This panel will present some initial observations on this topic from a number of different INCOSE working group leaders, and is intended to motivate a broader INCOSE collaboration to synthesize transdisciplinary approaches and methods to enhance the effectiveness of the systems engineering community as we deal with a volatile and hazardous cyber environment.

### Moderator(s):

Mark Sampson (INCOSE);

### Panellist(s):

Robert Halligan (PPI) Elise Higgins (Medtronic) Emilee Bovre (NASA)

Abstract. While complex systems transform the landscape, the Systems Engineering discipline is also experiencing a transformation to a model-based discipline. In alignment with this, the International Council on Systems Engineering (INCOSE) is seeking to strategically accelerate this transformation. The approach is to build a broad community that promotes and advances model-based methods to manage unprecedented change, empower digital transformation and prepare companies for what's next to speed innovation. More specifically, to leverage the discipline of Systems Engineering and practice of model based systems engineering (MBSE) as the core capability to digitally transform for advantage.

# SE Fundamentals Sessions

Room 260 - Level 2

Dr. Jon Wade (University of California, San Diego)

Abstract. Systems engineering is the ability to create systems that create value meeting their customers' needs under their timelines while being trustworthy, economical, and sustainable. It is not about following a given process, using a specific set of tools, or anything else that is context free. Systems thinking is the art of understanding the context, the structure and processes, that create value. While useful for all systems, systems thinking is especially valuable in complex systems, where the relationships between cause and effect are uncertain. In the past system complexity and complication were sufficiently low so that it was possible for someone or some small number of people to completely understand the value chain and the necessary technical capabilities to create an elegant design. As the world has gotten increasingly complex and rapidly changing, with blurring lines between humans and machine via Artificial Intelligence and machine learning, the temptation has been to back away from the challenging job of understanding the value chain, and focusing on the cleaner, clearer job of engineering complicated systems. However, this "ballistic" form of engineering in which everything can be predicted and calculated is becoming increasingly irrelevant. This presentation will describe the predicament that systems engineering faces, and a possible path forward using Systems Thinking as a foundation.

Courtney Wright (V1 Decisions)

**Abstract.** The one activity most commonly associated with systems engineering is writing requirements. To paraphrase Ralph Waldo Emerson, "Requirements are a journey, not a destination." There is arguably more value in arguing about what to put in a list of requirements than in being given a thorough set of requirements but no opportunity to change it.

Two other things commonly associated with systems engineering are documents and process. This presentation will explain what does and doesn't matter in requirements processes (hint: no surprises! We hate surprises!) and will address the role printable documents have and will play in the future of requirements.

We'll use personal examples and consumer products to talk about requirements in our daily lives. You'll come away more familiar with the vocabulary of systems engineering and a confidence that you've done all this before, whether you knew it or not.

Tom Strandberg (Syntell)

Abstract. In an ever-changing market, how do you manage complexity while developing successful systems and products that are adaptable, resilient, and sustainable? A good architecture is critical for sustained success when dealing with complex systems in a changing environment. We will discuss how your strategic business goals and other aspect drive the arrangement of your elements and their relationships. To arrive upon this, we will clarify concepts such as architecture description, viewpoints, views, models, system elements, interfaces, and modular design. Architecting a system is often considered an art, but we will present some methods and tools that you can use to inject science and practice as you deliver systemic success.

# SE Fundamentals Sessions

MBSE – The Natural Evolution of Systems Engineering .... Mon, 1330-1410

Jon Holt (Scarecrow Consultants)

**Abstract.** There are many myths and misconceptions concerning the use of Model-based Systems Engineering. Perhaps one of the biggest areas of misunderstanding is that MBSE is not a subset of System Engineering but is, in itself, Systems Engineering.

In this presentation, Jon will discuss the main reasons why we need Systems Engineering and then go on to expound upon how this need, particularly with regards to complexity, has evolved over the last few decades. This presentation will point out that there is nothing wrong with a traditional approach to Systems Engineering which has, as people are not shy to point out, been used for decades quite successfully. However, as the complexity of our systems evolves, so does the need for more rigorous practices and techniques to cope with this.

The main statement of this presentation is, therefore, that MBSE is a natural evolution of a more-traditional document-based approach to Systems Engineering.

Duncan Kemp (UK Ministry of Defence)

**Abstract.** You don't need to have been around Systems Engineers for very long before you will hear someone claim that the programme they are on is challenging because they are building a System of Systems. They talk about the challenges that they are facing, the superhuman systems engineering they are doing, and the magical architectures they are building that will 'deliver coherence'.

Whilst there is some truth to the statement, System of Systems Engineering is neither as difficult nor as new as some people would suggest.

As someone who has spent most of his career working with Systems of Systems, I always feel that the conventional description of System of Systems misses the point. Engineering Systems of Systems is different than engineering systems. It requires a different mindset, a broader set of tools, a bit more humility, and a different focus that developing systems. It requires looking at things from a different perspective.

This presentation will start with a description of why and how systems of systems are different. But more importantly it will describe how to engineer systems of systems. You will learn why system of systems are, at times, easier to engineer than conventional systems. We will use a range of real-world examples, from Defence, Rail, and Information Services.



# SE Fundamentals Sessions

Dr. Nicole Hutchinson (Stevens Institute of Technology)

**Abstract.** If you sit down and talk with almost any high-level systems engineer about how they got into systems engineering, you'll hear similar answers: "I came to systems engineering in an unusual way." "I got into systems engineering through a circuitous route." "I was doing systems engineering for years before I learned it was 'systems engineering." For years as engineers and programmatic folks worked up through the ranks, they learned the value of a systems perspective, applying it to bring diverse teams together to achieve a common vision. But few had formal training in "systems engineering". Fast forward to today, when there are 56 systems engineering programs in the US alone, most at the graduate level, but a handful at the undergraduate level. What can your career look like when you learn there is something called "systems engineering" in your teens or twenties instead of in your forties?

In this talk I will share knowledge and experiences gleaned from hundreds of systems engineers around the world – from the most junior to the very senior – about what makes systems engineers tick and how we can take control of our own careers. We will explore what it means to be a systems engineer (with or without the title) and how you can improve your self-awareness about your systems engineering skills. We will build on this to talk about what types of information you can have in your toolbox to drive your own career and growth in systems.

**Abstract.** Systems engineering (SE) competency offers the possibility of invention-on-demand, and thus a virtual license to print money. There is ample evidence of effectiveness, and abundant warning of the impact of ignoring SE. Therefore, ignorance of SE is no longer an excuse, nor is a lack of available expertise a viable reason for failing to leverage the power of systems engineering.

Given that every market force would favor adopting SE as quickly as possible, why then do so many leaders stubbornly ignore the opportunity? In this presentation we'll explore the forces more powerful than profit and leave you with practical ideas for overcoming them.



# Platinum Sponsors



www.3ds.com

Sponsor track:

Mon 27, Jun 13:30-14:00 (140B - Level 1) Tue 28, Jun 15:30-16:00 (140B - Level 1) Wed 29, Jun 11:30-12:00 (140B - Level 1)

**Booth:** B9-B10

Dassault Systèmes, the 3DEXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our 3DEXPERIENCE platform and applications, our customers push the boundaries of innovation, learning, systems engineering and production. Our 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. 3DEXPERIENCE on the Cloud provides all organizations with a holistic real-time vision of their business activity and ecosystem, connecting people, ideas, data and solutions in a single collaborative and interactive environment available at all times.



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Sponsor track:

Mon 27, Jun 10:00-10:30 (140B - Level 1) Tue 28, Jun 10:00-10:30 (140B - Level 1) Wed 29, Jun 10:00-10:30 (140B - Level 1)

**Booth:** C9-C10

IBM is the global leader in business transformation through an open hybrid cloud platform and Al, serving clients in more than 170 countries around the world. With 28 consecutive years of patent leadership, IBM is committed to being a responsible innovator and a force for good in the world.

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www.siemens.com

### Sponsor track:

Mon 27, Jun 14:15-14:45 (140B - Level 1) Tue 28, Jun 10:45-11:15 (140B - Level 1) Wed 29, Jun 10:45-11:15 (140B - Level 1)

Booth: C4-C5

Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Xcelerator, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, helps companies of all sizes create and leverage a comprehensive digital twin that provides organizations with new insights, opportunities and levels of automation to drive innovation.

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www.aerospace.org

### Sponsor track:

Mon 27, Jun 11:30-12:00 (140B - Level 1)

The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center. Aerospace addresses complex problems across the space enterprise and other areas of national and international significance through agility, innovation, and objective technical leadership.

# Silver Sponsors



www.pure-systems.com

Sponsor track:

Tue 28, Jun 11:30-12:00 (140B - Level 1)

Booth: B2

As a provider of the world's leading software solution for holistic variant management, we have been helping our customers optimize product line engineering and related processes for over 20 years. pure::variants is the "Single source of truth" solution to ensure consistent product variants across the entire product engineering tool chain.



www.saic.com

Sponsor track:

T<mark>ue 28, J</mark>un 11:30-12:00 (140B - Level 1)

SAIC® is a premier Fortune 500® technology integrator driving our nation's technology transformation. Our secure high-end solutions across the defense, space, civilian, and intelligence markets include engineering, digital, artificial intelligence, and mission solutions. Headquartered in Reston, Virginia, SAIC has approximately 26,000 employees and annual revenues of about \$7.4 billion.



www.ansys.com

Booth: C6

Ansys software extends the reach of simulation in every direction. From the design of a microchip to the orchestration of satellite constellations, simulate everything. From initial design through sustainment, simulate continually. True digital transformation is within reach when you take a leap of certainty with Ansys solutions.

# BAE SYSTEMS

www.baesystems.com

At BAE Systems our dedication shows in everything we create and deliver from advanced electronic systems to cyber operations and intelligence analysis from combat vehicles to naval weapons and from ship maintenance and modernization to vehicle upgrades and services. We deliver a critical advantage to our customers where it counts.



www.biglever.com

Booth: B7

BigLever Software is the long-standing leader in Product Line Engineering. Its PLE solution delivers the leading-edge technology, proven methodology, business strategy and organizational change expertise needed to efficiently transition to and operate a game changing PLE practice. The company's state-of-the-art PLE tools and methods are widely used in complex engineering organizations across aeronautics, defense, automotive, and more. Our experts are active INCOSE leaders, and our solution conforms with the INCOSE and ISO Feature-based PLE guidance and standards, helping organizations with their transition and steady state operation, to gain the dramatic benefits and risk reduction. For more information, visit biglever.com



www.boeing.com

Booth: B1

As a leading global aerospace company, Boeing develops, manufactures and services commercial airplanes, defense products and space. Boeing's diverse team is committed to innovating for the future, leading with sustainability, and cultivating a culture based on the company's core values of safety, quality and integrity. Join us.



www.eclipse.org/capella/

Booth: D2

Capella is an open-source MBSE tool enabling the design of system architecture models. Natively supporting the Arcadia method, it is a comprehensive, extensible, and field-proven solution with a vibrant ecosystem and fast-growing community of users worldwide, in many industries, from small to very large and critical projects.

# Deloitte.

www.deloitte.com

Booth: D5

Deloitte is the largest professional services firm in the world, and an industry leader in digital transformation, analytics, IT modernization, cloud services, and cybersecurity. Innovation, transformation, and leadership occur in many ways. The ability to solve complex issues is critical. Together, we can help you imagine, deliver, and run your business, wherever you compete, using the latest technologies like cloud and cognitive, from strategy development through implementation.



# www.maplesoft.com/products/maplembse/

Booth: C7

MapleMBSE software and services accelerate the benefits of MBSE in your Digital Enterprise initiatives. Build depth into your systems engineering model by connecting people, processes and platforms without slowing down the project tasks. Using MapleMBSE, systems knowledge becomes simpler to capture from cross-discipline stakeholders, boosting engagement and making the model more reliable.



# www.methodpark.com

Booth: B3

Method Park by UL specializes in complex product engineering in the environments of the automotive, medical, and aerospace industries. The company's portfolio includes consulting and engineering services, a comprehensive training program, and the #1 tool for managing processes in product development: "Stages". Method Park by UL has coached its global customers on process optimization, compliance with industry-specific standards, and legal regulations.



## www.ppi-int.com

Through expert SE-related training and consulting, Project Performance International (PPI) improves companies and the lives of engineers worldwide. Having alumni of over 17,000 professionals across almost every imaginable sector in 41 countries, we have been working for two decades alongside other name companies in improving the practice of engineering.



The way to see the future

www.usa.sener

SENER US is a subsidiary of the Global SENER Group, which brings together its own aerospace and engineering activities with industrial holdings in companies working in the field of energy through SENER Renewable Investments. SENER Aerospace has more than 50 years of experience and is a top international supplier in space, defense and science. SENER Engineering has become a leading company worldwide in infrastructure, energy and marine.



www.studiose.design

Booth: C3

Studio SE professionals bring exemplary experience, knowledge, and ingenuity that empowers your organization to develop innovative, unique solutions and effective processes. Learn to effectively, efficiently deploy MBSE, Systems Engineering, and Project Management. Give your teams the training and support they need to drive your technology and company forward. Let's begin!

# TOSHIBA

Toshiba Digital Solutions Corporation

www.global.toshiba/ww/products-solutions/manufacturing-ict/venetdcp.html

Toshiba Digital Solutions Corporation delivers system integration and digital service solutions that support companies in accelerating their digital transformation. In the symposium, we are presenting our Distributed Cosimulation Platform, VenetDCP. VenetDCP connects numerous models, various development tools, and different companies in cyberspace to provide an environment that enables joint verification.

# WILEY

# www.wiley.com

Wiley, a global leader in research and education, unlocks human potential by enabling discovery, powering education, and shaping workforces. For over 200 years, Wiley has fueled the world's knowledge ecosystem. Today, our high-impact content, platforms, and services help researchers, learners, institutions, and corporations achieve their goals in an everchanging world.

# Academic Sponsors

# Caltech

ctme.caltech.edu

Booth: A9

Systems engineering leaders choose Caltech CTME for customized professional development and learning programs that build organizational capabilities, skilled teams, and solutions-oriented mindsets. Learners tackle project-based challenges guided by Caltech experts. Advanced SE/MBSE and Systems Architectures programs are now available.



www.engr.colostate.edu/se/

The Department of Systems Engineering at Colorado State University is a graduate-only program delivering systems-thinking and innovative solutions for the world's most difficult and complex problems. We offer a graduate certificate, M.S., M.E., Ph.D., and D.Eng. in systems engineering. Our flexible and robust program is available in-person or online.

# Academic Sponsors



GTRI.gatech.edu

www.gtri.gatech.edu

Booth: A7

Georgia Tech Research Institute (GTRI) develops advanced technological solutions and large-scale system prototypes to address the most difficult problems in national security, economic development and the overall human betterment. Core research areas include complex and agile systems engineering, sensor design and integration, information management and cybersecurity, and defense technology development.



# engineering.jhu.edu

Booth: A8

Whether attending a lecture on the Homewood campus, working in a laboratory at the acclaimed Johns Hopkins School of Medicine, or enjoying the vibrancy of Baltimore, our full-time graduate students have access to faculty, research opportunities, and resources unrivaled among our peer institutions.



sercuarc.org

Booth: A3

The Systems Engineering Research Center (SERC) a University Affiliated Research Center (UARC) of the US Department of Defense leverages the research and expertise of faculty staff and student researchers from more than 20 collaborating universities throughout the United States. SERC is unprecedented in the depth and breadth of its reach leadership and citizenship in Systems Engineering.

# Academic Sponsors



utc-iase.uconn.edu

Booth: A5

The UConn UTC Institute for Advanced Systems Engineering serves as a hub for world-class research project-based learning by globally-distributed teams of students and industrial outreach activities focused on model-based systems engineering (MBSE) of complex systems that are built from and are dependent on the synergy of computational and physical components.



eng-sci.udmercy.edu/academics/engineering/professional-programs.php

Founded in 1877 by the Society of Jesus (the Jesuits), University of Detroit Mercy is Michigan's largest and most comprehensive Catholic university. In 1990, University of Detroit consolidated with Mercy College of Detroit, which was founded in 1941 by the Religious Sisters of Mercy, to form University of Detroit Mercy. Detroit Mercy offers more than 100 undergraduate, graduate and professional academic degrees and programsthrough seven schools and colleges. Detroit Mercy educates the whole person, focusing on the value of excellent academics, service to the community and a deeper spirituality to prepare graduates to live lives of purpose. For more information, please visit www.udmercy.edu.

University of Detroit Mercy's Graduate Certificate in Systems Engineering with INCOSE Equivalence is offered in an on-line delivery. The curriculum is hands on and world class delivered by experts in the field of systems engineering. This 15 Credit (5 course) Graduate Certificate stacks directly to a Full Masters Degree in Product Development furthering leadership skills and depth of knowledge in Systems Engineering.

# **Exhibitors**

### **Exhibition Hours**

B8 - Jama Software.....

Exhibit Hall. Grand Riverview Ballroom B - Level 2

Monday	. 0930 - 1930
Tuesday	. 0930 - 1800
Wednesday	. 0930 - 1700
Thursday	. 0930 - 1330

# Corporate Booths

C6 - Ansyswww.ansys.com
Ansys is a bronze sponsor - please see the sponsors pages for more information.
B7 - BigLever
BigLever is a bronze sponsor - please see the sponsors pages for more information.
B1 - Boeing
Boeing is a bronze sponsor - please see the sponsors pages for more information.
D2 - Capella
Capella is a bronze sponsor - please see the sponsors pages for more information.
B9-B10 - Dassault Systemes
Dassault Systemes is a platinum sponsor - please see the sponsors pages for more information. $ \\$
D5 - Deloite
Deloite is a bronze sponsor - please see the sponsors pages for more information.
C9-C10 - IBMwww.ibm.com/us-en/
IBM is a platinum sponsor - please see the sponsors pages for more information.

Sponsor-exhibitor track: Tue 28, Jun 10:00-10:30 (140C - Level 1)

...... www.jamasoftware.com

Jama Software provides the leading platform for requirements, risk, and test management. With Jama Connect™, engineering teams realize improved cycle times, increased quality, improved time to compliance and faster time-to-market.

D1 - LieberLieber / IncQuery ......www.lieberlieber.com

LieberLieber is a software engineering company. The know-how of the employees lies in model-based software and system design based on tools such as Enterprise Architect from Sparx Systems. LieberLieber's customers are companies that place particular importance on the quality of their software and systems development. They wish to maintain a constant overview of their complex development scenarios while ensuring that security-relevant requirements are clearly represented in models.For this task LieberLieber provides its own special tools, such as LemonTree and Embedded Engineer. In addition, LieberLieber offers a range of useful tool integration services to help make our customers' development processes more productive.

# **Exhibitors**

The IncQuery Group is a digital thread analytics company with an international team of engineering experts. Our flagship product, the IncQuery Suite, can revolutionize your systems engineering processes by boosting productivity. We also provide consultancy for R&D projects, tool customization, toolchain integration, or developing custom software according to your specifications.

C7 - Maplesoft ......www.maplesoft.com/products/maplembse/

Maplesoft is a bronze sponsor - please see the sponsors pages for more information.

B3 - Method Park ......www.methodpark.com

Method Park is a bronze sponsor - please see the sponsors pages for more information.

**D3 - Mirabilis Design Inc.** *www.mirabilisdesign.com* **Sponsor-exhibitor track:** Tue 28, Jun 11:30-12:00 (140C - Level 1)

Mirabilis Design is the Only Commercial Provider of System-level IP and Simulation Solutions for Architecture Exploration of systems, software, networks and semiconductors. Users create a virtual prototype, map behavior or SysML to architecture, simulate for different configuration and topologies, and generates continuous insight on timing deadlines, power consumption and QoS.

**B2 - pure-systems GmbH** .......www.pure-systems.com

pure-systems GmbH is a silver sponsor - please see the sponsors pages for more information.

**D4 - SE Scholar, LLC** .....se-scholar.com

SE Scholar is a company dedicated to helping Systems Engineers get their INCOSE SEP certification. Our goal is to reach all Systems Engineers with affordable, high-quality instruction no matter where they live or work!

**C4-C5 - Siemens Digital Industries Software** ...... www.sw.siemens.com/en-US/

Siemens Digital Industries Software is a platinum sponsor - please see the sponsors pages for more information.

B5 - SodiusWillert......sodiusWillert.com

SodiusWillert is a global software tools vendor specialized in developing powerful extensions for leading systems and software engineering tools. We help customers in highly regulated industries deliver products to market faster by extending systems engineering tools' capabilities, boosting engineers' productivity, and fostering team collaboration.

SPEC Innovations' flagship software solutions, Innoslate and Sopatra, help teams reduce time-to-market, cost, and risk on even some of the most complex systems and processes. Innoslate supports the entire system or lifecycle and provides you with the ability to perform requirements management, modeling, simulation, and testing, in one tool. www.innoslate.com

## **Exhibitors**

C3 - Studio SE, Ltd. .....www.studiose.design

Studio SE professionals bring exemplary experience, knowledge, and ingenuity that empowers your organization to develop innovative, unique solutions and effective processes. Learn to effectively, efficiently deploy MBSE, Systems Engineering, and Project Management. Give your teams the training and support they need to drive your technology and company forward. Let's begin!

**C1-C2 - The Reuse Company.** *www.reusecompany.com* **Sponsor-exhibitor track:** Mon 27, Jun 16:15-16:45 (140B - Level 1)

The REUSE Company is an organization specialized in the application of Semantic Representation and Analysis Technologies to a wide range of industries (Aerospace, Defense, Automotive, Naval, Health, Industrial machinery...). Our customers are usually (but not limited to) safety oriented organizations.

**B6 - Tom Sawyer Software Corporation......** www.tomsawyer.com

Tom Sawyer Software is the leading provider of graph and data visualization software for Systems Engineering. Our MBSE solution, built with Tom Sawyer Perspectives, transforms diagram creation, navigation, and customization into an automated process with interactive web-based and desktop views.

**B4 - Zuken Vitech Inc.** *www.vitechcorp.com* 

For 30 years, Vitech has helped organizations raise their systems engineering proficiency through a tailored combination of software, training, and services.

## Academic Booths

Caltech CTME is an academic sponsor - please see the sponsors pages for more information.

A7 - Georgia Tech Research Institute ......www.gtri.gatech.edu

Georgia Tech Research Institute is an academic sponsor - please see the sponsors pages for more information.

A8 - Johns Hopkins University, Whiting School of Engineering ......engineering.jhu.edu

Johns Hopkins University, Whiting School of Engineering is an academic sponsor - please see the sponsors pages for more information.

A4 - Purdue Systems Collaboratory/Purdue University .......www.purdue.edu/collaboratory/

The Purdue Systems Collaboratory contributes foundational systems-thinking principles and a holistic perspective, to education, research, and practice through value-added collaborative models. PSC drives home the concept of the convergence of knowledge – across the physical sciences, social sciences, arts, life sciences – which sets us apart from other universities.

## **Exhibitors**

A3 - Systems Engineering Research Center - SERC ...... sercuarc.org

Systems Engineering Research Center - SERC is an academic sponsor - please see the sponsors pages for more information.

University of Connecticut UTC Institute for Advanced Systems Engineering is a bronze sponsor - please see the sponsors pages for more information.

A1 - Worcester Polytechnic Institute .......www.wpi.edu/academics/online

Innovation in systems engineering happens quickly, which means it's crucial for academia to work closely with industry to address the evolving challenges and opportunities. Through a combination of courses in engineering, science, and management, WPI's graduate programs prepare professionals for challenging careers in Systems Engineering. Learn more at online.wpi.edu.

## **INCOSE**

**Upcoming Events.** Learn more about upcoming events from the event organizers at the INCOSE Village.

**Website.** Do you have questions about the new website? Get your questions answered at the village.

## D9-D10 - INCOSE Lounge

## A2 - Professional Development Portal (PDP) & Systems Engineering Education Ecosystem (SEEE)

The Professional Development Portal (PDP) is a comprehensive solution for Systems Engineers and other professionals who want to enhance their systems engineering knowledge. The Systems Engineering Education Ecosystem (SEEE) provides mechanisms by which educators, students and employers can communicate their specific educational capabilities and needs. Both are available for testing.

## Sponsor/Exhibitor Track

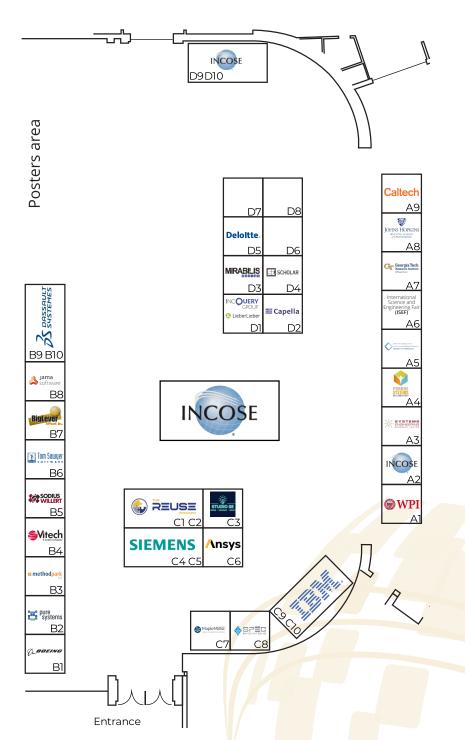
## Monday June 27

IBM (C9-C10)	
SPEC Innovations (C8)	
The Aerospace	
Dassault Systemes (B9-B10)	
Siemens Digital Industries Software (C4-C5)14:15-14:45 (140B - Level 1)	
The Reuse Company (C1-C2)16:15-16:45 (140B - Level 1)	
Tuesday June 28	
IBM (C9-C10)	
Jama Software (A7)	
Siemens Digital Industries Software (C4-C5)10:45-11:15 (140B - Level 1)	
SodiusWillert (B5)	
SAIC	
Mirabilis Design Inc. (D3)11:30-12:00 (140C - Level 1)	
Dassault Systemes (B9-B10)	
Wednesday June 29	
IBM (C9-C10)	
Siemens Digital Industries Software (C4-C5)10:45-11:15 (140B - Level 1)	
Dassault Systemes (B9-B10)11:30-12:00 (140B - Level 1)	
pure-systems GmbH (B2)13:30-14:00 (140B - Level 1)	



## Exhibit Hall Map

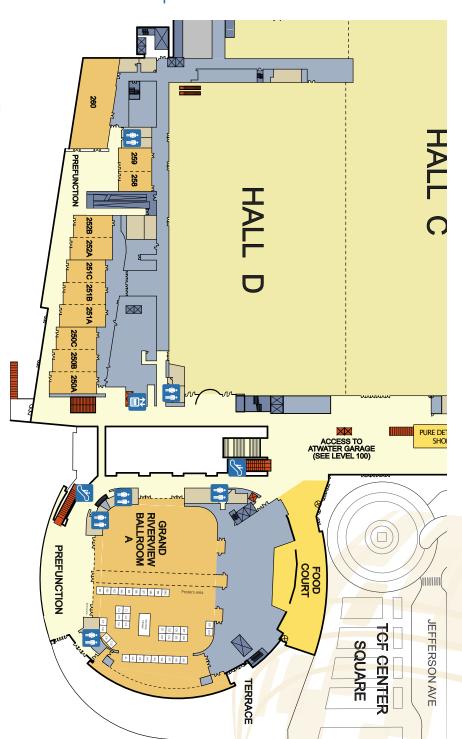
Exhibit Hall, Grand Riverview Ballroom B - Level 2



## Maps - Level 1



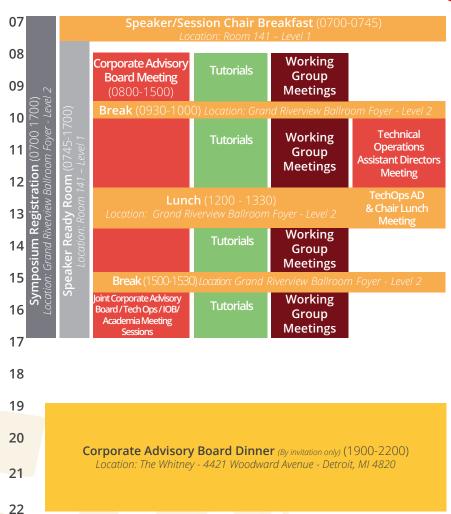
## Maps - Level 2



## Saturday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



## Saturday

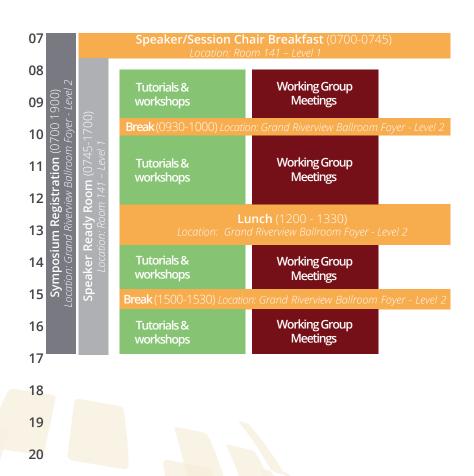
## **Tutorials**

A.1: Back to Basics: Fundamentals for Systems Engineering Success
David Long
250A - Level 2 (Ticket required)
A.2: Systems Security Engineering: A Loss-Driven Focus0800-1700 Mark Winstead, Michael Mcevilley, Daryl Hild (The MITRE Corporation)  250B - Level 2 (Ticket required)
A.3: Systems Engineering an Off-Grid Utility System – A MBSE Tutorial 0800-1700
Steve Cash 250C - Level 2 (Ticket required)
A.4: Behavior control: methodology and framework for integrating socio-technical systems
A.5: Artificial Intelligence for Systems Engineers: Going Deep With Machine Learning and Deep Neural Networks
A.6: Modelling Systems of Systems Without Drowning: Using ISO 24641-Compliant ARCADIA Methodology
C.1. Back to Basics: Thinking Like a Systems Engineering Practitioner
Dave Walden (Sysnovation) 250A - Level 2 (Ticket required)

## Sunday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



## Sunday

## **Tutorials**

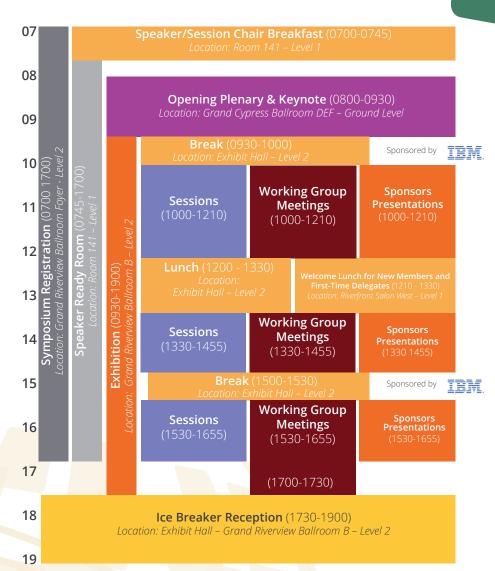
E.1: Systems 101 - An Introductory Tutorial on Systems Thinking and Systems Engineering0800-1700
Jawahar Bhalla (JB Engineering Systems)
Presented remotely - 250A - level 2 (Ticket required)
E.2: Systems Engineering by the Book0800-1700
Paul Martin (SE Scholar, LLC)
250B - Level 2 (Ticket required)
E.3: Negotiation, Persuasion and Conflict Management for the Systems Engineer
Zane Scott (Vitech Corporation)
250C - Level 2 (Ticket required)
E.4: Complex System Governance: Practical Implications for Improving Complex System Performance
Joseph Bradley (Old Dominion University) Richard Hodge (DrRichardHodge.com)
251A- Level 2 (Ticket required)
E.5: Building Really Big Systems with Lean-Agile Practices 0800-1200
Harry Koehnemann (Scaled Agile) Robin Yeman, Jeff Shupack (Project & Team)
251B - Level 2 (Ticket required)
G.5: Trustworthy Secure Design
Heidi Davidz (Aerojet Rocketdyne); Eileen Arnold (ConsideredThoughtfully.com); Dale Thomas (University of Alabama in Huntsville)
251B - Level 2 (Ticket required)



## Monday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



SIEMENS

## Keynote Speaker

## **Dr. Christopher J. Scolese** DIRECTOR, NRO



Keynote Title:

## Architecting the Future: The Role of SE and DE at the NRO

**Biography.** Dr. Christopher J. Scolese was sworn-in as Director, National Reconnaissance Office (NRO) on 5 August 2019. He is the 19th Director, and the first to be Presidentially Appointed and Senate Confirmed.

Dr. Scolese provides direction, guidance, and supervision on matters pertaining to the NRO and executes other authorities specifically delegated by the Secretary of Defense and the Director of National Intelligence.

Dr. Scolese began his government career as a United States Naval Officer in 1978, supporting a variety of Naval Nuclear Propulsion Programs for the U.S. Navy and the Department of Energy.

In 1987, following a brief period of service working in government and industry, Dr. Scolese joined the National Aeronautics and Space Administration (NASA) where he was assigned to the Goddard Space Flight Center in Greenbelt, Maryland. During this period, he served in a variety of senior management positions including: Earth Observing System (EOS) Systems Manager, EOS Terra Project Manager, EOS Program Manager, and Deputy Director of Flight Programs and Projects for Earth Science.

In 2001, Dr. Scolese was assigned to NASA Headquarters in Washington, D.C. where he served as the Deputy Associate Administrator in the Office of Space Science. In this position, he was responsible for the management, direction, and oversight of NASA's Space Science Flight Program, mission studies, technology development, and overall contract management of the Jet Propulsion Laboratory.

In 2004, he went on to become Deputy Director, Goddard Space Flight Center, where he assisted the Director in overseeing all activities, before returning to Washington, D.C. to become NASA's Chief Engineer in 2005. As Chief Engineer, he was responsible for ensuring all development and mission operations were planned and conducted on a sound engineering basis. In 2007, he was appointed the Associate Administrator, responsible for the oversight and integration of NASA's programmatic and technical efforts. From January-July 2009, Dr. Scolese served as NASA's Acting Administrator, responsible for leading the development, design, and implementation of the nation's civil space program.

In 2012, Dr. Scolese became the Director, Goddard Space Flight Center, where he led the nation's largest organization of scientists, engineers, and technologists responsible for building spacecraft, instruments, and new technology to study Earth, the sun, our solar system, and the universe. On 31 July 2019, he retired from NASA to become the Director, NRO.

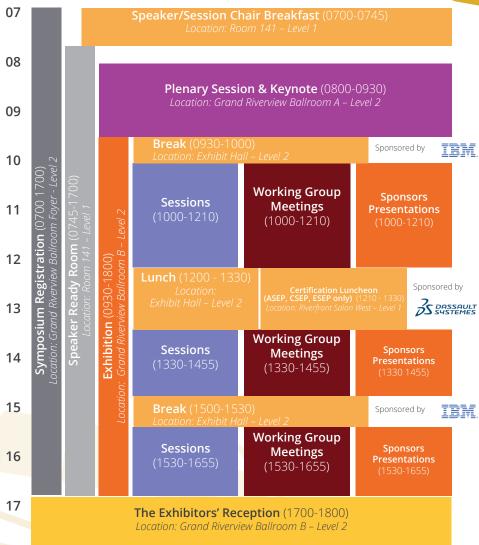
Dr. Scolese holds a Bachelor of Sciences degree in Electrical and Computer Engineering from the State University of New York at Buffalo, Buffalo, New York; a Master's degree in Electrical and Computer Engineering from George Washington University, Washington, DC; and a Ph.D. in Systems Engineering from George Washington University, Washington, DC. Originally from Buffalo, New York, Dr. Scolese and his wife, Dianne, currently reside in Springfield, Virginia.

**Abstract:** Since its inception more than 60 years ago, the National Reconnaissance Office has worked to secure and expand the U.S. intelligence advantage by developing, acquiring, launching, and operating the world's best space-based intelligence, surveillance, and reconnaissance, or ISR, capabilities. That mission is unwavering. But the world in which we operate has changed. Over the past two years, we learned we could no longer take anything for granted. Some of the processes and systems we relied on proved unreliable. The pandemic showed that the global supply chain is fragile, and Russia's assault on Ukraine made it harder to access raw materials. Rather than bemoaning the fact that what worked in the past may not work in the future, we can embrace this changing world as an opportunity. This presentation will explore how the NRO aims to take advantage of new capabilities to be faster and more efficient, relying on systems engineers and their digital engineering tool box to mitigate risks and architect the future.

## Tuesday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



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## Keynote Speaker

## Carla Bailo

Center for Automotive Research (CAR)



## Keynote Title:

## **Mobility and System Engineering Integration**

**Biography.** Carla Bailo is the President and CEO of the Center for Automotive Research (CAR), and is a leader in engineering and vehicle program management with 42 years of experience in the automotive industry. Under her leadership, CAR continues to be a preeminent resource of objective and unbiased research, analysis, and information regarding the North American automotive industry.

In addition to her role at CAR, Ms. Bailo is currently an Independent Director on the corporate boards for SM Energy (SM) and Advance Auto Parts (AAP).

Prior to joining CAR, she was most recently the assistant vice president for mobility research and business development at The Ohio State University. She also has 25 years of experience at Nissan North America, Inc., where she served as senior vice president of research and development. Ms. Bailo also spent 10 years at General Motors. She has a MS degree in mechanical engineering from the University of Michigan and a BS degree in mechanical engineering from Kettering University.

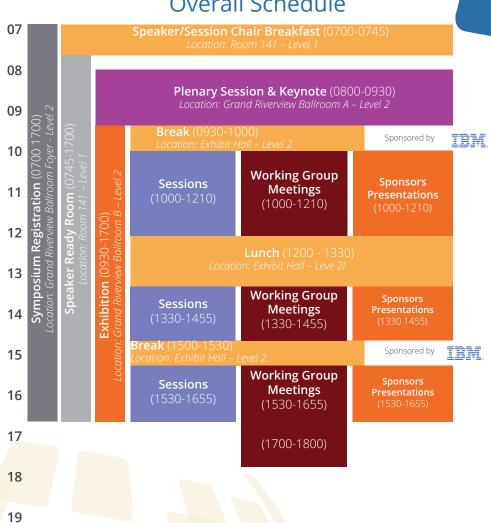
**Abstract.** The automotive and mobility industries have been undergoing dramatic shifts in the last decades. Emerging modern methodologies such as electrification, digitalization, artificial intelligence (AI), connectivity, automation, and shared mobility have collided with new ways to move people and goods. This technology is driving innovations such as mobility charging solutions, ride-hailing and sharing, and robotics. This is totally disrupting the mobility ecosystem of today and creating a much more equitable future.

This presentation will review the industry and technology updates its systems engineering impact on product development, infrastructure, and more.

## Wednesday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



## **INCOSE After Dark**

(Doors open at 20:00) Location: Grand Riverview Terrace - Level 2

21 22

20

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## Keynote Speaker

## Laura Doughty

Director Peakfield Consultancy Ltd and currently Head of Culture and Engagement, Project Delivery Directorate, Sellafield Ltd

Keynote Title:

## The Power of connection: The power of influencing and how to do it

**Biography.** Laura has over 25 years' experience in designing, building and leading multi-agency teams to achieve results from strategy, inception and planning through to delivery and operations. Her delivery track record reflects her approach which is centred on stakeholder engagement and the ability to foster robust relationships with multiple parties.

Laura is currently supporting Sellafield Ltd, Europe's largest nuclear site, to foster the culture and stakeholder environment needed to support a 20-year industry partnership that will deliver £7 billion (GBP) of major projects. Previously she assisted High Speed 2 Ltd with the unprecedented stakeholder programme associated with a £40+ billion (GBP) new railway. She led the business change strategy and architecture for the Digital Railway, an industry-wide initiative to transform and modernise Great Britain's railway. As part of the London 2012 Olympic and Paralympic Games, Laura led multi-agency teams that saw operators, government, security and organisers come together and work in new ways to perform as 'one team transport'. She also established and led a pan-Government office for a \$107 billion (AUD) sustainable urban growth infrastructure programme for Queensland, including advising Cabinet Ministers and Construction CEOs.

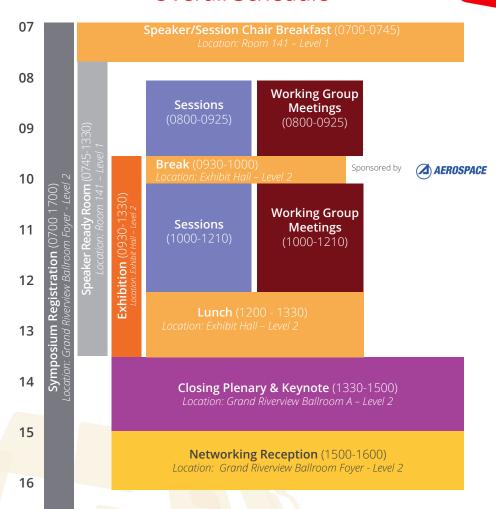
Laura is also an Executive Coach and Mental Health First Aid Instructor. She has undertaken reviews and provided advice, facilitation and stakeholder engagement support to a wide range of organisations, including HM Treasury on the £375 billion (GBP) 2013 UK National Infrastructure Plan.

**Abstract.** It can be frustrating, even demoralising, to develop technically excellent and highly useful ideas to then have them disregarded without due consideration – sometimes without any consideration. In her talk, Laura will explain why what you develop is only part of the solution. Knowing who you need and how to connect them to your ideas is key to achieving them. She will go on to share tips and techniques for how to achieve this in a range of situations with a range of personalities. Spoiler alert, the key to influencing starts with you doing the listening. Knowing who to listen to, how to engage them and what to do with what they tell you can help you create better solutions and foster the commitment to ensure their delivery.


## Thursday

Please see detailed program for all sessions and Working Group meetings.

## **Overall Schedule**



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## Keynote Speaker

## **Christopher Davey**

Global R&A Senior Global Manager for Systems Engineering, System Safety, Modelling & Simulation and Senior Technical Leader in Software & Control Systems Engineering, Ford Motor Company

## Keynote Title:

## Ford's Connected-Agile, Model Based Systems Engineering and Simulation Journey....so far.

**Biography.** Christopher Davey is currently Global R&A Senior Global Manager for Systems Engineering, System Safety, Modelling & Simulation and Senior Technical Leader in Software & Control Systems Engineering. He has a bachelors in Controls Systems Engineering and Masters' degrees in Advanced Systems Engineering and Engineering Management. Christopher has over 30 years of automotive experience working across global regions in diverse engineering teams such as Research, Electrical Systems, Powertrain Systems and Vehicle Program Launch. Christopher has a passion for applying advanced systems engineering and simulation methods to all aspects of innovation, design, implementation, and validation. He currently leads the application of SE, Safety and Simulation to advanced ADAS, AV and EV systems using an Integrated Al/ML based SE-Modelling & Simulation Framework. He led the team that successfully applied these agile MBSE capabilities to develop the real-time control systems for the F150 Lightening and Mustang Mach-E Electric prototypes. Previously, Mr. Davey developed and deployed Ford's Model Based Design (MBD) and Autocode process and Ford's global In-Vehicle Software (IVS) Releasing & Updates solution. The IVS solution was launched across all global assembly plants and dealerships, delivering in a warranty avoidance of over \$2Billion. He also led the development and deployment of an industry first, Global Vehicle Systems & Software Engineering Management solution (VSEM). This enterprise wide, systems engineering solution provided a functional architecture driven, fully traceability EE and SW management capability, enabling re-use and impact analysis. Mr. Davey was also a US expert in the development of the ISO26262 functional safety standard and has led Ford's roll-out of both ISO26262 & Safety of the Intended Function (SoTIF) standards. Mr. Davey is a member of INCOSE and IET, a regular contributor to NAFEMS and a Professional-Chartered Engineer with 30+ US Patents.

**Abstract.** Ford Motor Company is committed to helping build a better world, where every person is free to move and pursue their dreams. This will be advanced through the delivery of outstanding Electric Vehicles (EVs) with compelling connected vehicle services, Advanced Driver Assistance Systems (ADAS) and mobility solutions including self-driving Autonomous Vehicle (AV) technologies. These System-of-System (SoS) solutions will require that we leverage a diverse, global, agile Systems Engineering team that can extract actionable information from, and respond to, real-time connected customer experience data. This presentation will describe the Ford Model Based Systems Engineering (MBSE) journey. It will describe how our MBSE solutions have evolved and adapted to different system, software and technology complexity challenges, resulting in a Connected and Integrated, Agile, Model Based Systems Engineering & Simulation solution. The presentation will provide examples of how this Systems Engineering approach has been successfully applied to EV, ADAS and AV systems analysis and design. It will discuss some lessons learned on the tradeoffs encountered when balancing "just enough" formalism (ontologies and standards) with scaled agility and risk. It will conclude by discussing the power of a harmonized systems engineering-enterprise-wide, Al/ML powered, digital-twin/ digital thread solution. It is a fantastic time to be a system engineer. It is also an important time for us all to contribute where-ever and how-ever we can to help solve the many significant societal challenges.

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NINTAC





## hybrid event

Honolulu, HI, USA July 15 - 20, 2023

## Mark your calendar now! July 15 - 20, 2023

Submission date for papers, tutorials, panels and paperless presentations: **November 21, 2022** 



Call for Papers



Call for Panels/ Roundtables



Call for Tutorials



Call for paperless presentations



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4

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6

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## **Connection with** participants

The International Symposium offers many opportunities for sponsors to interact with participants:





Coffee breaks: all coffee breaks are organized on the exhibit hall



**Sponsor track:** sign up for a 30 minute time slot in our Sponsors Track and take advantage of this unique opportunity to deliver a nonrefereed presentation to symposium attendees



**Receptions:** (receptions held in the exhibit hall) connect in a relaxing atmosphere and present your services and products.



**Chat:** connect to all participants through a private chat available on the IS2023 APP and the dedicated virtual platform



## **Our promotion** tools

Ouarterly Newsletter over 12,000 recipients

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1,900 menbers

3,450 members

어 350 menbers

**in** 16,500 members

2,720 members

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## 2022 INCOSE Leadership

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## IS2022 Team

Technical Program

Dave Walden, Sysnovation

Robert Wirthlin, Ford Motor Company (Co-chair)

Plenary and Keynote Sessions

Donna Long, INCOSE Asc Dir Events

Technical Operations Liaison

TJ Ferrell, Boeing

Krystal Porter, Leidos (Co-chair)

Master of Ceremonies

Michael Vinarcik, SAIC

Marketing & Communications

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Local Chapter liaisons

Robin Mikola, Systemxi

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## Mark Your Calendar

Join us for



33<sup>rd</sup> Annual INCOSE international symposium

hybrid event

Honolulu, HI, USA July 15 - 20, 2023

Submission date for papers, tutorials, panels and paperless presentations: **November 21, 2022** 

## **Future events**

**SEP** 11-14

Systems Engineering Test and Evaluation (SETE) Conference 2022

Canberra, ACT, Australia

**SEP** 30-Oct 2



**2022 Western States Regional Conference (WSRC)** Golden, CO, USA

www.incose.org/wsrc

**NOV** 18-20

**2022 Human System Integration (HSI) Workshop** Torrance, CA, USA

**JAN** 28-31



**2023 Annual INCOSE International Workshop (IW)** Torrance, CA, USA

www.incose.org/IW2023

**APR** 24-27

**EMEA SEC and EMEA Workshop 2023**