MEMBERS NEWSLETTER

June 2021—Q2
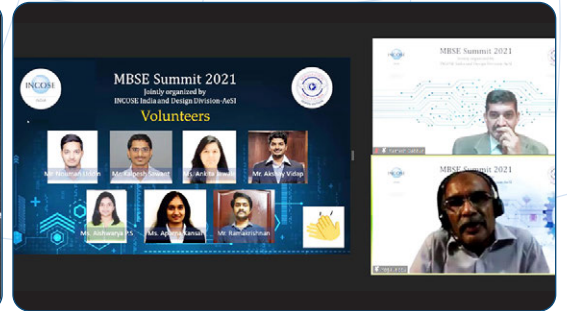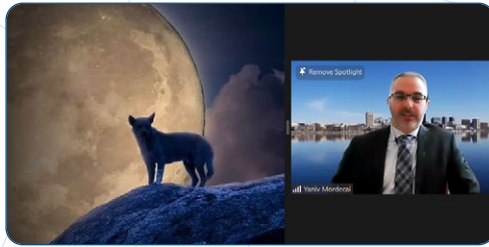
INCOSE

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President's Corner

Kerry Lunney
kerry.lunney@thalesgroup.com.au

*D*eming said, *"It is not necessary to change. Survival is not mandatory."* I regularly bring this quote into my consciousness when I find myself trying to determine what steps I need to take next in a task I am addressing, particularly when tackling new challenges. I ask myself, "what do I know, or what have I used that works, or, what do I need to modify, or even more drastic, what do I need to do that I have not done before?" And this requires change. Working in systems, we must have this "gene for change" in our DNA.

As you may know, INCOSE has numerous activities and teams focusing on what the future holds for systems-related activities, solutions, and those working in these areas, whether a practitioner, educator, researcher, or decision-maker. For example, we address growing trends such as connecting systems in ways never initially perceived, where interactions and interdependencies expand to increased complexity. Likewise, applying new technologies across all industries has created linkages, often with non-linear effects and non-deterministic responses, which we must address. Recognizing these trends, how adaptable are you? Are you able to adjust to these changes penetrating conventional practices and tools?

In the systems field, we should be the most creative and adaptable engineering discipline compared to other technical and engineering disciplines. We cannot restrict ourselves to mathematical models, algorithms, or science in our methodologies, frameworks, practices, and tools. We must be masters at balancing all stakeholder needs and considering the socio-technical elements of our designs. Our existing toolkit provides a strong foundation for starting this journey and requires continuous updates to serve our needs, equating to "seizing change."

Consider using different lifecycles. Will an evolutionary, incremental, spiral, or agile approach be the best fit for our future solutions? Does the "V" relationship model apply, or does it need to tailoring? Do we need to create a new development lifecycle, and if so, have you identified the objectives and expected outcomes at each phase and communicated it to your team members?

Look at what specialty engineering considerations dominate and focus on incorporating these needs into the solution. Ask yourself, "what models should I use? Do I need to invest in simulation capability? How do I balance and demonstrate conflicting requirements?" These constraints are not new, but the criticality and complexity may require us to rethink how we handle such demands and demonstrate the desired capabilities.

For verification, can you test the system to demonstrate suitability for use with an acceptable residual risk profile? If the system keeps evolving in the real world, which is likely under machine learning solutions, how can you conduct validation? Under these conditions, you may consider multiple validation phases during operations when the system has evolved. This would require change, not just in engineering activities and responsibilities, but also risk-sharing models and contract models, as appropriate.

The point is, we have the skills to be creative and to deliver elegant designs. We can also influence and persuade as leaders. But are we willing to change? The answer must be YES. Personally, I find

it very disheartening when people describe systems engineering as hardcore, inflexible, or even archaic processes. This should not be the case. Creativity created such processes to aid us in our work, and we will continue to be creative to conduct our work in the future.

Next time you find yourself facing a unique problem, ask yourself, "what do I have in my toolkit that I can use as-is or modified, or do I need to get creative?" If it is the latter, add this new approach to your toolkit once you know its value. After all, as systems engineers, we are creative problem solvers and leaders, able to demonstrate this talent through embracing change and exploring new possibilities while balancing conventional practices and tools with new ones.

On a different note, I hope you will join our premier systems engineering event, the International Symposium (IS2021), in July 2021. The event theme, *"accelerating through adversity,"* is more relevant than ever as we move into our second year operating under the COVID-19 pandemic constraints. We have prepared a great program, and there are many opportunities to meet new people, catch up with colleagues worldwide, and continue to discuss and learn. I am confident you will discover new techniques, research, and lessons learned to reflect taking a chance on change.

See you soon.

Cheers,

Kerry Lunney
INCOSE President 2020-2021

Information and Tools for Now

NASA Pilot with Assist 2 Develop

Leveraging the worldwide knowledge base available to us via the internet has never been easier. We could argue leveraging a crowdsourced approach for complicated work is necessary as we progress into the future. However, contemporary crowdsourcing has often been less reliable when it comes to engineering and complicated skill work than work in other fields. Freelance resources can get you to a systems engineer, but more often than not, this work requires specific know-how and/or a team of brilliant minds.

INCOSE, hosted by Assist 2 Develop, considered this while they helped promote a NASA pilot. NASA summarized the experience in a paper, citing a 90% time and cost savings improvement in a paper about the experience, prompting NASA to conduct interviews to create a compelling case study. This case study explores how NASA leveraged Assist 2 Develop's challenge platform and community to generate ideas for space architectures as a modeled parts library in a systems modeling language (SysML). The pilot's success proves crowdsourcing can be successful for specific engineering applications.

Check out the case study here.
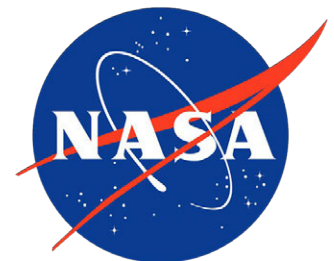
Notes from the Board

Lisa Hoverman, marcom@incose.org

The INCOSE Board of Directors (BoD) held their second quarter meeting remotely via Zoom, continuing the on-going global quarantine status. We all very much miss being together in person but the camaraderie of this Board, among old and new members, is strong.

This BoD meeting focused on:
- Planning and Developments for the International Symposium 2021
- Reviewing the 2021 recommendations for Honors and Awards
- Reviewing updates and projects from Technical and Service Operations
- Reviewing INCOSE's Annual Impact Statement
- Discussing an Academic Matters plan
- PMC Policy Review
- The Board shared 2021 progress and upcoming work on from our Value Streams:
  - Certification Updates (Online Testing Coming!)
  - Education and Training (including the Professional Development Portal Progress and INCOSE's STEM strategy)

- Events (specifically the first ever virtual IW2021, and planning for IS2021)
- Membership (Member Focus vs. Membership; Personalized interaction for CAB)
- Products (SE Handbook V.5 and Vision 2035 in progress; Product Licensing and Recorded Offerings
- Updates from the following committees, cross-cutting services, groups, and task teams:
  - Diversity, Equity, and Inclusion
  - Finance
  - IT Evolution and Initiatives; Policy Updates
  - MarCom
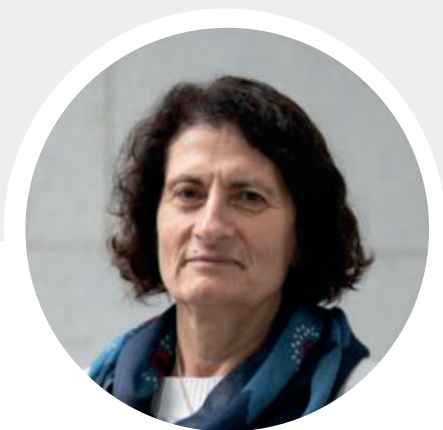 - Outreach/Alliances
  - Special Projects
  - STEM Task Team
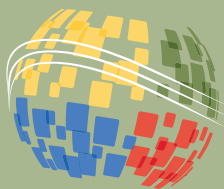
31st Annual INCOSE international symposium

Virtual Event
July 17 to 22, 2021

Technical Program

The Premier International Systems Engineering Conference
Accelerating through Adversity

Keynote Speakers

Victoria Coleman, PhD
USAF Chief Scientist
Senior Advisor to the Director at CITRIS & the Banatao
Institute, University of California
Former Director of DARPA

HIRAI Hirohide
Director-General, Commerce and Information
Policy Bureau Ministry of Economy, Trade
and Industry (METI), Government of Japan

Lex Hoefsloot
Co-Founder, Lightyear

Schedule

6 Days, 5 Tracks, 3 Keynotes,
120+ Presentations, Panels,
Tutorials and More!

www.incose.org/symp2021/schedule

including inspiring invited content
from the President and Tech Ops!

120 + Papers, Presentations on Systems Engineering

3 Inspiring Keynote Speakers

19 Countries Represented

24 Application Domains

39 Topics Represented

11 Panels

9 Tutorials

Register today: www.incose.org/symp2021/register

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More information @ www.incose.org/symp2021

Contributions from the Board

Updates from Technical Operations

Christopher D. Hoffman,
Christopher.Hoffman@incose.net

Hello to you from my home office/library/ craft storage/school supply room and, for the past 14 months, my work office!
My name is Chris Hoffman, appointed the current INCOSE Technical Director at the International Workshop 2021, and as this is my first newsletter message, I am happy to share a bit about myself and some priorities for the year.

I live in Indiana, US, with my wife, three children, and four cats. With our son recently finishing his 3rd year of college, a daughter heading to college this fall, and our youngest daughter finishing her first year of high school we have a diverse, inclusive, and busy household, not unlike INCOSE Technical Operations (TechOps). I lead technical information strategy for Cummins Inc., optimizing IT systems supporting technical business processes (systems engineering Handbook/ISO 15288) to protect and leverage our technical information. I improve efficiency and effectiveness through a large global team supporting these efforts with Cummins and INCOSE satisfying my thirst for learning.

INCOSE TechOps comprises over 50 working groups, initiatives, and the standards development department with perhaps the largest volunteer group in the organization. Our primary objective is advancing world-class systems engineering through activities relating to all systems engineering facets across all application sectors. As in years past, a deputy and 14 assistant directors support the technical director in accomplishing our goals.

Those involved in TechOps have countless opportunities with various needs expressed through the Corporate Advisory Board (CAB), the Future of Systems Engineering (FuSE) initiative, and specific TechOps initiatives (Smart Cities, MBSE, and Value Proposition). Our members also guide, contribute to, and review impactful products for release. These include major products such as the Systems Engineering Handbook version 5, Systems Engineering Vision 2035, SEBoK content, and supporting the Professional Development Portal (PDP) service with content. TechOps members also create and release other impactful products such as the Systems Engineering Competency Assessment Guide, the Systems Engineering Tools Database, primers, and guides. These efforts each follow our lightweight INCOSE product development process, starting with a Technical Project Plan (TPP) which considers and satisfies our development requirements leading to delivering an "impactful product."

With all these products, team members, and activities underway around the world, a strong support structure and communication platform are necessary. With some urgency brought upon by the ongoing pandemic, we have provided tools for our members to improve their collaboration and information sharing. I encourage you to learn more about these capabilities at https://www.incose.org/collaboration. This platform greatly benefits INCOSE around the world and shares best practices, such as reducing conflict between Microsoft 365 installations and identities on our computers (I run my INCOSE.net Teams id on Microsoft Edge browser, and my work Cummins Teams id on my local Teams application and Chrome browser).

A top priority for TechOps this year is leveraging and improving our online presence. This involves an online Working Group Charter tool (created in INCOSE.net SharePoint) for all active working groups and initiative groups. To date we have 53 charters migrated from document-based charters in various completion stages.

Our current goals for this online charter system are facilitating updates, orchestrating charter approvals, being the source of truth for public and internal working group web pages, and populating the "Working Group Information Sheet" documenting a team's yearly operating plan and contact information for new team members. This effort will result in more accurate and consistent information across our systems with less creation effort (enter once, use many).

Looking forward, I encourage you to apply systems engineering to your INCOSE work, leveraging the collective expertise we have as an organization to understand the problem scale, the intent of our processes, and tailor those appropriately to effectively satisfy needs. Use the language of others, be an approachable expert, and yet do not wait for others to approach you. Reach out and say hello as you offer a supportive hand to those in need. Be well!

Figure 1 - Working Group Information Sheet

Opting In and Out
Don't Lose Touch with INCOSE!

Barclay Brown, barclay.brown@incose.net

New data privacy rules and changes in INCOSE's privacy policy could cause you to lose touch with INCOSE.

We are all annoyed with email sometimes. An email arrives at the wrong time and in frustration, you click "unsubscribe." If the email was for the upcoming conference, you just opted out of receiving emails for all future conferences. If this is what you want, fine, but make sure you only opt-out of the subjects you want to ignore. Here is a hypothetical story to illustrate.

Andre signed up for an INCOSE working group. It was an active group and they had busy back-and-forth email conversations covering fascinating topics—at least they were fascinating to *some* group members. There was no "unsubscribe" link in the emails, and Andre got so frustrated with the numerous messages he decided the next email "from INCOSE" would make him drop off the list. The next message came, and it was a general announcement for the latest INCOSE INSIGHT magazine. Andre clicked the unsubscribe link. Andre will no longer receive any messages about INSIGHT magazine, but worse, he will keep receiving unwanted messages from his working group colleagues. What happened?

Using the unsubscribe link in an email to opt-out stops only that particular email category for that person. Members manage group messages and discussions among working group or chapter members, so to stop those messages the person must contact the group leaders.

To make sure you receive the communications you intend, visit your INCOSE user profile, by logging into www.incose.org, selecting "Welcome," then "Profile Home." Then click "Edit my Information" and scroll down to check your "Communication Preferences" and "Message Categories." While you're at it, check your email address and make sure it is the best way to reach you.

If you have any questions regarding the best ways to maintain effective communication within INCOSE, feel free to contact me: barclay.brown@incose.net.

FYI
Information and Tools for Now

Associate Director for Diversity, Equity, and Inclusion

We recently created a new leadership role. The associate director for Diversity, Equity, and Inclusion (DEI) will report to the president and will lead our approach to this important area. This role is ideal for someone passionate about DEI, and who wants to improve INCOSE's diversity. The role will also chair a new INCOSE DEI advisory committee, which will unite people across INCOSE to help us understand and address DEI issues and opportunities.

This role will have a tremendous opportunity to influence and engage at a senior level, using and further developing leadership skills, and making a significant positive change on diversity and inclusion in engineering.

The full role details are available on the INCOSE Volunteer Opportunity Board, where you can register your interest. The Q1 2021 Newsletter also has an article on our DEI progress to date.

If you have any questions on this role please contact Alan Harding (alandharding@gmail.com) or Alice Squires (alice.squires@wsu.edu) for more information.

Update from Sector I—The Americas

Tony Williams, tony.williams@incose.net

WOW can you believe it's already June of 2021?

I'm Tony Williams, and I have the pleasure of serving as your Director for the Americas Sector.

I work as the Chief Engineer for SE&I for Jacobs Clear Lake Group at NASA Johnson Space Center in Houston Texas, where we support NASA in the development and sustainment of space flight systems including the Space Station, Orion, Gateway, and Artemis.

As Americas Sector Director, I serve the 44 Chapters in North and South America, working to help these chapters succeed in bringing the INCOSE Chapter experience to our membership.

For 2021, the Americas team is working on two priorities:

• Providing the 'chapter experience' to all INCOSE members in North and South America. This translates to ensuring that all members are affiliated with Chapters that are active – including regular chapter meetings and other activities (e.g., tutorials, newsletters, mini-conferences, workshops). While this seems like a natural thing for Chapters to provide, sometimes due to environmental changes, Chapters may lose their critical volunteers and it becomes increasingly hard to continue normal operations, resulting in members without Chapter support. Our vision is that all Americas members are connected with one (or perhaps more) Chapters where they receive quality experiences and are welcomed and included.

• Extending INCOSE's impact on Latin America. Today, the Brasil chapter is our sole Latin American chapter. Latin America has many pockets of highly active Systems Engineering, we want to help connect those pockets the

benefits that INCOSE can bring through Chapters.

So far this year, we're having pretty good success this year attacking these priorities:

• The Northern/Great Lake region has seen two 'restarted' Chapters that are now conducting monthly activities, in collaboration and partnership with other local Chapters. Heartland (Iowa) and Three-Rivers (Pittsburgh). Discussions with the Wright Brothers chapter (Dayton, Ohio) are progressing well and we are hopeful that Chapter will resume operations in the near future.

• Engagement from the Spanish Chapter as well as other motivated INCOSE leaders is creating a promising scenario for Latin America as well. For example:

  – Spanish Chapter plans to promote a conference this year in Spanish language for Spanish speaking countries

  – Spanish chapter also routinely invites Latin American members to their programs.

  – Upcoming Spanish translations of the Systems Engineering Handbook v5 will include Mexico and Columbia and perhaps other Latin American groups

Sector Updates—Americas

INCOSE-LA Report, 11 May 2021

INCOSE-LA looks forward to the following events:

- 26 May: 14-week Systems Engineering Professional (SEP) Test training (joint with the San Diego Chapter)

- 8 June evening speaker: "Using Architecture & MBSE to Develop Validated Requirements" by Ron Carson

- 29 June tutorial: "Correcting Misperceptions of Systems Engineering Practices" by Ron Carson

- 12 July evening speaker: "Natural Systems WG, swarm decision making" by Gary Vincent

See the chapter webpage to register.

INCOSE-LA held their March Speaker Meeting 9 March 2021.

123 members and guests from around the globe attended the meeting, held over Zoom, "A Trio of MBSE Case Studies to Satisfy Any Appetite" by Casey Medina and Studio SE. Casey presented the following three case studies with a Model-Based Systems Engineering model for each, exemplifying an effective systems engineering process in the digital world.

- An LED in an imaging system has gone obsolete. We need a suitable replacement.

- Develop a compliant usability engineering process for medical devices

- Improve support organization ability to assist individuals experiencing homelessness

His presentation is available on the INCOSE-LA website here.

INCOSE-LA held their March Tutorial 13 March 2021.

On 13 March we hosted an interactive Cameo Systems Modeler TM tutorial by Casey Medina.

INCOSE-LA held their April Speaker Meeting 13 April 2021.

63 members and guests from around the globe attended the meeting, held over Zoom, "INCOSE Systems Engineering Program (SEP) Certification & Study Groups" by David Mason. David reviewed the effectiveness of the INCOSE SEP certification levels, the process to achieve and advance certification, and proposed a joint INCOSE San Diego and LA three-month cohort training program to prepare potential candidates for the SEP exam. His presentation on the INCOSE-LA website here.

INCOSE-LA held their May Speaker Meeting 11 May 2021.

82 members and guests from around the globe attended the meeting, held over Zoom, "Systems Engineering in Early-Stage Research and Development Working Group" by Ann L. Hodges, Dr. Micael DiMario, and Dr. Gary Mastin. The three presenters reviewed the value and the challenges associated with the early-stage research and development from the Early-Stage Research and Development Working Group. The group presented an early-stage research and development framework as well as highlighted common risks, the TRL 5-6 Valley of Death, and engineering transition failures. They concluded with ways to address risk-averse organizations as well as their progress on strategies to improve early-stage research and development performance. Their presentation is available on the INCOSE-LA website here.
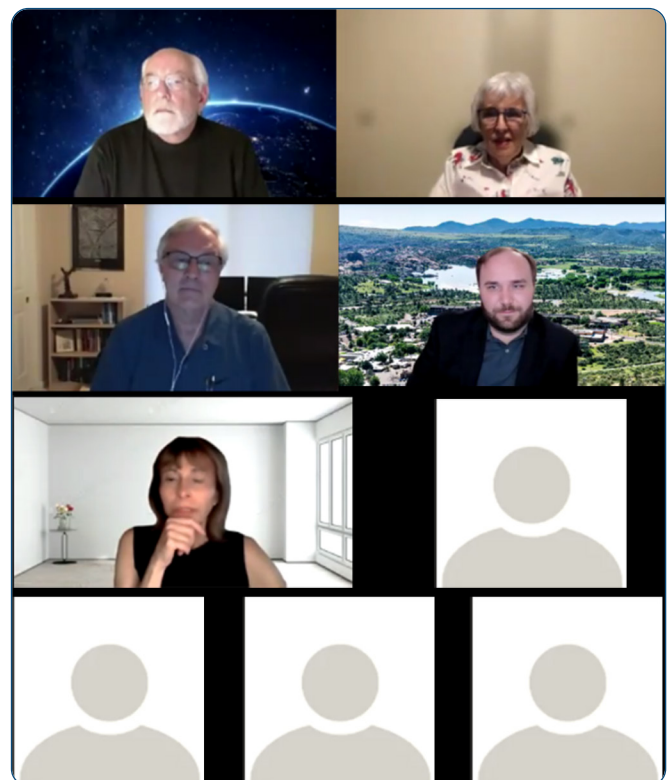

Figure 1: May Speaker Meeting, 11 May 2021, Discussion on Zoom

Nazanin Sharifi nominated for the 2021 Institute of Technical Leadership Program

INCOSE-LA nominated Nazanin Sharifi for the 2021 INCOSE Institute of Technical Leadership Program. Nazanin held systems engineering roles for Northrop Grumman for over eight years and contributed to multiple programs at both the BWI (Baltimore, MD) and Space Park (Redondo Beach, CA) Facilities. She demonstrated exceptional leadership, drive, and expertise supporting and leading the INCOSE Chesapeake and LA Chapters over the years. Currently, she is the INCOSE-LA elected vice president for 2021. Check out Nazanin's bio here.

Dr. Rick Hefner awarded the INCOSE 2021 Outstanding Service Award

Dr. Rick Hefner from the Los Angeles Chapter recently received the 2021 INCOSE Outstanding Service Award. Dr. Hefner served on the INCOSE-LA board of directors for several years including president in 2018. He also provided several presentations and tutorials to INCOSE chapter events, regional conferences, and national conferences. Rick's bio is available here.

INCOSE-LA Needs You!

INCOSE-LA currently needs someone interested in quarterly newsletter production to become the INCOSE-LA chief editor and help support the INCOSE-LA Chapter. If you or anyone you know might be interested, please reach out to us at president@incose-la.org!

Western States Regional Conference 2021

INCOSE-LA is actively working on the Western States Regional Conference (WSRC) committee for 2021. WSRC 2021 will be in San Diego the 17-19 September. Check out our website where you can find information on sponsoring the conference or submitting your proposal: https://www.incose.org/wsrc/wsrc2021/home/when-where

Collaboration on Virtual Chapter Meetings Increases Attendance

Shadrak Rajkumar
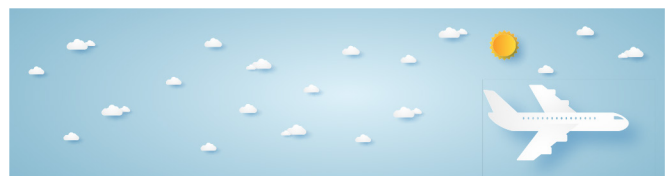mshadrakraajkumar@gmail.com
Jack Stein
Jack.stein@me.com

The INCOSE Heartland Chapter is one of the smallest in the INCOSE Americas North Region with just over 30 members. Before the pandemic, the chapter's monthly meetings typically had about 10-15 attendees. These were in-person meetings with additional attendees participating virtually on GlobalMeet. When the pandemic hit, the Heartland Chapter stopped holding monthly meetings, thinking things would be "back to normal" soon. But after six months, and no end to the pandemic insight, we knew we had to do something different.

In October 2020, the Heartland Chapter started hosting monthly meetings using our regional INCOSE Zoom account. We invited several other chapters (Wright Brothers, Canada, Michigan, and Three Rivers) to partner with us. Dr. Rick Hefner (a previous Los Angeles Chapter president and Professional Education Director at Caltech) worked with Sean Mahrt (the Chapter program director) to establish the meeting structure. Rick helped arrange several featured speakers and has spoken at two meetings himself. All participating chapters promoted meetings through their communication channels and we advertised the meetings on the Heartland Chapter website, LinkedIn, and Regional Newsletter.

To date, we have held eight meetings, six led by the Heartland Chapter and one each by the Michigan and Three Rivers Chapters. These meetings are FREE of charge to all. Attendance has been amazing (661 registrations in all, an average of 82 per meeting)! Meeting attendees are not only from the Heartland and contributing/guest chapters but from other chapters in the Americas North Region, across the US and Canada, and around the world. About 1/3 of attendees are non-members, making the meetings a significant outreach tool.

The Heartland Chapter has added a "Chapter Meeting Documents" page to its website, which allows meeting attendees and people who missed the meeting to view the meeting flyer, slides, and Zoom recordings. Check out the Heartland Chapter website at www.incose.org/Heartland.

July 17 - 22, 2021
www.incose.org/symp2021

Save the date

31st
Annual **INCOSE**
international symposium

Virtual event

Future events

JUL
17-22

31st Annual INCOSE International Symposium 2021
Virtual Event
www.incose.org/symp2021

SEP
17-19

2021 Western States Regional Conference (WSRC)
San Diego, CA, USA
www.incose.org/wsrc/wsrc2021

SEP
20-24

9th Nordic Systems Engineering Tour 2021
20th (Helsinki), 21st (Stockholm), 22nd (Oslo), 23rd (Copenhagen), 24th (Hamburg)
www.nordic-systems-engineering-tour.com

Early
OCT

New England Workshop 2021
Virtual event

OCT
28-29

EMEA Workshop 2021
Sevilla, Spain
www.incose.org/EMEAWS2021

NOV
17-19

INCOSE Human Systems Integration Conference 2021
San Diego, CA, USA
www.incose.org/HSI2021

JAN
29-Feb 1

Annual INCOSE International Workshop 2022
Torrance, CA, USA
www.incose.org/iw2022

JUNE
25-30

32nd Annual INCOSE International Symposium 2022
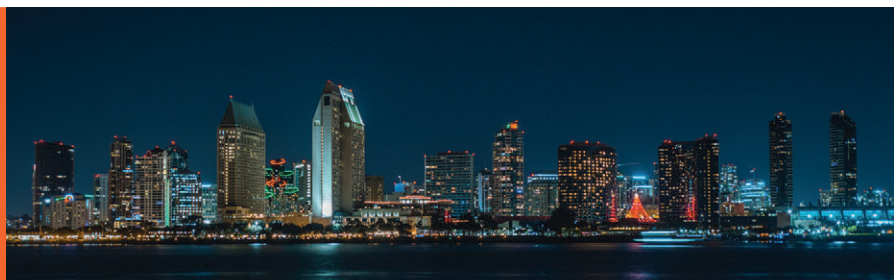*Detroit, MI, USA*
www.incose.org/symp2022

HSI2021
Human Systems
Integration
Conference

San Diego, CA, USA

INCOSE

Save the date

November 17-19, 2021
www.incose.org/hsi2021

Collaboration on Virtual Chapter Meetings Increases Attendance

Shadrak Rajkumar
mshadrakraajkumar@gmail.com
Jack Stein
Jack.stein@me.com

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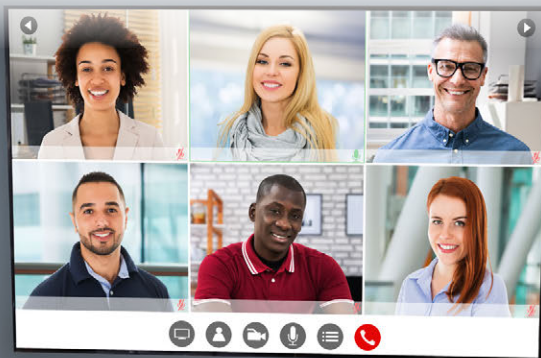
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The New Look of Collaboration

Update

Registration is now open !
www.incose.org/symp2021/register

President's Invited Content

Hear about

- Viewing Grand Challenges as a System
- Digital Engineering Approach
- Using Systems Thinking to add value - in these uncertain times
- Brown Field Challenges

Certification

The INCOSE knowledge exam is one of the steps toward getting certified as an Associate Systems Engineering Professional (ASEP) or Certified Systems Engineering Professional (CSEP).
Get a discount on the exam by registering to the IS2021.

SPONSOR INCOSE IS 2021!

1 VISIBILITY
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more information at www.incose.org/symp2021

Sector Updates—Asia-Oceania

The 4th CSD&M Asia Conference and the 2021 INCOSE Beijing Summit successfully held in Beijing

Mengyu Guo,
mengyuguo@mail.tsinghua.edu.cn

The 4th International Complex Systems Design & Management Asia Conference (CSD&M Asia) integrated with the 2021 INCOSE Beijing summit held in Beijing on 12-13 April. The Chinese Society of Aeronautics and Astronautics (CSAA), CESAMES, and the INCOSE Beijing chapter co-hosted the conference. More than 150 scientific and technical practitioners from research institutions, universities, state-owned enterprises, and private enterprises attended the conference physically, and dozens of worldwide systems engineering experts, including INCOSE President Kerry Lunney, participated in the online conference. The conference gathered experts in various fields and domains, such as aviation, aerospace, weaponry, shipbuilding, electronics, automobile, transportation, architecture, communication, medicine, information, and urban planning. These experts held in-depth discussions on complex systems engineering and model-based systems engineering topics.
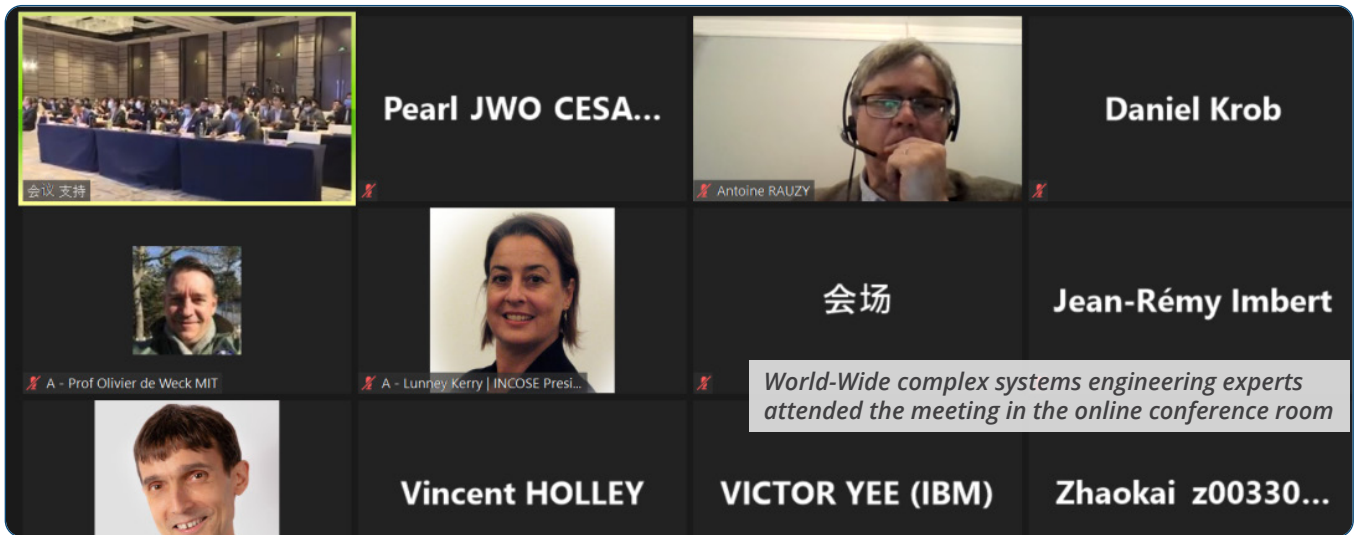
In the morning of the 12th, Dr. Zhang Xinguo (the CSAA vice president, a Tsinghua University distinguished professor, a CSAA chief scientist, and the INCOSE Beijing chapter president) and Dr. Daniel Krob (CESAMES president, an École Polytechnique professor, and an INCOSE founding member) gave welcoming speeches in the conference's opening ceremony as conference co-chairs.
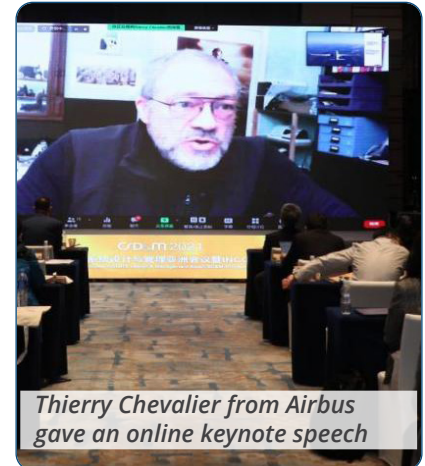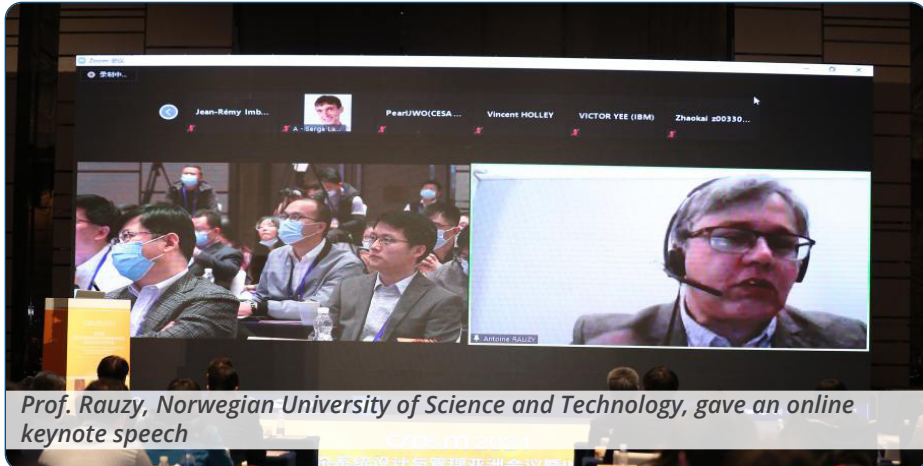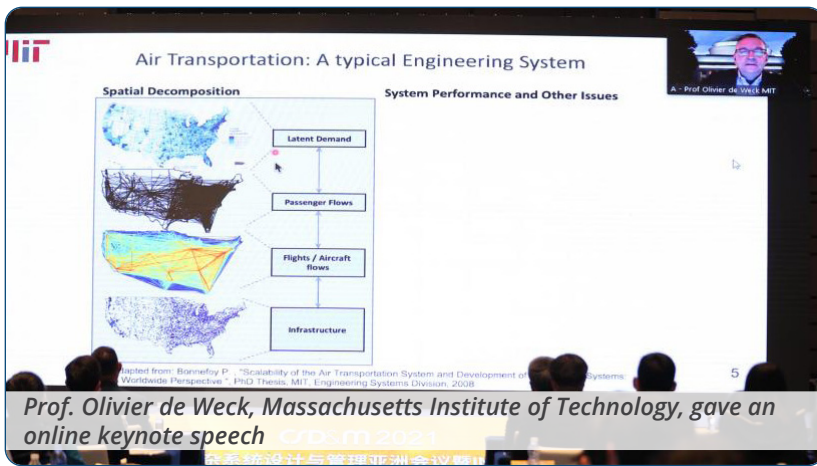

Dr. Daniel Krob gave an online opening speech

Dr. Zhang Xinguo delivered an opening speech

Dr. Zhang Xinguo delivered an opening speech

Dr. Li Lefei, Program Committee Academic Co-Chair

More than 150 scientific and technical practitioners from various industries in complex systems engineering attended the conference

World-Wide complex systems engineering experts attended the meeting in the online conference room

During the keynote speech session, Prof. Olivier de Weck (Massachusetts Institute of Technology and an INCOSE founding member), Prof. Rauzy (Norwegian University of Science and Technology), Mr. Zhou Fanli (the Suzhou Tongyuan Software & Control Information Technology Co. Ltd. CEO), Thierry Chevalier (Head of Digital Design Manufacturing Thrust of Airbus), Mrs. Zhang Wenfeng (a Research Professor at the Institute of Aerospace System Engineering in China), and Kerry Lunney (the INCOSE president) introduced the latest systems engineering advancements and understandings from different perspectives.

Kerry Lunney, the INCOSE president, gave an online keynote speech
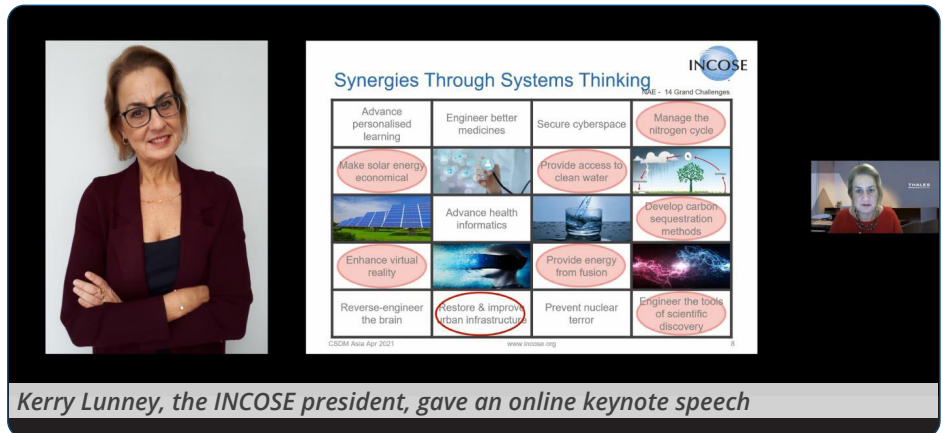
In the following talks, more than 40 authors contributed papers, presented their research, delivering in-depth discussions and exchanges. Springer published the conference proceedings, and they are available now.

Prof. Olivier de Weck, Massachusetts Institute of Technology, gave an online keynote speech

Zhou Fanli, the Suzhou Tongyuan Software & Control Information Technology Co. Ltd CEO, gave a keynote speechCo-Chair

Prof. Rauzy, Norwegian University of Science and Technology, gave an online keynote speech

Thierry Chevalier from Airbus gave an online keynote speech

Zhang Wenfeng, an Institute of Aerospace System Engineering research professor, gave a keynote speech

In the afternoon of the 13th, we held the 2021 INCOSE Beijing summit. Prof. Zhang Xinguo, the INCOSE Beijing chapter chairman, gave an in-depth analysis explaining the essence of MBSE transformation—system conceptual integrity and layered mapping. Prof. Lui Pao Chuen, Temasek Defense Professor at the National University of Singapore, gave a comprehensive view of the growing smart city in nature. Prof. Daniel Krob,

CESAMES president, presented "Enterprise Level Systems Engineering Application: Success Stories from Automotive Industry." Serge Landry, Equilibrant force principle and INCOSE Asia Oceania sector director, gave a detailed analysis of issues in digitally transforming complex systems engineering and how to focus on what matters most.

Besides academic participations, many domestic and foreign MBSE tool vendors and industrial corporations (Dassault, Siemens, APSYS, PGM Shanghai Pugoushan Technology Co., Ltd., Aviation Industry Automation Control Institute, Aviation Industry Power Supply Institute, IBM, CESAMES, and MBSE Consulting) displayed the latest systems engineering technology tools. This conference fully used the excellent exchange platform to expand the academic exchange scope, promoting the close integration of all parties and international exchanges. Experts and scholars in the industry, as well as the participants, unanimously recognized the conference's academic level and atmosphere.
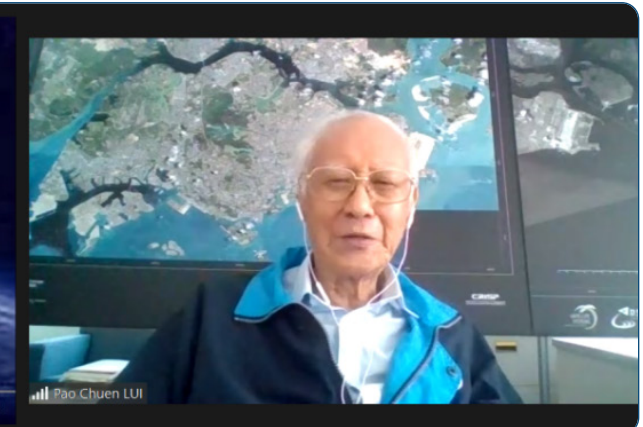
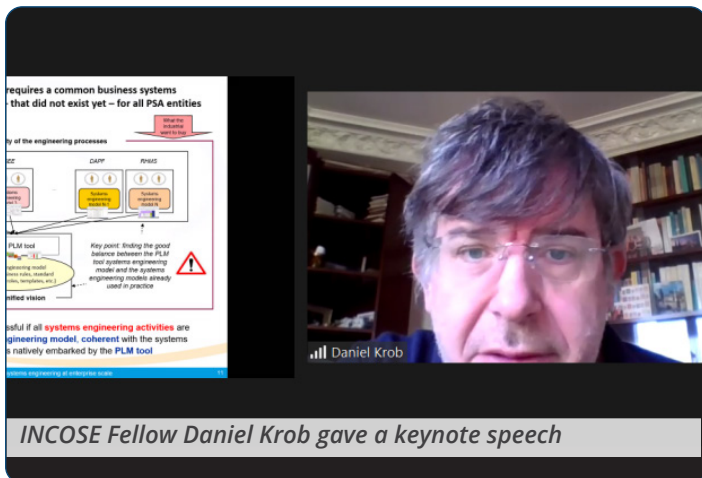Mengyu Guo, Assistant professor at Tsinghua University and INCOSE Beijing summit chair

Prof. Zhang Xinguo, INCOSE Beijing chapter president, gave a keynote speech
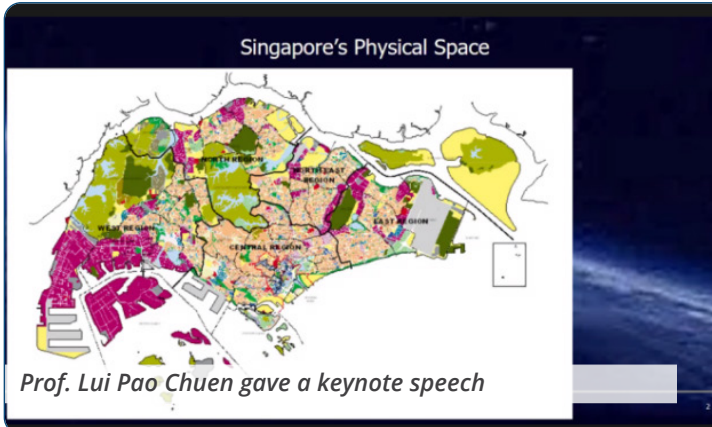
Prof. Lui Pao Chuen gave a keynote speech

Serge Landry, INCOSE Asia-Oceania sector director, gave a keynote speech

INCOSE Fellow Daniel Krob gave a keynote speech

Serge Landry, INCOSE Asia-Oceania sector director, gave a keynote speech
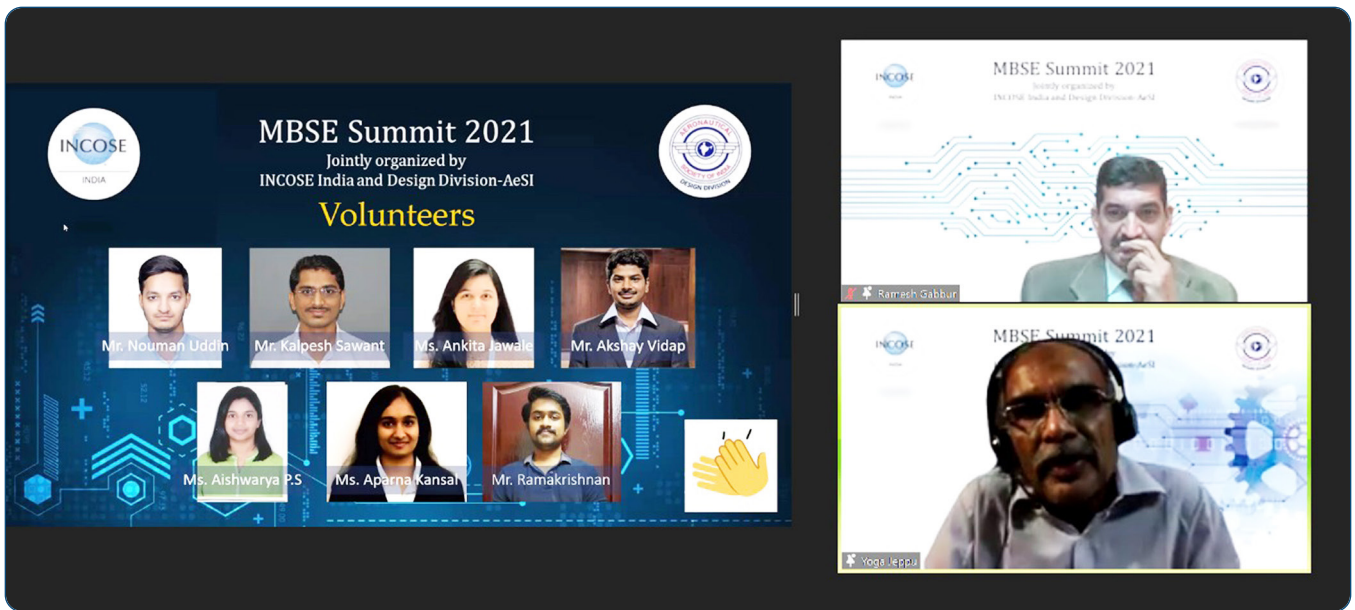
MBSE Summit 2021

Aparna Kansal, aparna.kansal@boeing.com

15 and 16 April 2021 saw a new wave in the Model-Based Systems Engineering (MBSE) field in India. The INCOSE India chapter collaborated with the Aeronautical Society of India (AeSI) to organize India's first MBSE Summit. The summit brought together MBSE and systems engineering experts from across the aerospace community in India and the globe, to collaborate, educate, and discuss the need for MBSE, its current applications, and its future in the industry. It was an exciting opportunity for all the attendees to witness talks and discussions by distinguished speakers on their MBSE experiences.

The MBSE Summit is the brainchild of Dr. Kota Harinarayana, AeSI design division chairman and architect of India's Light Combat Aircraft, also known as the "Father of India's indigenous fighter program." Dr. Kota supported by Dr. Hemendra Arya, professor at IIT Bombay, organized the summit and brought together members leading the INCOSE India Chapter—President Stueti Gupta, Treasurer Dr. Yogananda Jeppu, Secretary Dr. Ramesh Gabbur, and INCOSE India MBSE Technical Working Group Chair Dr. Nikhil Joshi and Co-Chair Mudit Mittal, along with AeSI design division members Shri. Kishan S. Chowhan and Shri. Rakesh Kumar. Key to the event's success were the enthusiastic volunteers from the aerospace industry and academia including Nouman Uddin; IIT Bombay project research assistant; Kalpesh Sawant; SWA and John Deere system engineer; Ankita Jawale; INCOSE ASEP and MBSE Working Group; Akshay Vidap; Eaton requirement engineer; Ramakrishnan; B.Tech, AE, and IITKGP; Aishwarya P.S.; B.Tech, AE, and BMSCE; and myself, Aparna Kansal, Boeing systems engineer (MBSE). The event was a grand success, with attendees and eminent speakers collaborating virtually. The event saw attendees from several organizations including, all Defence Research and Development Organisation (DRDO) and Indian Space Research Organisation (ISRO) divisions; big Aerospace giants like Boeing, Airbus, Collins Aerospace, General Electric (GE), Honeywell; and several others. Although this summit targeted aerospace field members, it received interest from over 50 organizations, including some outside aerospace. The event also received support and sponsorship from reputable MBSE domain companies like Ansys, Dassault Systemes, Mathworks, and Capella.

Model Based Systems Engineering

INCOSE INDIA

MBSE Summit 2021
(Virtual)
15th -16th April 2021
16:30 hrs – 20:30 hrs IST

Jointly organized by
INCOSE India Chapter
&
Design Division, Aeronautical Society of India
(DD-AeSI)

Registration
Website: http://bit.ly/MBSESummit

Registration Fees
500 INR for Professionals
250 INR for Students

Day 1 : 15th April

Time	Topics & Speakers
1630 h (15 mins)	**Welcome & Introduction**
1645 h (30 mins)	**MBSE: What and Why ?**
	Dr. Swaminathan Natarajan, TCS
1715 h (30 mins)	**MBSE in Action**
	Dr. Abhay Pashilkar, CSIR - National Aerospace Laboratories
1745 h (15 mins)	**Break**
	Sponsor Videos
1800 h (60 mins)	**Panel: Aerospace & Space Industry Outlook**
	Air Marshal Raghunath Nambiar (Retd.), PVSM, AVSM, VM & BAR, Former DCAS & AOC&C, Western Command Dr B N Suresh, Chancellor, IIST, Former Director,VSSC , Honorary Professor, ISRO Dr Tessy Thomas, DG (Aero), DRDO Dr Bala Bharadvaj, Former Managing Director, Boeing India Engineering & Technology Center *Moderator: Dr. Kota Harinarayana, SERB SERB Distinguished Fellow, CSIR-NAL & Chairman, DD-AeSI*
1900 h (10 mins)	**Break**
	Sponsor Videos
1910 h (30 mins)	**MBSE Adoption**
	Dr. Gan Wang, BAE Systems
1940 h (30 mins)	**MBSE - A Case Study**
	Mr. Casey Medina, Studio SE, CalTech
2010 h (5 mins)	**Session Round-up for the Day**

Day 2 : 16th April

Time	Topics & Speakers
1630 h (25 mins)	**Information Session: INCOSE INDIA Chapter**
1650 h (60 mins)	**Sponsor Lightning Session**
1740 h (10 mins)	**Break**
	Sponsor Videos
1750 h (30 mins)	**MBSE for Satellite Design**
	Dr. Robbie Robertson, Sedaro Satellite
1820 h (30 mins)	**Unified Architecture Framework (UAF)**
	Mr. Matthew Hause, SSI
1850 h (30 mins)	**Experiences with MBSE in Aviation**
	Dr. Yaniv Mordecai, MIT
1920 h (10 mins)	**Break**
	Sponsor Videos
1930 h (60 mins)	**Panel: Ecosystem needs for MBSE adoption**
	Mr. Brendan Hall, Fellow, Honeywell Dr.Manas Bajaj, Chief Systems Officer, Intercax Dr. Helene Bachatene, VP Systems KTD/CTO, Thales Defense Eelco Scholte, Assoc.Director, MBSE Technology, Collins Aerospace Dr Rajalakshmi Menon, Outstanding Scientist and Associate Director, Center for Airborne Systems *Moderator: Nikhil Joshi, Chair - INCOSE India MBSE Technical Working Group*
2030 h (10 mins)	**Summit Wrap-Up**

Volunteers' Appreciation

We planned the discussions and talks on both virtual summit days so the first day covered topics related to what MBSE is, the associated challenges in adopting MBSE, and the MBSE environment in India and Aerospace Industries. The second day covered implementing MBSE tools and processes. Each day had a few talks by guest speakers and one engaging panel discussion, altogether covering an exciting and packed four-hour schedule. The first day started with lighting the virtual lamp, followed by a brief welcome address by Dr. Ramesh Gabbur, and Shri. Kishan Chowhan. Day one had talks by Dr. Swaminathan Natarajan (Chief Scientist at TCS Chennai), Dr. Abhay Pashilkar (the systems engineering division head at CSIR-NAL), Dr. Gan Wang (Chief Engineer at BAE Systems), and Dr. Casey Medina (CalTech). The talks engaged and educated the audience. One key point highlighted by the experts was as the work complexity increases with increasing interconnections, and although adopting MBSE and knowledge on the existing tools is essential, any tool, in general, is only as good as the person using it or the methodology and process to implement it. As systems engineering professionals and MBSE practitioners, most attendees could relate to the challenges faced in adopting MBSE or systems engineering across organizations, mainly due to misconceptions people have and the cultural resistance to change. The day one panel; comprising Air Marshal Raghunath Nambiar (retired), Dr. Bala Bharadwaj (former Man-

Panel Discussion: Day 1

aging Director of Boeing India), Dr. BN Suresh (Chancellor of Indian Institute of Space Science and Technology), and Mr. Alok Nanda (CEO of GE India Technology Center and CTO GE South Asia); discussed the current state and future of the Indian aerospace and defense sectors from various viewpoints. The panel discussion, moderated by Dr. Kota, gave a good understanding of what to expect for the next five to 10 years in the Indian aerospace industry and defense sector, what opportunities are there to tap, and what role MBSE would play.

With so much to take back on day one, the participants were eager for day two. The second day started with an MBSE working

group of INCOSE India introduction by Mudit Mittal, covering the group activities, how to join and contribute, and other details. Following this were short sessions by the event sponsors where they had the opportunity to talk about their products and MBSE tools. There were three great talks by guest speakers on day two discussing MBSE application. The audience had learned from Dr. Robbie Robertson (Sedaro Technologies CEO and Co-founder) about applying OpenMBEE for collaborative design, Mr. Matthew Hause (SSI Principal Consultant and OMG SysML specification team member) on the Unified Architecture Framework (UAF), and Dr. Yaniv Mordecai (an MIT post-doctoral researcher) about his experiences with MBSE in Aviation. The speakers used simple and fun examples to discuss concepts which helped make them stick. Mr. Hause's UAF explanation using an example model to order and deliver flowers to the modeler's wife for Valentine's Day was the most entertaining. Some highlights from Dr. Mordecai's talk were also interesting, especially how he depicts Model-Based Systems Engineering as mbSE rather than MBSE, to emphasize the term "model-based" is a gain coefficient of systems engineering and not something requiring specific emphasis. The panel discussion on the second day, moderated by Dr. Nikhil Joshi, was a conversation between Dr. Manas Bajaj (chief systems officer at Intercax), Dr. Helene Bachatene (VP Systems KTD/CTO at Thales Defense), Echole Scholte (MBSE Technology associate director at Collins
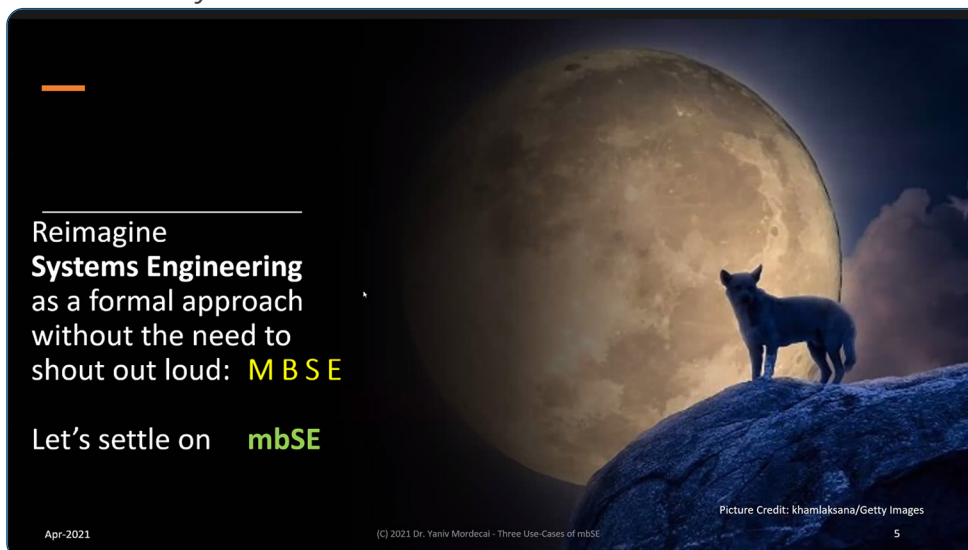
Presentation by Dr. Mathew Hause

Presentation by Dr. Yaniv Mordecai

Panel Discussion: Day 2

Dassault Systems Presentation on 3DS

Presentation on Capella by Obeo

Aerospace), and Dr. Rajalakshmi Menon (Center for Airborne Systems associate director at DRDO). This discussion also introduced interesting aspects to consider while applying MBSE tools and adopting MBSE.

The two days saw eight hours of power-packed sessions on MBSE. We noted a 220-participant peak attendance and even at the end of day two, there were 180 attendees present. Although the event was virtual, it had live
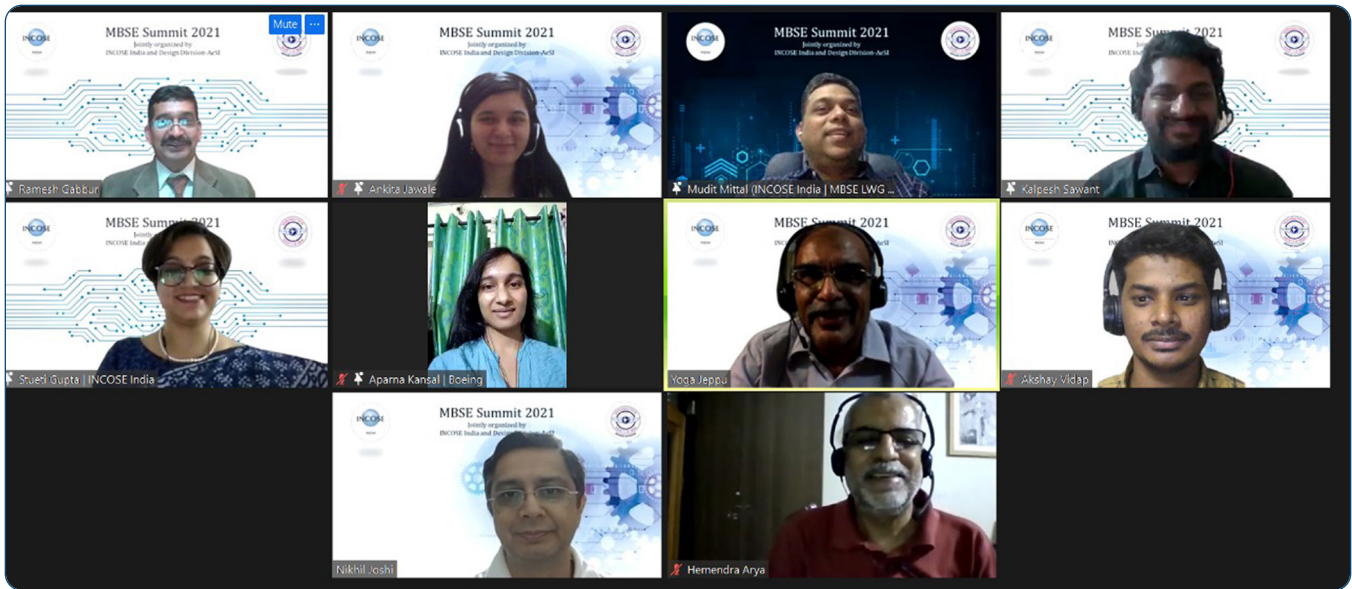
Organizers in Action: Post Event Celebration

discussions through chats, with participants posting great questions and the speakers responding enthusiastically, and it gave opportunities to make great connections. We took polls and surveys between sessions on both days. This enabled capturing the current MBSE status from the audience alongside the learnings from the invited speakers. The polls covered MBSE awareness among the participants, experience with commonly used tools and processes, barriers to MBSE adoption, and the value MBSE adoption gives or would give for the work currently performed in the industry. The event received great applause from all attendees and guest speakers alike. As mentioned by Prof. Arya post the event, "I was glued to my chair throughout the processing in both days!" We are grateful for the support from our patrons, Dr. Satheesh Reddy (Chairman, DRDO/DG, ADA) and Serge Landry (ESEP, Director, INCOSE Asia Oceania), and all our guest speakers who helped make this event a grand success. We all hope this event becomes a regular yearly meeting allowing MBSE professionals and enthusiasts to network, collaborate, learn, and grow.

2021 Western States Regional Conference

In-Person Event!

Sailing the Digital Wave...

September 17-19, 2021
San Diego, California

www.incose.org/wsrc

Japan Chapter

Maz Kusunoki
m.kusunoki@jcose.org

The past three months have seen a surge in JCOSE activities. We held two open-to-the-public virtual workshops that had full capacity attendance. We held the first workshop in two parts. The first session provided an International Workshop summary in Japanese to those who could not attend. The attendees greatly appreciated this, and we should consider this session again for future international INCOSE events. The second part was an inspiring open dialogue between practitioners and academics on what systems engineering means to us.

The second workshop presented the #IamRemarkable workshop in Japanese to a small group of participants. Midori Daida, encouraged by Stueti Gupta from the India Chapter, facilitated the workshop, and a diverse mix of men and women of various ages attended. It provided a discussion platform unavailable before.

Looking forward we have another workshop in June and September. Parallel to these larger events, there is a working group focusing on reviewing the Systems Engineering Handbook V5. This group aims to contribute both to the handbook content delivery and the translatability.

INCOSE India MBSE Study Group

Kalpesh Sawant
sawantkalpeshk@gmail.com

The INCOSE India chapter has started the MBSE study group in December 2020 with the objectives below:

• Learn MBSE and SysML in a supportive peer and practitioner environment

• Practice creating artifacts and diagrams and receive feedback

• Learn advanced concepts and share case studies and tools

Study group participants come from different industry backgrounds (aerospace, automotive, healthcare, engineering services) and expertise levels.

We have conducted 11 meetings so far focusing on MagicGrid methodology. Due to the diverse background and expertise level, the study group needs to develop a common understanding of behavior and structure diagrams. Participants had discussions on block definition diagrams, internal block diagrams, use case diagrams, activity diagrams, and sequence diagrams.

We encourage participants to practice these concepts on exercise examples decided by group (point of sale system and vending machines) and share their work with study group members. The study group plans to explore different MBSE tools and methodologies in the near future.

JOIN US FOR THE IS 2021 !

31st Annual INCOSE international symposium

www.incose.org/symp2021

Virtual Event
July 17 to 22, 2021

INCOSE UK Update

INCOSE UK Secretariat, publications@incoseuk.org

Endorsed Training Provider Event

NCOSE UK, excited to have completed the first Endorsed Training Provider course in conjunction with our Endorsed Training Providers Scarecrow Consultants Ltd, held the event with delegates from numerous different organisations. This event proved how successful training can be in an online environment. There is a maximum of 15 delegates per INCOSE UK Endorsed Training Provider course, ensuring each attendee can engage with the trainers and their fellow delegates as they would in a face-to-face environment.

Our next event will be the 15-17 June 2021, with courses run by Burge Hughes Walsh Ltd and Scarecrow Consultants Ltd. Further information on each course and online booking is available by going to ETP Schedule - INCOSE UK.

Should you have any questions, please contact techserv@incoseuk.org

SyntheSys Becomes an Endorsed Training Provider

It is our pleasure at INCOSE UK to announce SyntheSys Technologies has become the third company to complete the assessment process and become an INCOSE UK Endorsed Training Provider.

The scheme allows organisations who provide professional systems engineering-related training courses to apply for assessment to achieve the 'INCOSE UK Endorsed Training Provider' status.

The SyntheSys endorsement (when delivered by Mark Williamson) extends to the following standard courses:

- Systems Engineering Foundation
- INCOSE Systems Engineering Professional Training Course: Prepare to Pass the SEP Examination
- Requirements Writing
- The endorsement also extends to Bespoke Courses

Mark Williamson, SyntheSys Technologies managing director, said "As a company who has a clear focus on furthering systems engineering knowledge, it made complete sense to apply to become an INCOSE UK Endorsed Training Provider and we look forward to offering our training course through the Endorsed Training Provider Training Events."

Ian Gibson, INCOSE UK president, comments: "It is my pleasure to see another company become an INCOSE UK Endorsed Training Provider. This scheme is something we have wanted to do for a long time, as it provides individuals and organisations with a route to obtaining high-quality training from reputable organisations we assessed as suitable systems engineering training providers."

More information about becoming an Endorsed Training Provider is available here.

The Endorsed Training Provider Scheme

If you are a training provider, you may wish to consider the Endorsed Training Provider Scheme. The scheme allows organisations who provide professional systems engineering related training courses to apply for assessment to obtain the "INCOSE UK Endorsed Training Provider" status. More information regarding this is available on the INCOSE UK website.

Annual Systems Engineering Conference 2021—Keynote Speaker Announced

This year's Annual Systems Engineering Conference (ASEC) will take place at Heythrop Park Resort, Enstone, Oxfordshire on 16-17 November 2021.

It is our pleasure to announce Jessica Leigh Jones MBE will give this year's M'Pherson Memorial Lecture on ASEC2021 day one.

Jessica Leigh Jones, MBE, is a multi-award-winning engineer and astrophysicist. She is Co-Founder and Chief Executive of iungo, a CareerTech start-up democratising access to excellent careers for everyone. She is also a Royal Academy of Engineering Visiting Professor and a Royal Society Entrepreneur in Residence at the University of Wales Trinity St David. Here, she leads the flagship Enterprising Engineers Programme for engineering undergraduate students and apprentices.

Graduating from Cardiff University with an honours degree in astrophysics in 2015, Jessica is a Chartered Quality Professional (CQP MCQI). She is an Institute for Apprenticeships and Technical Education (IfATE) non-executive director and Vice-Chair of Wales' largest exam board, WJEC. She is the Womenspire 2020 Board Member of the Year and a recent advisory panel member at the Centre for Digital Public Services Wales.

Jessica received an MBE for services to women in engineering in Wales in the 2020 Queen's Birthday Honours. She received the Freedom of the City of London and represents the fastest progression to the Liveryman rank at the Worshipful Company of Scientific Instrument

Makers. She was 2017's Woman of the Future for Technology & Digital, featured in the 2020 Who's Who list of influential British people, and appeared as one of the youngest in the Forbes 30 under 30 Europe List 2018.

ASEC2021 Sponsorship

We asked systems engineers if they could provide insight into, amongst other things, how they got their start and what advice they would give to those just beginning in the industry.

The recent interview focuses on Emma Sparks of Cranfield University, Shrivenham.

*"I'm a systems engineer, and I do"*

Emma Sparks

Emma started her career as a graduate research scientist working within defence and received the opportunity to extend her training with a systems engineering option promoted as the right way to go. Initially unconvinced, Emma discovered she has a passion for systems engineering and says it "finally gave me the foundations to bring together seemingly disparate knowledge and experience, and channel it into something more than the sum of parts".

The full feature is available to read on the INCOSE UK website.

Working Group Updates

INCOSE UK Publications

On 9 April 2021, Paul Davies talked to attendees about his book *Don't Panic! The Absolute Beginners Guide to Managing Interfaces* in our second "Meet the Author" online Zoom sessions.
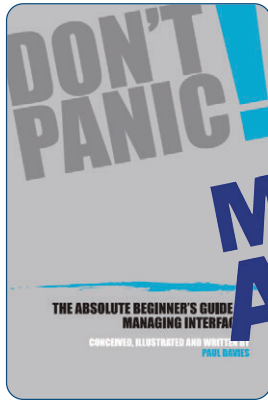
Paul spoke about his objectives for writing the book and how the book

MEET THE AUTHOR

evolved from a work shop session to a tutorial and eventually into a manuscript for the Don't Panic! book series. He also spoke about the challenges he faced when writing the book, and provided some useful tips to consider when submitting your own Don't Panic! manuscripts. The event had good attendance and there was good discussion raised around the topics within the book.

The next "Meet the Author" event is on 25 June 2021 where Mike Wilkinson and Tim Rabbetts will discuss their book, *Don't Panic! The Absolute Beginner's Guide to Architecture and Architecting.*

On 9 July 2021 Jon Holt and Simon Perry will talk about their book *Don't Panic! The Absolute Beginner's Guide to Model-Based Systems Engineering.*

Booking is available via the INCOSE UK events page. To book, click the More Info button on the event you would like to attend.

Professional Development Online Sessions

14 July 2021—SEP Certification Clinic

Attend this session to gain a better understanding of INCOSE UK SEP Certification. The session will be an open forum for discussion and will cover an application requirements overview for each level and the application process details. The session will include input from a recent candidate and a certification application reviewer along with a Q&A.

15 September 2021—Registration Interview Preparation Clinic

A session exploring the professional registration interview. Find out what the interview involves and the best way to prepare. This is an open forum session with input from a recent candidate and the INCOSE UK assessment team.

10 Nov. 2021—C/D/E Competencies Clinic

In this session, we will focus on the UK Standard for Professional Engineering Competence (UK-SPEC) C, D, and E competencies and how systems engineers should map their experience to these when applying for professional registration. The session will be an open forum including input from the INCOSE UK assessment team.

Professional Registration Webinar (UK Spec v4) 16 June 2021, 18 August 2021, 13 October 2021, 15 December 2021

Our regular INCOSE UK professional registration overview covers how to apply and answers your questions on the professional registration process. These sessions include input from our assessor team and a recent INCOSE UK applicant.

To book a place for you or a colleague, please email profdev@incoseuk.org.

Israel Chapter

Yoram Reich

yoramr@tauex.tau.ac.il

The Israeli Society for Systems Engineering held the 11th Israeli International Conference on Systems Engineering online on the 16th and 17th March 2021. The conference theme was "Systems Engineering in the Age of Disruptions and Transformation," signifying both the influence of COVID-19 on our way of thinking and future operation as well as significant technologies transforming the systems we design, the way we design them, and consequently, our profession. The conference was in English and consisted of four keynotes and three tracks with lectures from academia and industry as well as five tutorials.

The conference started with a plenary keynote by INCOSE President Kerry Lunney who first received an honorary membership of the Israeli Chapter (INCOSE IL) from INCOSE IL President Dr. Ram Oron and subsequently spoke about pathways for tomorrow's systems engineering. This forward-looking talk paved the way for numerous sessions such as digital transformation, model-based systems engineering (MBSE), complex systems, systems engineering with software, cyber and AI, and systems theory. Prof. John Clarkson from Cambridge University presented the second plenary talk discussing how a systems engineering approach has led to better medical care. The second-day plenary talks featured two speakers. The first talk by Brigadier General Ziv Avtalion, Israel Defense Forces' Chief of Digital Transformation, presented how to manage digital transformation in a large complex organization. The second talk by Dr. Irit Idan, Rafael's executive research and development vice president, presented the future vision of Rafael in systems engineering.

The conference also included five one hour and a half long tutorials on advanced MBSE, smart complex systems, designing systems security, software engineering dependability, and a framework for organizing system engineering projects. Also, one session focused on four leading systems engineering educational programs in Israel.

The operation as an online conference (by KMD Events) went extremely smoothly. There were about 200 participants from four continents. The conference received amazing feedback from the participants.

I had the honor to be the conference chair, and on behalf of the organizing committee, we thank our industry partners: Israeli Aerospace Industry, Rafael, and Elbit Systems; and academia partners: Tel Aviv University, Technion-Israel Institute of Technology, Ben Gurion University, and Holon Institute of Technology for supporting the conference and making it a success. We also thank our partner Institute of Electrical and Electronics Engineers (IEEE) Israel for sponsoring a session on model-based systems engineering.

9th Mars Rover and Society Expo!

WHEN: Saturday, July 24, 2021
TIME: 1pm to 5pm
WHERE: LIVE at S-Café at Northrop-Grumman,
                     Redondo Beach
COST: FREE (Parking & Admission)!
E-RSVP@:   *https://tinyurl.com/MarsRoverExpo*
                     RSVP required, more details on the link
MASKING: Required

- **Latest Mars Rover Engineering & Science Results**
- **Rover Landing Site Scale Model, Hardware & Mock-ups**
- **FREE Bottled Water & Healthy Snacks**
- **Special Tours of JWST Space Telescope (Last Chance!)**
- **Exhibit Tables from LA & OC Professional Societies (Planetary Society, IEEE, INCOSE, AIAA, SWE, SHPE, OC-VitalLink, SBWIB, SAE, OSSC, NSBE, IET & others!)**
- ***Kids Activities (Rocket Contest, Robotics & More!)**
- ***Closing Q&A & FREE Raffle ("Space-Related") Prizes!**

This is an LA/OC-Area-Wide Science, Technology, Engineering
& Math (STEM) Outreach, so Kids, Students & Adults Welcome!!!
Questions: Fred @ fredlawler@hotmail.com

Working Group Updates

SETDB is Coming!

John Nallon, Chair, SETDB WG

It is time to fill you in on the Systems Engineering Tools Database current status and upcoming events! On January 28th the SETDB went live to the public and to our INCOSE membership to get users acquainted with the system and to give users and vendors the opportunity to use the system and provide feed back about the system so we could make adjustments prior to the SETDB v1.0 release. Before I go into the release schedule the table below shows some of the system metrics captured since January 28th: (All statistics were captured at 10:30 am on June 7, 2021)

What is Happening and What is Coming Do You Ask?

- The SETDB Development Team is wrapping up new feature implementations and attending to the issues found during validation and verification activities. These activities are scheduled to conclude on June 21, 2021.

- The SETDB Technical Board will review the configuration status with the development team on June 21 to evaluate any showstoppers, top priorities and must fix issues.

- On June 21 the SETDB v0.9 system database will be taken offline to execute data migration to the production servers.

- On June 22 the SETDB Casual access webpages will be released to the public, with a representative example of tools. These webpages are the SETDB V1.0 web access pages and will be fully operational, except you will not be able to log into the SETDB Database.

- On June 23 SETDB V0.9 will be opened but the database will be frozen. (we will not be able to add to it)

- The SETBD v1.0 Site database will remain "frozen" until approximately June 30, 2021.

- SETDB 1.0 will be integrated with the INCOSE and PPI Websites starting on June 23, 2021.

- System integration and testing will continue until June 30th.

- Barring any showstoppers, SETDB v1.0 will be opened to the public on July 1, 2021.

There are a significant number of functionality changes coming in Release 1.0. You will have a link from the INCOSE main web page and you can always reach it at www.systemsengineeringtools.com and the Home Page, shown in Figure 1, with several ways to Explore the system, login, register as a tool vendor, become a member of INCOSE or PPI.

# Visits	# Unique Visitors	# Searches	# Taxonomy Browsings
774	480	447	190

# Tools in the SETDB		# Vendors in the SETDB		# Vendors with Account
305		88		10

Most Visted Vendors Visited	Most Visited Tools	
1. Obeo Software 2. Siemens Polarion 3. Spec Innovations 4. Sparx Systems 5. Vitech 6. Change Vision Inc. 7. Jama Software	• CORE • Enterprise Architect • GENESYS • Polarion • Innoslate • Team for Capella • Eclipse Sirius Desktop	• Astah System Safety • Architect Designer • Prolaborate • Publication for Capella • Eclipse Sirius Web • Astah SysML
Vendors with their own SETDB Account manage their own tool entries and supporting data. All other vendor and tool data is entered by SETDB Working Group representatives from INCOSE and PPI. SETDB WG Reps are limited to the amount of information they can enter. Only tool vendors can enter long descriptions, graphics, and so forth to describe their products. We do encourage tool vendors to open their own account and maintain their tool data.		

Figure 1. Landing page for SETDB

Once you are logged in you can navigate to the tools, vendors and categories (taxonomy) exploration areas as shown in Figure 2.

New functionality includes the new home pages, publishing of the initial capabilities questionnaires, simple and advanced search commands, active quick links in all of the banners, user interface changes to ease the user experience, and the integration with the PPI Systems Engineering Goldmine to highlight the major changes.

We are very pleased and excited to be finally bringing the Tools Database back to life for our systems engineering community. You can contact the SETDB support team at: Contact SETDB Support for any issues, tool suggestions, vendor suggestions and questions.

Figure 2. Sample exploration areas

INCOSE Configuration Management Working Group Starting Work on a Don't Panic ... Guide

Sandrine Gonthier, sandrine.gonthier@ thalesgroup.com

The INCOSE Configuration Management Working Group has taken shape in INCOSE over the last few years and we propose a new Don't Panic... guide focused on configuration management.

The working group members collaborated on improvements for the Systems Engineering Handbook 5th edition chapters concerning configuration management and believe these can extend into a more comprehensive Don't panic ... guide.

We propose a global comprehensive approach describing the core configuration management purpose and provide a general configuration management primer to dispel the perception that this discipline is complex, difficult to understand, not accessible, or a brake to agility.

Our shared configuration management vision has an enabler providing truth, trust, and traceability during the full product lifecycle whatever the industry sector type or the product type.

Configuration management can:

- Be a rich activity

- Adapt to the product's environment complexity

- Already be part of your engineering activities without the "configuration management" stamp

- Strongly relate to information, data, and product lifecycle management as a process

- Extend to product in-service phases until dismantling

- Extend to managing the core processes of any company

We are just beginning this guide so if you wish to share your own personal experience and knowledge as well as your vision for the future please contact us.

Acquire Engineering Value from AI

Link Parikh, Link.Parikh@Rocket-Technology.com

The rising interest in artificial intelligence (AI) has led to industry and government agency investments into experimentation, exploration, and model development. It may be best to consider the questions "what insights should we pursue?" and "how do we bring new insights into an existing operation" before significant product and service purchases and using an integrated engineering lifecycle with model-based systems engineering management and an AI platform ecosystem.

What Is AI for Engineering?

Datasets and data sources have become so vast, partly because regulations require us to store them. One can argue we can mine the near-zero value of these assets for insights familiar to us. On the other hand, there may be unknowns we have not yet imagined which could be enormously valuable to the organization's mission.

We can simplify the problem by breaking down the AI lifecycle to find potentially existing data science opportunities. One approach is reducing the new capabilities into five elements for simplicity and from an engineering program management perspective, not necessarily from the data science practice:

- Data Discovery (across structured and unstructured data)
- Analytics (statistical approaches)
- Automation (remote process automation)
- Machine Learning (training models)
- Deep Learning (neural networks with decision optimization)

Decision optimization is the ultimate AI destination or even holy grail. At this point, it may soothe the newcomer to know we will avoid the often imagined "cyber-net takeover of humankind" and embrace the human in the loop to choose from options offered by the decision optimization system and make the final decision. Some closed systems, with encapsulated risk and where the models train over long periods/cycles, would be exceptions. Examples include self-driving vehicles,

unmanned systems, and space-based systems where decisions must be made in real-time.

We can dive deeper into each element another time, however, one can imagine their value in a competitive large engineering program with a state-of-the-art capability to mission or product owners within a certain period. In this case, one may hire data scientists, buy products, and say "go ahead find something." Or one can say "here is my gap, resolve it." Certainly, these approaches can be valuable but often hard to justify from a financial perspective, outside of experimental processes. So again, what can we do?

How Can an Engineering Collaborative Lifecycle Platform Help Us?

Today, many industrial firms and primes have implemented a modern collaborative systems engineering management and model-based platform integrating tools, automated processes, and project elements. Justifications, needs, use cases, requirements, epics, stories, and other data link to assets at the atomic level. Links form between discrete statements, paragraphs, artifacts, testing procedures, and, if they are incredibly wise, architectural elements in a canonical object-oriented model. The Collaborative Lifecycle Management (CLM) platform has become a standard in the automotive, aerospace, industrial systems, and/or software development organizations. Similarly, competency teams and those responsible for integration and interoperability (I&I) have used this proven approach.

So how does this help us make AI valuable to our organization?

Integrating the CLM capability to an AI platform can offer two benefits as an integrated whole.

Program participants may encounter a need to use AI elements (see the five listed above) enabling the engineer or analyst to instantly connect to the data science platform and conduct the analysis, creating a data science lifecycle for the task. From there, the results return to the CLM platform and project team whereby the canonical model or other lifecycle platform elements can determine the impacts of the necessary proposed changes. This "on-demand" approach focuses AI investment on solving discrete program challenges

An AI team may need to explore or mine data to find "known-unknowns," hard to find things, and "unknown-unknowns," things we cannot imagine. These insights or decision options apply to the right task in the CLM platform. The program team reviews the insight values. A canonical model (or other approaches) could "simulate" the insight value by analyzing the "what" (cost/benefit) and "how" (project, budget, materials, and team) it can implement into the program.

The combined capability of an integrated engineering lifecycle management platform, AI platform, and environment may be a breakthrough for agencies and industry in enabling an optimized approach to acquiring the best insights and decisions for a faster, better, smarter, and possibly less expensive program delivery.

INCOSE Awards Three Students at the International Science and Engineering Fair

NCOSE participates in the International Science and Engineering Fair (ISEF) as a Special Award Organization. Since 2009 INCOSE participates to provide systems engineering awareness to very talented high school students from all over the globe. This year students were awarded a total of over $4 million in special awards and INCOSE provided three awards for "The Best Use of Systems Engineering" totaling $2,200 in cash and 10 Honorable Mentions. The first place winner is also invited to the INCOSE Symposium and offered a booth at which to exhibit their project. ISEF Special Awards were done virtually this year for the first time; ISEF was virtual last year but did not include the special awards. The INCOSE Fellows lead the effort with ISEF and this year there were nine INCOSE members that served as judges contributing over 250 hours of their time to this worthy endeavor. The ISEF formally aired May 16-21, 2021, with the Special Awards Announced the evening of May 20th, but the INCOSE ISEF judges started their work on April 23rd with our award decisions provided by May 7th. We started with targeting ISEF Categories of projects that were likely to have systems engineering content, reviewing over 400 abstracts; from there we narrowed to 53 projects that we were able to visit virtual booths and using qualitative criteria narrowed to 15 projects for which we were able to conduct interviews with students. Every project is impressive, and the hardest part of our participation is choosing the winners. We applaud our winners and wish them success.

First Place Award of $1,500 for Best Use of Systems Engineering

Robotics and Intelligent Machines—FS HIVE MRK 12: An Autonomous Swarm Robotics Fire Suppression System. Joseph Saturnino from Hannon, Ontario, Canada, developed a very exciting and impressive system of systems project. He is in his last year of high school and plans to go to McMaster, University of Toronto, M.I.T or Stanford. His project consisted of a swarm of robotic vehicles which carry fire suppression materials. The
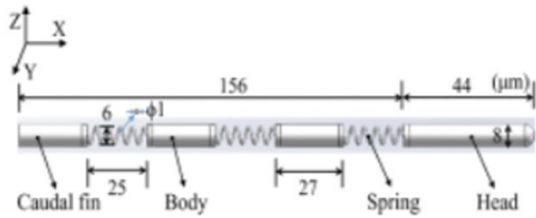

First Place—Joseph Saturnino from Hannon, Ontario, Canada

robots communicate with each other while seeking the fire. They search for the fire using Lidar, infrared, and vision methods. He employed collision avoidance and backup communications. He tested and evaluated the testing responses. He identified many items that could be improved while comparing his work to fire sprinkler systems in warehouses. He plans to continue to find ways to make low-cost better ways to extinguish warehouse fires while they are smaller more manageable fires.
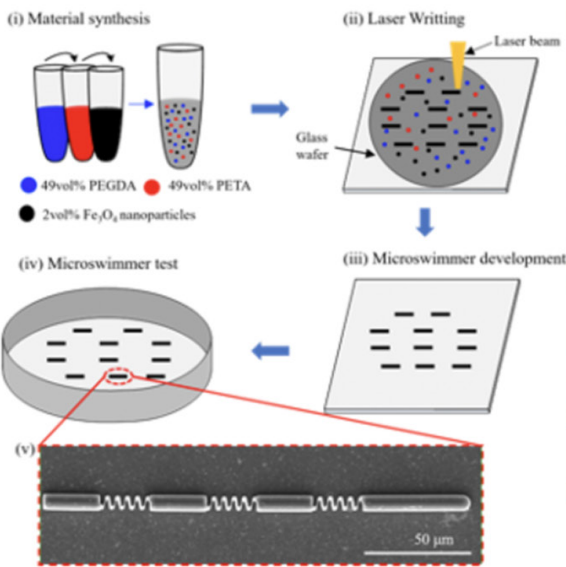
Second Place Award of $500 for Best Use of Systems Engineering

Robotics and Intelligent Machines—Magnetically-Powered Multi-Segment Degradable Microswimmer. Michael Sun from Hong Kong, China, developed a micro-scale robot with a head and 3 rigid body parts, 200 microns long and 8 microns in diameter. It can be directed by magnetic energy to move through blood or tissue to carry medicine,
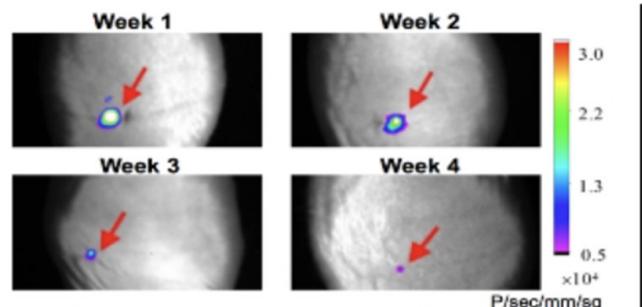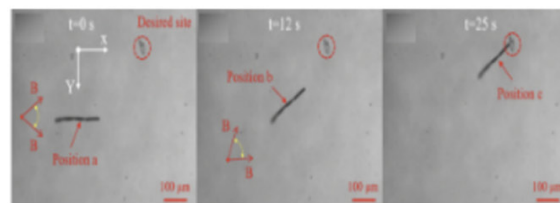

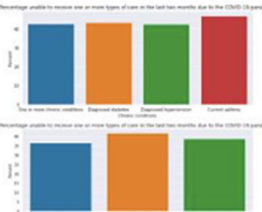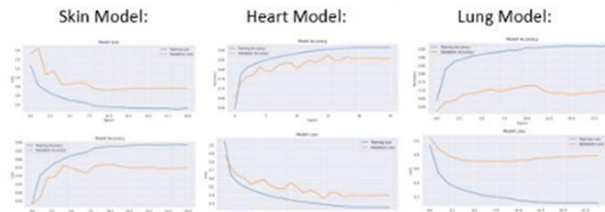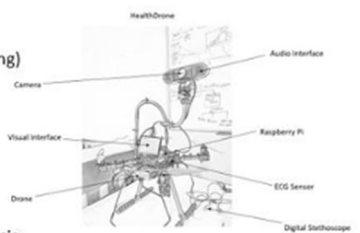*Second Place—Michael Sun from Hong Kong, China*

stem cells, or micro-sensors through the body for diagnosis and treatment of diseases. He fabricated this using 3D laser lithography with two-photon polymerization; the four parts of the micro-robot and the springs connecting them are fabricated in a single step from a combination of materials approved by the Center for Disease Control (CDC) for safe use in human tissue. He did an impressive job of materials research, experimentation with different micro-robot shapes and sizes, and conducted extensive testing to assure that the micro-robot motion could be precisely controlled, and that entire micro-robot degraded quickly (so it would not remain in the body).

Third Place Award of $200 for Best Use of Systems Engineering

Robotics and Intelligent Machines—HealthDrone: An Autonomous, Offline Medical UAV for Advanced Biometric Collection and Analysis Using Deep Learning. Nithin Naikar from Olentangy Liberty High School, Powell, US-OH developed a medical drone that can be implemented across all societies with minimal expense and deployed to rural areas in the US or Western Europe where medical care is scarce or in remote villages in Africa, Asia or South America where medical care may be non-existent. Mr. Naikar demonstrated

utility, novelty, and potential major impact in biomedical engineering. The drone is equipped to fly into a medical situation and capture key measurements of a patient and then using techniques of telemedicine communicate the results to a medical staff in a hospital anywhere in the world. There are six measurements taken including basic visual acuity, hearing accuracy, and mental state. The three advanced measurements consist of deep learning assisted examinations, including heart arrhythmia detection, lung respiratory audio analysis and dermatological lesion examination.

Honorable Mention's for Best Use of Systems Engineering

Biomedical Engineering—Application of 3D-Bioprinting and Electromagnetic Field for the Development of Bioartificial Bone from Stem Cell-Laden Bioink Incorporating Sepiolite and Eggshell. Tan Elcin from Ankara, Golbasi, Turkey has a unique project that has potential impact for osteoporosis patients and patients who have destroyed bone structure because of severe accidents. This project may have a major effect on future surgeries that involve bone replacement and repair. Mr. Elcin demonstrated utility, novelty, and potential major impact in biomedical engineering.

Second Place—Michael Sun from Hong Kong, China

Biomedical Engineering—The Giraffe Walker.
Rebecca Paratz from Kew, Australia is a very impressive inventor; she is only 14 yrs. old! Her project was called the "Giraffe Walker" which was a walker for people that allowed them to navigate going up and down stairs and uneven terrain. Her unique design featured a center neck that, with the press of a button raised and lowered the user to help them stand or sit.

Biomedical Engineering—An Ultra-Low-Cost, Brain-Controlled Transhumeral Prosthesis Operated via a Novel EEG/Gesture-Based Approach. Benjamin Choi from McLean, US-VA, developed a prosthetic arm that is controlled using brain waves. He used alternate material for the 3D printed arm and developed a more robust control approach using the user's gestures. The performance of his hand beat expensive industry prosthetic hands for a fraction of the cost.

Biomedical Engineering—Personalized Implantable Scaffolds for Wound Treatment and Management. Ashwin Prabhakar from Madison, US-AL, developed a system to treat deep wounds that is rapid, customized, low-cost, and implantable. 3D models of the wound are imaged and printed using photogrammetry. The wound treatment, or scaffold, is developed using a 3D printer of Alginate, that includes a drug delivery using chlorophyll, integrated with pectin for wound temperature monitoring, and stem cells for cellular therapy. The models can mimic layers of tissue and skin in the wounds.

Biomedical Engineering—A Low-Cost Approach to EEG based Mind-Controlled Prosthetic Arm Using Brain-Computer Interface. Madhu Balaji a freshman from Madison, US-AL developed a prosthetic arm that is controlled using brain waves. She used 3D printing to construct the arm and spent significant time designing the software and test cases during development. She achieved her goals of demonstrating significant functionality at a fraction of the cost of industry produced prosthetic arms.

Biomedical Engineering—Engineering a Clinical Force Measuring Walker for Patients with Restricted Upper Extremity Weight Bearing. Ansel K. LaPier from Spokane, US-WA developed a noteworthy system, in his junior year. His qualitative and quantitative research study, design and implementation led to a useful system enabling patients to heal faster after bone fractures by providing feedback to limit weight bearing during the healing process.

Robotics and Intelligent Machines— Engineering a Robot Arm with Computer Vision and Simulated Grabbing for Manipulation of Objects. George Delong from Jacksonville, US-FL developed a vision guided robotic arm with 21 motor controls to maximize the degrees of freedom while minimizing the cost. He used multiple engineering disciplines, conducted trade studies to develop design concepts and test his models, set criteria for acceptance, and tested his design with a live subject. The test subject performed three distinct operations while having the computer control arm smooth out and perform the actions that the subject could not do on his own.

Systems Software—Development of Immersive Technologies Applied to Astrobiology Teaching. Henrique Amorim of Sao Paulo, Brazil developed an impressive immersive virtual reality environment to allow students to learn about astrobiology. Students can explore an 8200 square foot spaceship, explore many planets, discover aliens, and analyze their DNA. Topics and skills covered all map to the curriculum prescribed by the government of Brazil, and in addition to astrobiology, the student learns critical thinking and becomes more literate in science and technology.

Continuing Our Support for the Next Generation of

Potential Systems Engineers

INCOSE

Following Nature's Cue

Vandana Suresh, vandanas@tamu.edu

Researchers Build Successful and Sustainable Industrial Networks

Food Web Structural Characteristics Provide Guidelines for Creating Industrial Networks

Summary: Predator-prey food webs, known for their effective resource utilization, minimize waste production. Research now shows eco-industrial parks, inspired by the food web architecture, are economically beneficial, resilient, and environmentally friendly.

By translating the interconnection pattern between nature's food chains to industrial networks, Texas A&M University researchers have delineated guidelines for establishing successful industrial communities. The researchers said this guidance can facilitate economic growth, lower emissions, and reduce waste while simultaneously ensuring partner industries can recover from unexpected disturbances.

"Industries can often partner to exchange byproducts and over time these industries might form bigger communities. While these networks sound quite beneficial to all industry partners within the community, they are not always successful," said Dr. Astrid Layton, assistant professor in the J. Mike Walker' 66 mechanical engineering department. "We tried solving this problem by providing design guidelines inspired by nature's food webs so the overall system will both remain eco-friendly and save money for everyone."

The researchers published their study in the journal *Resources, Conservation & Recycling.*

An essential part of running any industry is identifying economically viable resources, such as raw materials. Rather than having each industry work out these details independently, an eco-industrial park or a partnering industry network is an emerging trend. Further, businesses belonging to these parks work symbiotically where industries mutually benefit from each other, much like in nature. For example, one industry's waste is another one's raw materials—often saving both partners money.

When successful, industrial symbiosis can help to reduce raw material use, costs, and emissions while generating sizeable financial returns. However, there have also been instances where eco-industrial parks have not worked.

"When eco-industrial parks started to show success, people took note and began trying to form their own community of companies exchanging byproducts, but these 'from-the-ground-up' designs can hit or miss," said Layton. "The underlying reasons could be many, such as economic issues, or one company goes bust and the whole system breaks down because they're all connected."

To combat this problem, the researchers sought to provide guidelines on how to design these industry communities to leverage the industrial symbiosis benefits while avoiding the downfalls.

For their analysis, Layton and her team referred to food webs that are both resilient to disturbances and produce minimal waste. These biological networks comprise multiple food chains linking predators and prey. Furthermore, scientists have used quantitative measures to extensively study the interconnected chain organization in food webs over the years. Of the many metrics, the researchers especially focused on one called nestedness.

This metric, ranging from 0 to 1, reflects the location where connections occur within networks. When nestedness has values closer to one, there is a hierarchy in the connections.

In other words, one actor connects to all other actors in the network, another actor connects to a subset of those, and so on. For example, a highly nested structure would be one where certain species of bees pollinate various plants while other "specialist" bees pollinate only a small number of plants within this much wider set. Alternatively, poorly nested structures have values closer to zero and every actor in the network may connect to every other actor.

Unlike food webs, many industrial networks have low nestedness. So, the researchers tested if increasing industrial network nestedness could promote the financial benefit and the ability for industries to recover from disturbances.

For their study, Layton and her team included nine industries; including a fertilizer plant, a pharmaceutical plant, and a wastewater treatment facility; that could participate in five water-based exchange types. Next, they created 4,000 different network designs, broken up into 200 designs at 20 different nestedness values.

The network designs with high nestedness used less freshwater and the network survived unforeseen disturbances, ultimately resulting in more savings and resource conservation. In more specific scenarios, such as when the industries spread out geographically with expensive resources, high industry network nestedness was, again, more advantageous.

The researchers noted they analyzed only water exchanges in the current study and their future work will address other resource exchange and environmental impact types. However, they said the high nestedness benefiting industrial networks applied to other exchanges as well.

"Water is the worst-case scenario compared to other exchange products in infrastructure costs," said Layton. "Our results have identified situations when high nestedness is an advantage, which can then guide the network design. This work will support success both from an economic perspective and resilience perspective."

Abheek Chatterjee and Colton Brehm from the mechanical engineering department also contributed to this research.
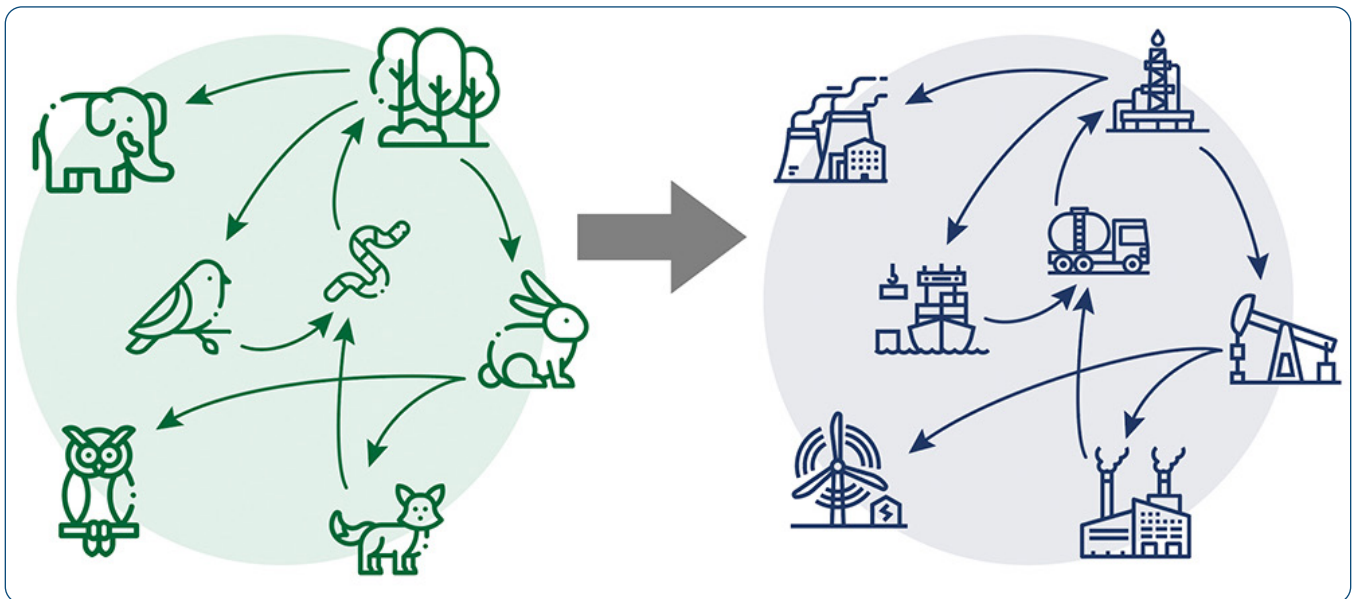
Research shows design guidelines based on the food web connection characteristics can create successful industry networks. | Image: Rachel Anthony Barton/Texas A&M Engineering
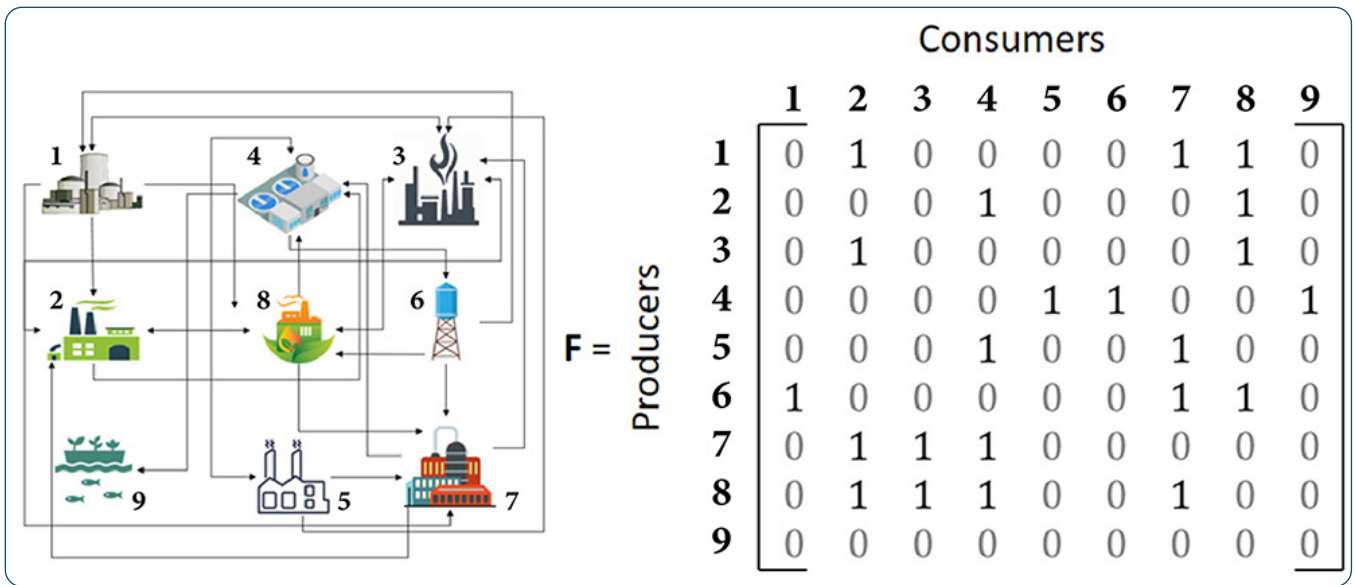
An industry network example (left panel) with water-based exchanges. The matrix (right panel) shows a mathematical connection representation. The ones indicate the connected industries and the zeros are the not connected industries. | Image: Courtesy of Dr. Astrid Layton

A Look Back—IS 2019

A Look Back—IS 2020

Note From the Editor

Lisa Hoverman, newsletter@incose.org

It is hard to believe we are ½ way through 2021! The time is flying by. The Q2 2021 Newsletter is being published as the World is continuing to grapple with the COVID-19 Pandemic in many different ways. As we work through this 31st year of INCOSE in the 'new normal' we are encouraged by the work we see continuing in INCOSE, at the Central, National, Chapter, and Individual levels. This particular Newsletter reflects all of that, and we hope you enjoy the read.

INCOSE went truly virtual in 2020 and we are just now starting to emerge from that and considering how to meet in person again, when and where it is safe. INCOSE continues in serving our membership with improved IT offerings that make chapter meetings, symposia, conferences, cafés and more accessible remotely, and in some cases, to more systems engineers than ever before! We work hard to make sure that systems

engineers keep connecting, networking, and working together. INCOSE is looking forward to our member-wide virtual Joint Leadership Meeting tomorrow, and our 2nd fully virtual International Symposium (IS) 2021, necessary as the world still is largely in a quarantine status. We hope to see you there, attending, contributing, networking, and possibly even presenting. Get your IS downloads now!

We hope you fully enjoy this second issue of the Newsletter with a lot of highlights of INCOSE from Q2 of 2021 and the impactful work we continue doing together. As a reminder, we are many—more than 18000 systems people strong, spanning more than 70 chapters, 68 countries, with more than 120 Corporate Advisory Board Members and working in over 50 working groups on the state-of-the-art products, standards, and research that will continue to improve and keep systems engineering relevant and of increasing relevance and value to our world.

The Newsletter continues to grow to inform our readership on all things INCOSE, both current, upcoming, and historical. There are some interesting previews on the many upcoming and exciting 2021 happenings, specifically the IS 2021 next month! We have upcoming powerful virtual chapter meetings, working group sessions, and other initiatives of INCOSE reported on in this Newsletter. Important to this Newsletter are some great articles from practitioners—practitioners tackling both the real and grand challenges of our times that apply to the Future of Systems Engineering.

Please keep sharing your publications with us as we continuously work to improve. I hope that you see some of your suggestions and contributions in this issue. As always, we welcome feedback and contributions at newsletter@incose.net.

We look forward to seeing you participating virtually as we network at, and present at, and gather at one of the many terrific upcoming virtual INCOSE events. I end with a sincere note of appreciation to all who contributed to this Newsletter. Have a wonderful June, stay healthy and safe I really hope to see you at an upcoming online chapter meeting, the Joint Leadership Meeting, a Systems Exchange Café, or an INCOSE conference!

INCOSE Member Newsletter

Publication of the International Council on Systems Engineering

For further information on submissions and issue themes, visit the INCOSE website as listed above.

Who are we? INCOSE is a 18,000+ member organization of systems engineers and others interested in systems engineering. Its mission is to share, promote, and advance the best of systems engineering from across the globe for the benefit of humanity and the planet. INCOSE charters chapters worldwide, includes a corporate advisory board, and is led by elected officers and directors.

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