MEMBERS NEWSLETTER

December 2020—Q4

President's Corner • Notes from the Board • Updates from the Board • Sector Updates—Americas
Sector Updates—Asia-Oceania • Sector Updates—EMEA • Working Group Updates • EWLSE Updates
Highlighting Our Working Groups • Stanley Irwin (Stan) Weiss, Tribute • Note from the Editor

Follow us

President's Corner

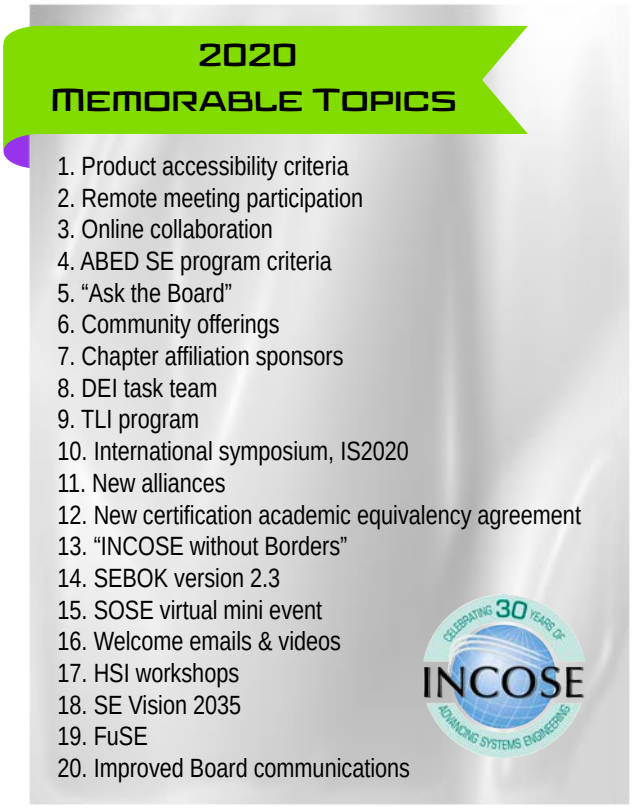
Kerry Lunney
kerry.lunney@thalesgroup.com.au

It is near the end of the year and I started to reflect on "how did we go in 2020." This led me to thinking about the number 2020's symmetry which in turn sparked the idea of listing 20 memorable topics for 2020. After all, it is the time of the year when lists start to resonate with everyone. Finding 20 topics was not difficult, quite the opposite, as we had some amazing moments in this extraordinary year. So here we go!

- ***Product accessibility criteria—***establishing such criteria will aid us in making our products more accessible for future members with hearing or vision disabilities, and improve understanding for members with English as a second language.
- ***Remote Meeting Participation—***offering faster adoption and adaptation. How did we survive before Zoom?
- ***Online collaboration—***improved connectedness and productivity with Microsoft Teams, BudgetPak for finances, SmartSheet for planning and tracking activities, and Alliance Relationship Management System (ARMS) for managing Outreach commitments. The communication ease on an activity across the world has increased in magnitude.
- ***ABET Systems Engineering Program Criteria—*** after many years of dedicated work by the task team (thank you again), the ABET's Engineering Area Commission voted unanimously in favor of the proposed INCOSE Systems Engineering program criteria. It will continue to the Engineering Area Delegation and Board of Delegates for approval and publication for public review and comment in the 2020-21 cycle.
- ***"Ask the Board"—***a simple and quick means for every member to interact with the Board of Directors over our website.
- ***Community offerings—***introducing system exchange cafes and showcase webinars. At the international level there is at least one event occurring every two weeks—unprecedented!
- ***Chapter affiliation sponsors—***a new additional services offering to the organisations affiliated with INCOSE Chapters, thereby enhancing the benefits to all. It was a great achievement to reach a mutually acceptable model.
- ***Diversity, Equity, Inclusion (DEI) task team—*** as INCOSE strives to be "a DEI professional society where everyone who practices or aspires to practice systems engineering can comfortably be their authentic self, recognizes themselves in other members, and has an equal voice and opportunity in all aspect of the organisation", we need to support this high but achievable aspiration with a focused plan currently under development. Next year, we will seek support from our members to help us on this journey.
- ***Technical Leadership Institute (TLI) program—*** our TLI leaders continue to refine this commendable program, offering participation from all corners of the world. If this interests you, consider signing up for Cohort 7 by 28 February 2021—you won't look back!
- ***IS2020—***the first fully virtual premier systems engineering event with tremendous results. This was a huge challenge to convert a very mature, planned, face-to-face event into a fully virtual experience in less than 10 weeks. This is a big steppingstone in developing future hybrid international symposiums.
- ***New alliances—***ever expanding our outreach through collaboration with other organisations and industries, we successfully added or renewed our alliances, including signing seven new agreements with APTA, ASEE, ASME, CESAMES, Jama Software, Vitech Corporation, and IEA. This is quite a feat under the COVID-19 constraints.
- ***New certification academic equivalency agreements—***with Colorado State University, Naval Postgraduate School, and University of Michigan. Our certification qualification significance continues to earn worldwide recognition.

- ***"INCOSE without Borders"—***under the current world constraints, our chapters are more connected than ever, interlacing many regional and chapter events, articles, and newsletters, to name a few. It is definitely a hard decision to decide the "good neighbor award" for 2020.
- ***SEBoK version 2.3—***our 14th release since quarter 3 of 2012. By the way, unique visitor numbers jumped from 26,500 in August to 42,750 in September, and the unique pageviews jumped from 66,485 in August to over 100,000 in September! Well done to all involved.
- ***System of Systems Engineering (SoSE) virtual mini event—***a very well attended, global event, receiving many accolades. This is only the beginning of expanding our events portfolio which will continue in 2021.
- ***Welcome emails and videos—***a means to say thank you and to engage our new members and CAB organisations.
- ***Human Systems Integration (HSI) workshops—***a shiny example of what a working group can achieve using their global footprint. Well done guys!
- ***SE Vision 2035—***a popular product undergoing a transformation to progress the systems engineering vision further into the future. It has many interested parties if the numerous volunteers to review the draft early in 2021 is anything to go by.
- ***Future of Systems Engineering (FuSE)—***we started to realize our vision through forming the Artificial Intelligence (AI) Systems Working Group (WG), resurrection, and to focus on grand challenges with Social Systems WG, developing systems engineering principles, and systems engineering Heuristics, and many more initiatives taking shape.
- ***Improved Board communications—***through introducing the newsletter columns from each board member, the "Message from the President Series," and the almost published INCOSE 2020 brochure. This brochure will update every 6 months to provide facts, figures, and initiatives underway for the year.

And there are many more advancements and key decisions made throughout the year. Lastly, on a personal front, the start of my presidency coinciding with natural disasters and a pandemic, closely followed by adversities to humanity and economic upheavals, has made my term very interesting, to say the least. I am sure every volunteer experienced something new and challenging under this environment. It certainly is a time for retrospection, inspiration, and positive thinking.



Looking forward, 2021 will be the year we experience the ramifications of 2020 instability. I believe it will be much more challenging as the longevity of disruptions and uncertainties will test our decisions and actions. Although we live in a changing world and must be flexible in everything, we have a strong foundation to build on. 2021 will be "one exciting year." Bring it on!

To our INCOSE family, I wish you all the very best in your endeavors. When you reflect on your journey in 2020, celebrate your achievements. If your 2020 year-end festivities differ from past celebrations, consider the possibility you may start a new tradition.

Cheers,

Kerry Lunney
INCOSE President 2020-2021

Message from the INCOSE President #8

Kerry Lunney, Kerry.Lunney@thalesgroup.com.au

Dear INCOSE Members,

Well, the year 2020 has been quite a year! Whether you experienced highs or lows, it continues to truly be very memorable. However, I do think the full impact of the turbulence of 2020 will not be evident until we are well into next year. It is how we continue to serve our members, our community, and our discipline, while shaping the future of systems and systems engineering that will be our test. I am confident we will continue to progress in all our endeavours. I believe INCOSE has positioned itself as a technical organisation that can absorb, adopt, and/or adapt, while advancing its vision and executing its mission.

I would like to recap on some of the decisions we have made in 2020 in the face of natural disasters, COVID19 pandemic, adversities to humanity, and economic upheavals.

We adopted "Zoom" as our preferred video conferencing application over our existing applications. This has had a magnitude increase in usage and satisfaction with our members.

Microsoft Teams has been introduced to improve our collaboration activities across working groups, special projects, communities, and chapters.

The International Symposium IS2020 and now the International Workshop IW2021 are fully virtual events. INCOSE in collaboration with our Events Organiser, KMD, developed a very good, fully integrated virtual platform for IS2020 that can be scaled to support many other types of events. For IW2021, we will continue to introduce new virtual capabilities—so stay tuned and join us at IW2021. A short video will be available describing the IW2021 program highlights for you.

We increased our offering of events in addition to IS, IW, and webinars with the debut of system exchange cafes, showcase webinars, workshops, and mini events. All of these you can participate in virtually. Every two weeks there is at least one INCOSE virtual event at the international level you can join. And, if we consider our offerings at the sector, regional and local levels, this number is just further magnified. At no time in the history of INCOSE has this been achieved. In 2021 we would like to continue to provide you this benefit.

Consideration for membership support to individuals and organisations has been worked on a case-by-case basis to ease financial burden where possible.

Certification is an area that we had to make some hard decisions considering world constraints. We could not and still do not offer paper exams where travel is prohibited and/or social distancing is not possible. Likewise, some of our members were struggling to earn their minimum number of Professional Development Units (PDUs) to renew their qualification in 2020. In recognition of the increased hardship we extended the certification exam eligibility period to 31 Mar 2021 for all those whose exam eligibility would have expired in 2020 and lowered the number of PDUs required for renewals in 2020. We have also deferred introducing the scheduled application fee increase by 1 year, and we are very close to introducing the option of taking online exams. These adjustments serve both the Certification program and our members in striving to achieve or maintain this internationally recognised qualification.

Despite our travel direction on prohibiting air travel and face-to-face meetings on INCOSE related business throughout the year, we have continued to perform well on all our working groups, community activities, and special project initiatives. In fact, the virtual space has in most cases, increased the collaboration with greater remote participation, both in numbers and in the number of group meetings. We are making great strides in the SE Vision 2035 initiative, in updates to the SE Handbook Edition 5, in crystallising the Future of SE (FuSE) activities, and in progressing the Human Systems Integration (HSI) working group activities, just to name a few. Our SEBoK is regularly exceeding the number of visitors

set previously, including a record month of over 42,000 visitors just recently, a testimony to the wealth of knowledge and information it provides to the community. And if you are not aware, SEBoK version 2.3 went live recently – well done to all involved.

Regarding travel restrictions for the immediate future, we respect the guidance provided by your authorised authorities. We will not be asking any INCOSE member/volunteer to travel on INCOSE business, including events, that would be in contradiction or violation of such guidance. This decision will be reviewed at the end of March 2021, with the hopeful expectation we can ease travel restrictions.

We have faced many challenges in our Outreach program in 2020, primarily due to the pressures every organisation, institution, and domain has faced under the 2020 global constraints, which in turn has minimised opportunities to open discussions on possible collaborations. However, we are very proud to announce that all our negotiations we had in work have all been fulfilled in 2020, including 7 new alliances and 3 new certification academic equivalency agreements. Well done to the teams! Our focus in 2021 will be to get out there and start focusing on domains where we can expect to have the greatest synergies and/or that need our SE skills.

The execution of these decisions has been pivotal in our progression. I do hope that you can reflect on these. Should you have further recommendations or ideas please do not hesitate to let myself or any of the Board of Directors know. You can do this directly or through the "Ask the Board" website (located in INCOSE Connect), another initiative we introduced in 2020. And prior to year-end you will all be recipients of a new INCOSE brochure detailing INCOSE the organisation, our achievements in 2020, and our focus in near future. I hope you enjoy it and will share it with your family, colleagues, employers and other organisations.

On a final note, a BIG thank you all our INCOSE volunteers and members. We could not have navigated this tumultuous year without your dedication and passion. I wish you, your families, friends, and colleagues the very best.

Keep well, keep safe. Enjoy your 2020 year-end festivities.

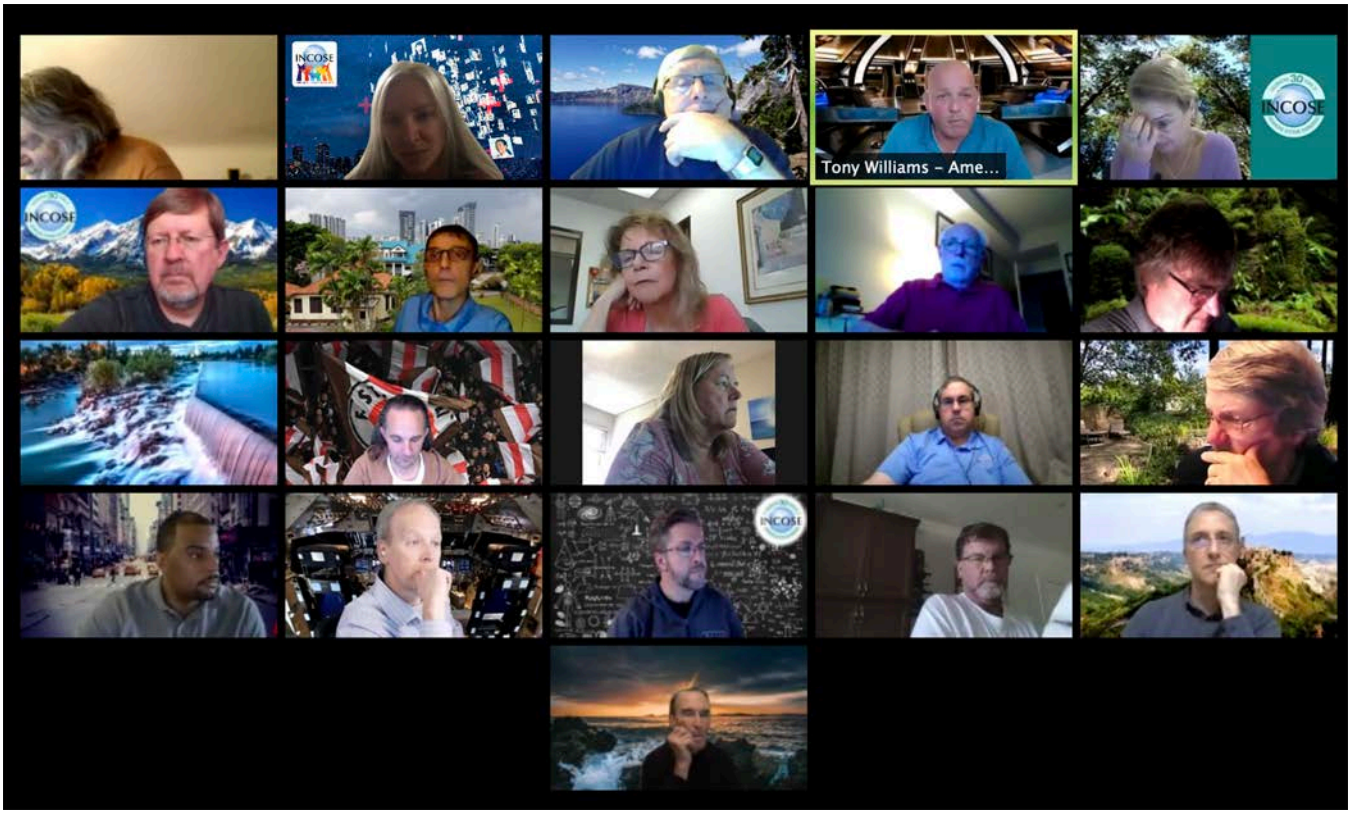
Kerry Lunney
INCOSE President 2020-2021

Notes from the Board

Lisa Hoverman, marcom@incose.org

The INCOSE Board of Directors (BoD) held their fourth quarter meeting remotely via Zoom as part of the on-going global quarantine status. While we all very much miss being together in person – the camaraderie over the "interwebs" is strong. The focus of this BoD meeting was:

- Welcoming newly elected BoD members joining for their first meeting, and introducing them to their new positions
- Finalizing and approving the Budget and Planning Process for 2021 – including new tools—BudgetPak—for handling the INCOSE budget,
- Updates from the following committees, cross-cutting services, groups, and task teams:
  - Community Offerings (Systems Exchange Cafés success, work on Webinar Showcases)
  - Diversity, Equity, and Inclusion
  - Executive Leadership
  - IT Initiatives (updated infrastructure (Zoom, Teams, etc.) and website redesign)
  - MarCom
  - Nominations and Elections
  - Special Projects
  - Strategy Sessions
- Progress and upcoming work on from our Value Streams:
  - Certification (keeping frees stable during pandemic, moving to more remote offerings?)
  - 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 (Individual vs CAB, benefits, differences)
  - Products (licensing, product awards for the IW, and more)



Members of the INCOSE BoD busy at work on a Zoom Call during the INCOSE Q4 Board Meetings

Updates from the Board

Contributions from the Board

Updates from the President

Kerry Lunney

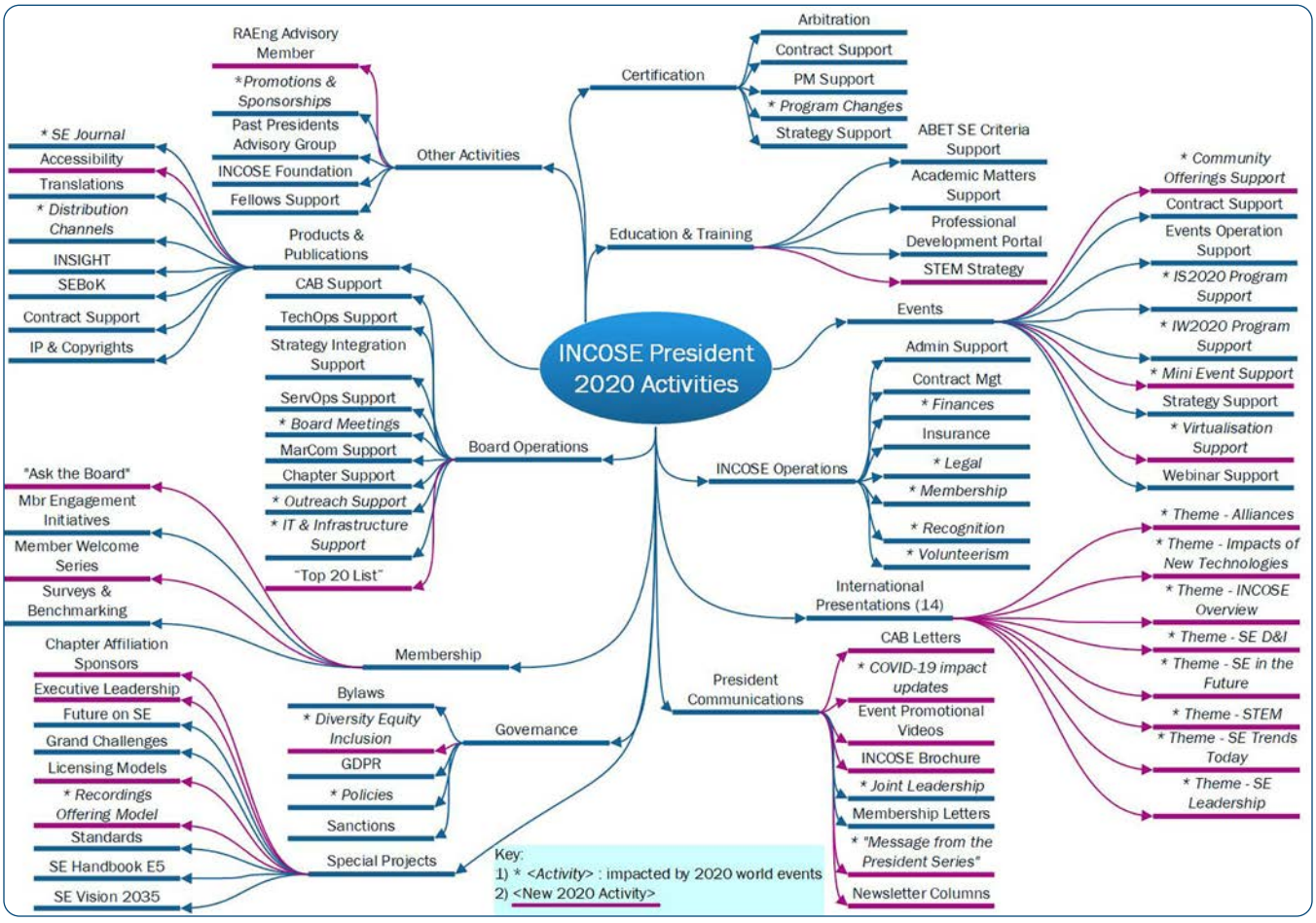
president@incose.org

Hello Everyone,

I hope you are all doing well. As INCOSE's president, people often ask me what this role involves. Now, having served 10 months of the 24 month term I thought I would share the activities I have participated in, whether leading, attending, supporting, or advising over this period.

To describe the commitment I made to you, our members, I have depicted the main activities in the diagram below. There are multiple levels but I kept it to a simple 2-level model to illustrate the broad range the role encompasses. The activity scope can change from week to week depending on the "INCOSE calendar," our priorities, and our available resources. As a volunteer led organisation the latter is the most difficult challenge we face regularly. Family and work life demands often make our INCOSE commitments "fluid" which adds a complexity you do not experience in your work life on such a regular basis.

In 2020, we undertook numerous new activities, highlighted in pink in the diagram. These primarily concern membership, special projects, events, and president communications. Each are pivotal in progressing INCOSE through its next 10 years. For example, we provided more communication channels with the board of directors, as mentioned in this newsletter's President's Corner, and we continually look to increase our benefits to our members, while always considering "a sense of fairness" across our community. We also develop our strategy



for supporting STEM opportunities across all sectors and we continue to evolve our events portfolio, through community offerings and mini events for example.

What you may not know however, is the number of international events ranging from workshops to conferences and symposiums I have spoken at as president. As any past-president can concur, presenting at events is a significant workload increase in addition to the "daily presidential responsibilities." In fact, I have found request numbers increased as the world transitioned into the virtual event space. The cadence was approximately three international events every two months. I had the honor to speak at events in Brasil, Tunisia, Canada, South Africa, France, USA, and Australia on topics ranging from "what is systems engineering" to "systems engineering transformed through a digital approach", to "systems engineering leadership, jumping from expert to executive", just to name a few. It truly has been a positive, eclectic experience!

The 2020 world, with its many "upheavals and wake-up calls," did not leave INCOSE untouched—quite the opposite. On the diagram, the main activities directly impacted by such upheaval lead with an asterisk and are in italics. Of course, events and meetings are the first thing most people think of and I hope you were happy with how INCOSE has responded—I know I am. We also made further adjustments and refinements in certification, membership, publications, board operations, INCOSE operations, and governance. We have communicated these changes throughout the year to you. We have also formed new task teams to facilitate addressing opportunities to improve our service and our organisation under these extraordinary times. As such, I invite you to consider "what else could INCOSE do" and if so, please let us know by submitting a short message to "Ask the Board."

I trust this small insight into the president 's role has somewhat demystified it. To head such an organisation as INCOSE has been both demanding and exhilarating, but never dull. I do wonder what 2021 will bring for our INCOSE community, but I suspect it will hold a few surprises, just like 2020. As for the remaining period of 2020, enjoy the end-of-year celebrations, whether it is with friends or relaxing with your favorite meal and a movie. And if you wish for a rewarding opportunity, we are always looking for volunteers!

Systems Engineering Wisdom: The Worth of Advice

Don York, INCOSE
Corporate Advisory Board Chair
Donald.M.York@saic.com

My children are either out of college or finishing their schooling, but they still, on occasion, seek my advice. I tell them, "My opinion is free, advice will cost you, and wisdom is really expensive." As a result, they very carefully choose their words when they come to Dad for his input. The systems engineering industry is not so different; there are many opinions, but advice and wisdom are not as readily available.

So how does advice differ from an opinion? Advice is guidance or recommendations concerning prudent future action, typically given by someone regarded as knowledgeable or authoritative. Thus, an advisor is a person who gives advice and is typically an expert in a particular field.

INCOSE, the International Council on Systems Engineering, is the professional society solely devoted to promoting, applying, and enhancing the systems engineering discipline and profession. Considered the world's systems engineering authority, INCOSE and its senior leadership rely on seasoned practitioners' experience, advice, and wisdom from over 100 organizations forming its Corporate Advisory Board (CAB).

While my children come looking for job application or resume wording advice, INCOSE needs a different advice type.

Although its membership comprises numerous logical, practical, and well-trained systems engineers, INCOSE leverages the CAB's wisdom not for basics but for elevated perspective. The organization looks for the strategic viewpoint gained by experience and hard-won wisdom—the kind practicing sustainable systems engineering in complex, critical, and ever-evolving environments provides.

From the CAB, INCOSE gets insights on:

- ***Important systems engineering challenges industry and government face—***autonomous systems, healthcare systems, agile life-cycle development, systems security, sustainability, systems engineering certification, and more.
- ***Where and how to invest time and energy helping to shape INCOSE's strategic direction—*** identifying and prioritizing how best to advance the systems engineering discipline in industry, science, and academia.
- ***Guidance for INCOSE's working groups—*** recommendations for products these working groups should produce and sparking genuine collaboration on priorities.

INCOSE's CAB helps provide this advice, strategic guidance, or recommendations concerning prudent future action for INCOSE and its 18,000 members keeping INCOSE relevant for the challenges of today and tomorrow.

Corporate Advisory Board Updates

Ronald Giachetti, CAB co-chair
regiache@nps.edu

I am the newly elected Corporate Advisory Board (CAB) co-chair. The CAB chair is Donald York. The Chair position is two years, after which the co-chair takes over. Consequently, I am in the training and mentoring phase before becoming CAB Chair in 2022.

I am the Department of Systems Engineering chair and professor at the Naval Postgraduate School (NPS) in Monterey, California. NPS has been a CAB member for at least the past 10 years. We teach systems engineering to active

duty naval officers, civilians in the Navy, and all other services including Marine Corp, Army, Air Force, Missile Defense Agency, and US federal agencies. We have about 40 faculty and staff serving almost 400 students, making us one of the country's largest graduate programs in systems engineering. It is extremely fulfilling working for the Navy in this role.

My engineering background started in the aerospace industry on Long Island, New York, after which I earned my PhD in North Carolina. I worked in Washington, D.C., and then moved to Miami to teach at Florida International University. In Florida, I applied systems engineering principles to non-traditional domains including cruise lines, healthcare, and logistics. I wrote a textbook on how to apply systems engineering to designing such enterprise systems. From Florida I moved to Monterey to take the position at NPS.

As CAB co-chair, my main responsibility is assisting the CAB chair. However, looking forward my priority is for the CAB to play an ever-increasing role in helping establish INCOSE's direction and priorities. The CAB size and diversity is a real strength of INCOSE, and can help define and grow the profession we all share.

INCOSE CAB Members CSU and Woodward Inc. Created an Innovative Lung Ventilator

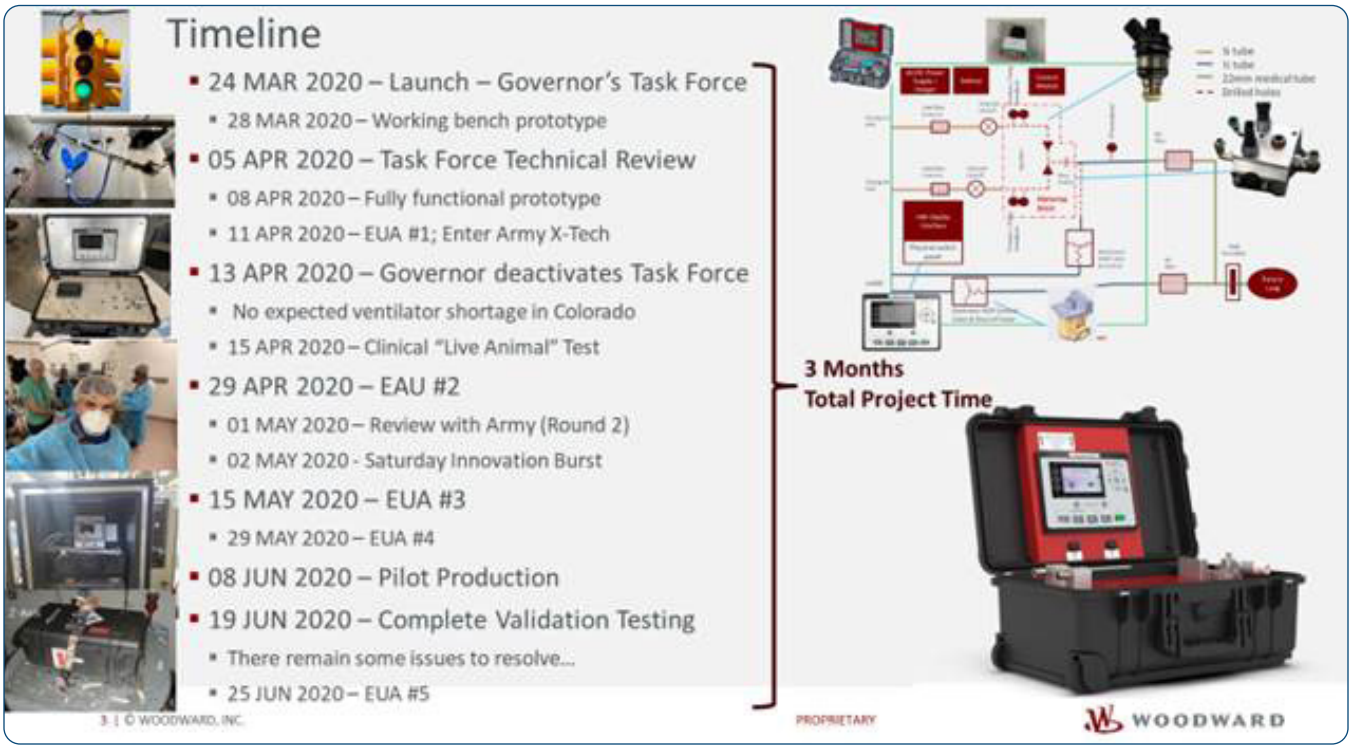
In March 2020, the state of Colorado (CO) faced a potential lung ventilator shortage due to the Covid-19 pandemic. INCOSE Corporate Advisory Board (CAB) Members Woodward Inc. and Colorado State University (CSU) joined forces to create a solution to this problem. They started working together on Wednesday, 25 March and had a working prototype the following Saturday, and a short three weeks later they tested the ventilator prototypes.

How did the CSU-Woodward team manage to move at such lightning speed without compromising their device's safety?

Colorado Governor Jared Polis Asks for Help.

When the state of CO risked running out of lung ventilators, its governor Jared Polis contacted various universities for help. One person he called was Bryan Willson, the executive director of the Energy Institute at CSU. Willson, who had worked with Woodward Inc. on various projects for two decades, then called the company's CEO Tom Gendron and proposed collaborating on a ventilator to help prevent the potential shortage.

Gendron agreed immediately and asked Doug Salter, the vice president of corporate



technology, whether he would like to get involved. Salter's response? "Absolutely!"

And so, with Bryan Willson leading the CSU side and Doug Salter leading the Woodward side, the developing a new kind of lung ventilator project commenced.

Establishing the Guiding Principles for the Project. The CSU-Woodward team was under extreme pressure to create a working solution. They knew a ventilator shortage meant people could potentially die. This could include their own loved ones. So, they needed to create with something fast. But this was not a project where you could "move fast and break things." A poorly calibrated ventilator can destroy the patient's lungs. The team was well-aware they needed to proceed with caution.

The team agreed on these guiding principles:

- We do not want to harm any patients.
- We do not want to spread the virus.
- We want to create a device to help people recover from Covid-19.
- We need to practice disciplined urgency, meaning move fast while still adhering to the best practices.

Of course, the "do no harm" principle was the most important one because if the ventilator was not safe, then nothing else mattered.

"We always took the conversation back to the patient," says Doug Salter. "We kept asking ourselves, 'What is the risk to the patient and how do we avoid it?".

Creating a Medical Device With a Broken Medical Supply Chain. Systems thinking helped the team notice a problem with the medical supply chain.

"We realized ventilator parts were in a very short supply, so even if we came up with the design, manufacturing the necessary parts in time would be very unlikely.

We took commercial parts designed for precision and used them to create something other than their original design," explains Ann Batchelor, assistant director of systems engineering at CSU.

Relying on the commercial supply chain allowed the team to create a ventilator manufacturable even in a broken supply chain situation.

What a Global Team Working 24/7 Can Accomplish: Bench Top Prototype in 4 Days, Fully Functioning, Portable Prototype in 15 Days, Live Animal Test in 22 Days. The CSU-Woodward team involved people in the United States, Germany, Poland, and India working together to create an innovative lung ventilator. They understood the state of Colorado may need 50,000 devices in a month which added additional pressure for the team members based there.

"We knew if the worst happened, then we, our families, and our friends may end up needing this ventilator, which made us incredibly motivated. We worked around the clock because we really thought it was a life-or-death situation," recalls Kamran Eftekhari Shahroudi, principal engineer at Woodward and a systems engineering professor at CSU.

As a result, the team managed to create a working prototype in three days, then started testing the ventilator on pigs three weeks later. While no plans to put the ventilator into production exist, the unprecedented development speed allowed the team to apply to the U.S. Army's XTech Covid-19 Ventilator Challenge where the Aether-100 ventilator won a $100,000 prize.

"The main lesson I learned from this experience is this: when people commit to the same goal, there is probably nothing they cannot do if they believe in it strongly enough," says Batchelor.

Doug Salter: "No matter what situation you are in, the principles still apply." Doug Salter believes disciplined urgency allowed the CSU-Woodward team to develop the Aether-100 ventilator under emergency conditions. They knew they had to be fast to provide the ventilator in time, but they also needed to ensure the device was safe to use. Thus, they decided to follow the standard systems engineering processes despite the time constraints.

Doug Salter shares the following with the systems engineering community: "No matter what situation you are in, the principles still apply. Do not let urgency take you away from

being robust in how you go through things. Every time you ignore the principles of how to develop requirements, validate those requirements, and then create things against them, you end up having remorse later because you inevitably find you have to do it anyway. I really think the basic systems engineering principles apply even in emergency situations."

Conclusion. People can accomplish incredible things when they face a life or death situation. However, what the CSU-Woodward team did was only possible because they applied disciplined urgency. Moving fast while still adhering to systems engineering principles allowed them to create a safe to use quality product in record time. This provides a valuable lesson in dealing with emergencies as a systems engineer: the principles still apply.

31st
Annual INCOSE
international symposium
Save the date
Honolulu, HI, USA
July 17 to 22, 2021

Additional Services for Chapter Affiliation Sponsors

Lucio Tirone, lucio.tirone@fincantieri.it

Marilee Wheaton, Marilee.J.Wheaton@aero.org

Donald York, Donald.M.York@saic.com

Michael Vinarcik, treasurer@incose.org

Serge Landry, serge.landry@incose.org

Andy Pickard, Andrew.C.Pickard@Rolls-Royce.com

As a truly global organization, INCOSE commits to deliver value to all its members across the world, and to the organizations they belong to. As INCOSE's footprint consolidates outside the US, with consistent growth both in membership size and contribution to the systems engineering discipline coming from all sectors, so grows chapter relevance and their impact on INCOSE's strategies. This is especially true for those countries in which a National Association represents the local INCOSE chapter, which becomes the "center of attraction" for the national community involved with systems engineering, both at individual and organizational level (government, corporate, academia). Such chapters identify as "MOA Chapters", based on the Memoranda Of Agreement granting them the INCOSE representation in their country, while organizations supporting them (Local Corporate Advisory Board members, or affiliated with the chapter in other ways), identify as "Chapter Affiliation Sponsors", or CAS.

Currently, both INCOSE and the chapters provide individual membership services, and harmonize with providing to the members a seamless INCOSE vision as a single entity. However, in Chapter Affiliation Sponsors, INCOSE Central is currently not aware of their relationship with the MOA Chapter, and at the same time CAS do not receive services from INCOSE Central.

INCOSE now offers Additional Services to Chapter Affiliation Sponsors, enabling an effective interaction and collaboration between the CAS and INCOSE Central, and at the same time maintaining the strong CAS relationship with the local Chapter. The first two examples of such services are:

- ***Additional Service 1—***Chapter Affiliation Sponsor employees can receive INCOSE Associate Members recognition; an Associate Member is not a regular INCOSE member, but still receives numerous benefits, including downloading the Systems Engineering Handbook as well as several other publications (Systems Engineering Journal, Technical Products, and International Symposium proceedings), or to access online tutorials and webinars; a full benefits list granted to Associate Members is available on the INCOSE Membership Benefits Differentiation table, here
- ***Additional Service 2—***the eligibility to apply for Certification Equivalency of Academic Programs with the SEP Program; this service is currently available only to University members of the Academic Council; full details on the Academic Equivalency Program are available on the INCOSE website here

Implementing the Additional Services falls under a new specific policy (CHP-101, available on the INCOSE Website here), and supervised by the Sector Directors who will act as liaison between INCOSE Administration and the Chapters requesting their activation.

By offering these Services INCOSE recognizes the relevancy of local contributions to the greater global community and wishes to reach out to as many local organizations as possible, providing an opportunity build on their connection with the local Chapters.

INCOSE-LA Report, 14 November 2020

Phyllis Marbach
prmarbach@gmail.com

INCOSE-LA proudly hosted 55 attendees using INCOSE America West's Zoom account for our Tutorial 9 and 10 November. Harry Koehnemann, a SAFe Fellow and a Scaled Agile Inc. principle consultant, presented "Building Really Big Systems with SAFe®." SAFe® is Scaled Agile Framework at scaledagileframework.com. Harry's charts are available on the INCOSE-LA library here. The workshop included nine SAFe application practices and Lean-Agile practices for system engineers building large applications in increasingly complex, connected, and unpredictable environments. This was the final 2020 Systems Engineering Education event for the LA Chapter. Another event held in November was the Chapter Quarterly Strategic Planning Meeting (SPM) conducted over Zoom. Most board members attended, provided director reports, and discussed planning for the 2021 and the new board transition.

INCOSE-LA supported the Conference on Systems Engineering Research (CSER) 8-10 October 2020. Over 200 systems engineers from around the world met virtually to present their systems engineering research. This 18th CSER focused on exploring recent Model-Based Systems Engineering (MBSE) trends and advances and MBSE synergy with simulation technology and digital engineering.

On 13 October, the virtual speaker meeting hosted Dr. John Lynch of SAIC. Dr. Lynch is the Future Operationally Resilient Ground Enterprise (FORGE) program's chief enterprise architect. He presented the architecture development methodology the Space and Missile Systems Center's (SMC) space force uses.

Our 15 September virtual speaker meeting hosted Mark Sampson who presented Systems Engineering MBSE Implementation in Your Organization; click here for the library and the available session recording.

The Western States Regional Conference 2020, hosted by the Seattle chapter, took place virtually 17–19 September. Almost 150 individuals from across the world registered to listen to the many successful systems engineering application examples from the Puget Sound area and the Western US. Mark Sampson followed his MBSE presentation with a tutorial, on 28 and 29 September, emphasizing the need to move from disconnected communications with documents to continuous communication with models.

The chapter held our year end event with a virtual networking and Jeopardy game on 4 December. The 2021 officer election concluded on 30 November. A Town Hall, planned for January 12, will include inducing officers and a members survey to help inform chapter event direction for 2021. We all hope 2021 sees the end to social distance requirements. Wishing everyone a happy and healthy holiday season and new year.

FYI

Information and Tools for Now

SEBOK v 2.3 Goes Live

Version 2.3 of the SEBoK went LIVE the first week of November. This is our 14th release of the SEBoK since Fall of 2012.

September was a huge month for the SEBoK. The number of unique visitors jumped from 26,500 in August to 42,750 in September. Pageviews jumped from 66,485 in August to over 100,000 in September! Well done to all involved.

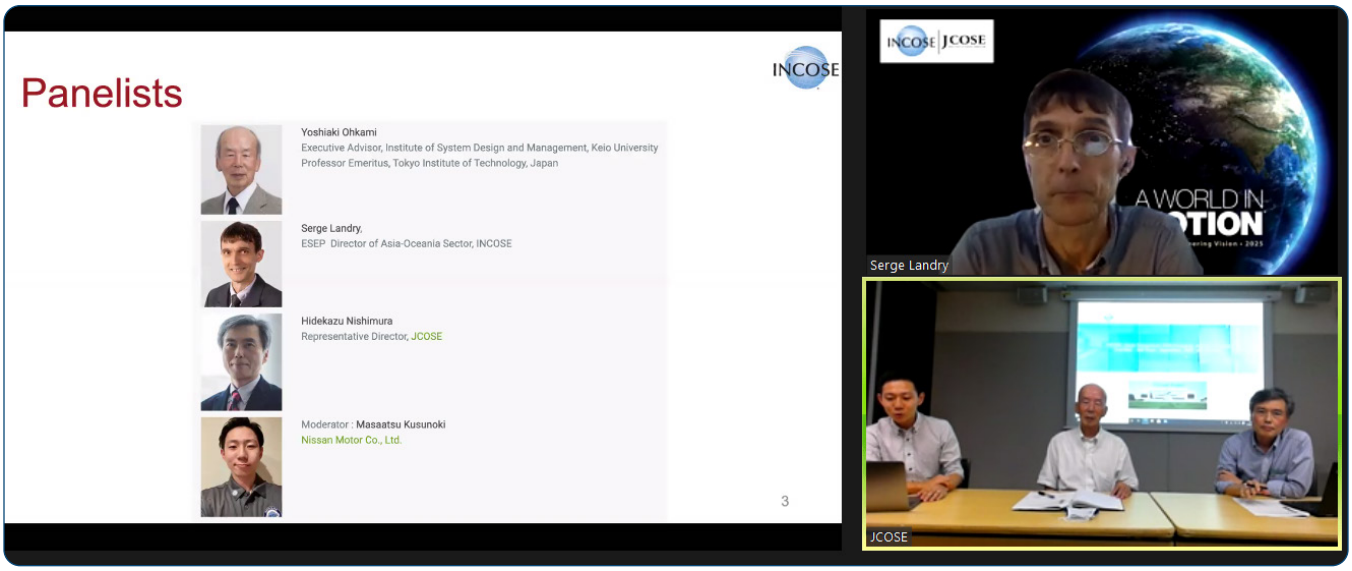
If you missed getting your new/updated content into this release, Version 2.4 is scheduled for April/May 2021. If you have plans, thoughts, or interest in contributing content to the next release, please let me know. Thanks.

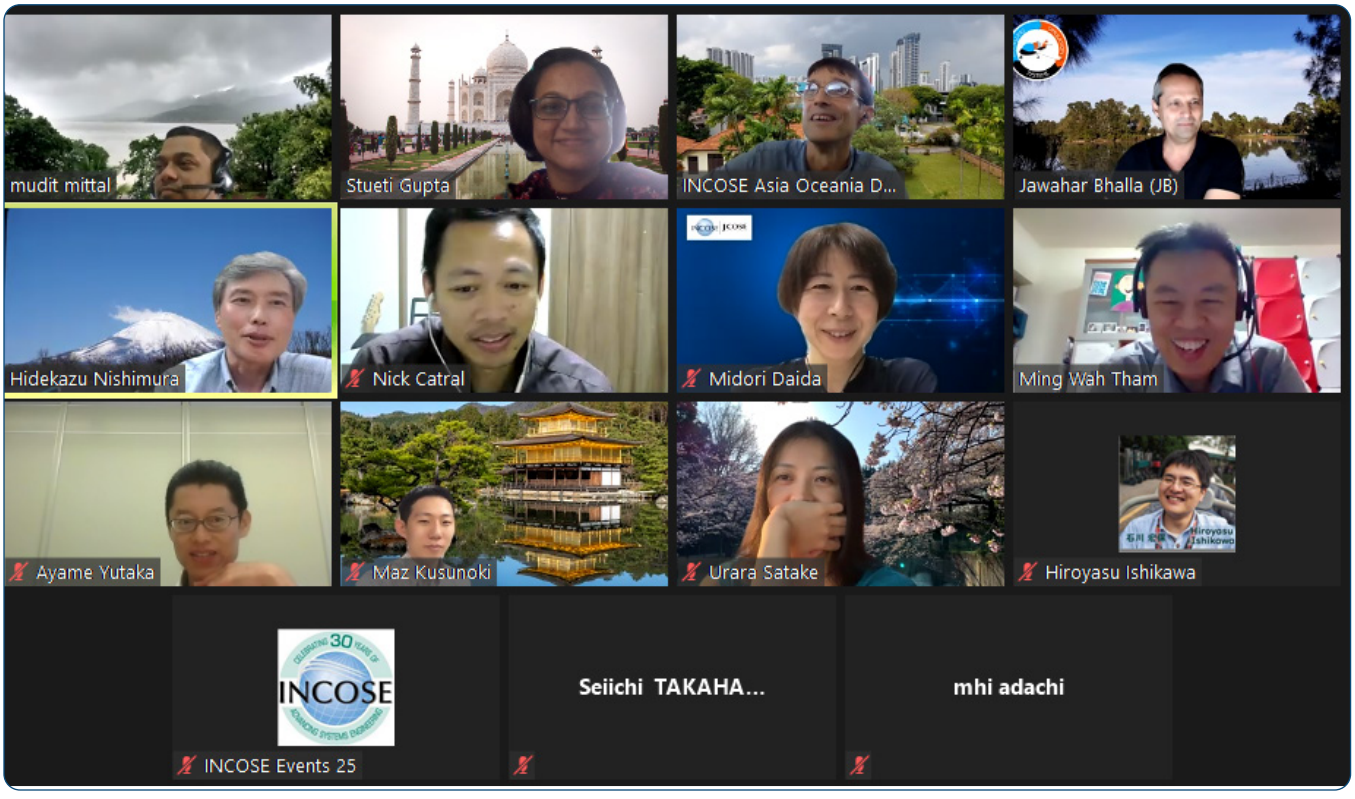
Robert Cloutier
rcloutier@southalabama.edu

Sector Updates—Asia-Oceania

Masaatsu Kusunoki
mazkusunoki@gmail.com

JCOSE hosted a virtual symposium between 2-3 September, 100 participants across 7 different countries from the Asia-Oceania region attended. Attendees highly praised the keynote speeches delivered by David Walden, Takashi Kono (Architecture Design Department, IPA) and Dr. Yoshiki Yamagata (Center for Global Environmental Research, National Institute for Environmental Studies). The diverse invited speakers lineup, and the well-received virtual café led attendees to request a regular JCOSE café session to continue. This highlight event could not have been possible without sponsor, speaker, event management team, and organizing committee support. Unfortunately, due to the prevailing pandemic, we could not host attendees and speakers looking forward to visiting Tokyo for a face to face event this time. Perhaps in the near future.





Australian Systems Engineering Workshop 2020

David Orr (ASEW 2020 Convenor) & Jawahar Bhalla (Technical Director—SESA)
David.orr@transport.nsw.gov.au,
jb@engineeringsystems.com.au

The Systems Engineering Society of Australia (SESA) held their annual Australian Systems Engineering Workshop (ASEW) from 26-29 October 2020 with the theme "Adapting with Agility for a Resilient Future."

For the first time, ASEW 2020 occurred as an interactive virtual event with participants interacting via audio and video, breakout sessions, show of hands, and polling. ASEW 2020 was extremely successful with over 550 registrations split half and half between Engineers Australia members and Technical Society members.

The ASEW program covered methodology, strategic management, life cycle, sustaining capability, and asset management techniques. The ASEW organizing committee selected these technique areas to cover the areas considered currently relevant to Systems Engineering in Australia. These techniques align with the techniques selected for the upcoming Integrated Project Engineering Congress (IPEC), 26-28 May 2021, Brisbane, Australia, and facilitated IPEC 2021 paper production.

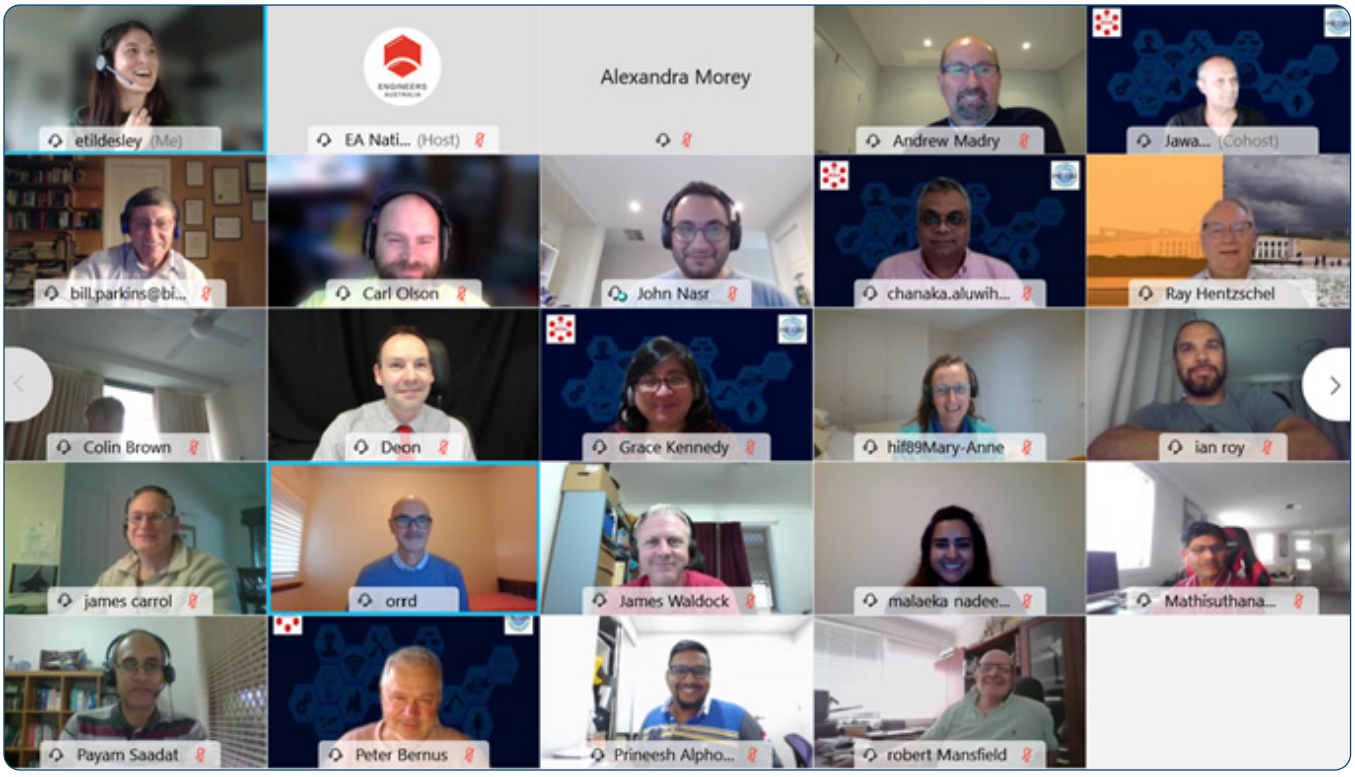
The ASEW spanned the defense and aerospace, transport and cities, health and welfare, and critical infrastructure domanins. These domains align with the Australian focus domains identified by the SESA management committee.

The chosen ASEW virtual session times minimized disruption to participant's work with:

- Three early morning roundtables where all participants could contribute to discussions
- Ten lunchtime workshop and discussions addressing learning and idea exchange
- Six evening panels with short panelist presentations followed by questions and answers

The "Architecting for the 'illities'" workshop was a very positive session with participants interested in contributing to a joint IPEC 2021 paper.

The "Systems Engineering Pipelines & Careers" workshop was comprised of three sections: introductory talks, system engineering pipeline, and general discussion, goal wishing, and ways forward.



The "Operational Concept Development" workshop had an excellent participation through show of hands and suggestions. There was a sequence diagram exercise for a rail level crossing using the Enterprise Architect tool.

The "5G—Accelerating OT/IT Convergence" workshop discussed 5G, private mobile networks in Singapore, INCOSE Systems Engineering Handbook Ed. 5 Update, rail signaling and GSM-R, FRMCS, and cybersecurity concerns with operation technology.

The "Maritime Capability Sustainment" panel speakers covered how to assure maritime capability seaworthiness. This considered the current system engineering state and application limited to system upgrades or obsolescence management and systems engineering still largely based on EIA-632 & MIL-STD models.

The "Lessons Learned from the Mentoring Program" roundtable emphasized the online environment has become a great way to meet people outside organizational structures. SESA needs to think about how we support systems engineering's "next generation" and consider how we can support people learning systems engineering through all career stages (students/early/mid/late career), especially through systems engineering courses/training/information/pathways.

The "Capability Development and Management" workshop discussed understanding and managing capability within defense presented alongside how to train across defense and industry resources.

The "Human Systems Integration" workshop discussed progress in the INCOSE HSI Working Group and presented HSI outcomes from the SESA Systems Resilience Initiative as well as HSI related principles and emerging issues.

The "Maturity of Systems Engineering in the Australian Transportation Sector" workshop noted the noticeable increased systems engineering uptake, partially due to establishing AEO framework in the transport sector in NSW. Transport needs systems engineering, due to complex networks and integrated transport solutions spanning numerous stakeholder and user requirements. Better systems engineering application for needs assessment and procurement is necessary.

The "Systems Integration in Transport Projects" panel concluded contracts should effectively understand requirements and not the other way around. Systems engineering and procurement not working closely enough together often restrict how we work.

The "Developing capabilities for certification and guidelines for career planning for Early Career Systems Engineers" panelists provided background and identified the guidance early career systems engineers seek, pathways to certification, and charter from different starting points.

The "Systems Thinking 101—Tutorial" comprised an interactive session covering three key questions to better understanding systems: Why is systems thinking important? What is systems thinking? How does one understand systems?

The "Project Management and Systems Engineering Integration" workshop addressed changing our project management/systems engineering approach to employed life cycle processes (agile) and suggested a playbook for each different domain application. Tailoring guides and adapting terms/terminology for different domains will help project management and systems engineering project planning, aligning the different but overlapping standards (AS 55000, ISO 15288).

The "Cyber Risk Assessment for Transport Operational Technology" panel discussed how we educate senior executives to cyber security risks/threats.

The "Lessons learned from COVID" panel resulted in better hospital working methods, addressing the patient's perspective, and better system interoperability. We hope the system will incorporate the things we learned—not forget them in 10 years.

The "Assurance & Aerospace" workshop comprehensively discussed capability assurance aspects using rail systems through to Triton UAV examples, specifically focusing on the 737Max investigation. The systems engineering importance to provide assurance

included the opening of "how should SE evolve to cater to the ever increasing modern capability complexity question."

The "Defining a Systems Resilience Framework" workshop started with INCOSE President Kerry Lunney presenting the INCOSE Resilience working group's work. The SESA Resilience Initiative overview and work done to date followed her presentation. Breakout sessions then followed addressing the work done and defining the way forward. There was general ratification of the work done, while feedback from the breakout sessions identified numerous key focus areas going forward, including identifying relevant stakeholders and decision makers to ensure their buy-in.

India Chapter

Stueti Gupta
stueti.gupta@gmail.com

India Chapter continued to build momentum among the members in India via the India Webinar Series. We have organized 15 so far with 560+ participants across the webinars. The webinars have encouraged learning and networking among systems engineering professionals. The webinar recordings are available in INCOSE YouTube Channel—INCOSE India playlist here: (https://www.youtube.com/watch?v=y3k_CQbSbFM&list=PL3wD0Sb1jb1LxR0sP61G5E4WFXcf1ZVgW)

- Functional Safety—Automotive/Avionic Systems, Session II
  - Mr. Reveendra Menon, CSEP, principal member, technical staff, SENZOPT Technologies PVT LTD, Bangladore.
- Knowledge-Centric Integrated Systems Modelling
  - Dr. Swaminathan Natarajan, chief scientist, Tata Consultancy Services Research and INCOSE systems science working group co-chair, ISO 30103 product quality achievement standard editor, and a SysML v2 standardization contributor.
- INCOSE Systems Engineering Professional Certification and CTI preparation course overview
  - René King, managing director, Certification Training Institute
- The Surprising Benefits of Creating a Failure Resume
  - Tim Boyd, senior systems manager, Northrop Grumman
- Using System Dynamics to Understand and Model Complex Problems
  - Büşra Atamer, researcher and consultant, PhD (Middle East Technical University, Turkey)

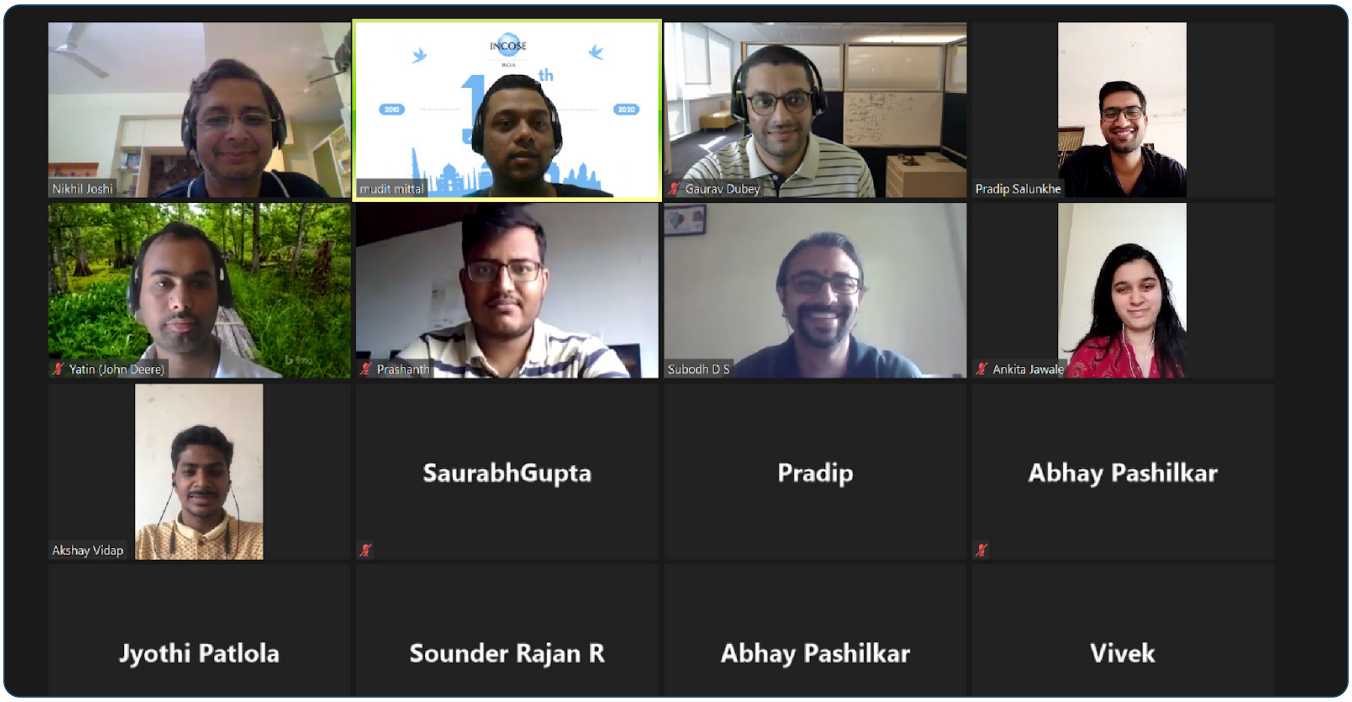
If you would like to connect with the INCOSE India Chapter, please email the chapter at IncoseIndiaChapter@gmail.com. You can follow the chapter activities on LinkedIn (https://www.linkedin.com/groups/2876451/) and Twitter (https://twitter.com/INCOSE_India).

SEP Certification Mentoring

INCOSE India Chapter started a mentor-mentee circle in 2019 to aid INCOSE SEP certification aspirants. Apart from 1-on-1 mentoring, now there is a WhatsApp group with around forty participants including around five mentors who guide in the application process as well as preparation for the exam itself. The participants greatly enjoy this forum.

MBSE Local Working Group

The India Chapter's MBSE Local Working Group kicked off in May last year, and has seen active participation from MBSE practitioners and beginners from various industries. The global pandemic did disrupt the working group in-person meetings and discussions. However, the team members quickly adapted to the new working norms. The team completed the MBSE building a SysML model for a smart parking lot reference architecture challenge. The group has now kicked off multiple new activities. These include an MBSE study group meeting every fortnight (virtually) to discuss a specific MBSE example or topic and share individual learnings. We have also started a periodic MBSE quiz, a short question set one can attempt from anywhere using Google Forms. The idea is members take turns preparing quiz questions, enhancing their learning while preparing the questions, and giving others a chance to test their knowledge,



all in a fun, convenient way. These quizzes will be on LinkedIn with the hashtags #mbsequiz and #INCOSEIndiaMBSELWG. We have planned other activities around supporting the INCOSE Smart Cities Initiative, SysML v2 evaluation, and taking on new MBSE challenges.

The working group continues to publish #SysML4fun quizzes providing clues to guess Bollywood songs in the form of SysML diagrams.

Finally, the MBSE Chapter Working Group sincerely appreciates the support received from the INCOSE Netherlands Chapter as they conducted a "Absolute Beginner's training for SysML" for the group's members. Marcel van de Ven and Jaco Buitelaar took significant efforts to adapt their in-person, hands-on training into an online training format, and delivered the training in convenient sessions across time zone barriers over three weeks.

The group is available for all to join in person or virtually. One can share their interests or concerns with najoshi@gmail.com .

OLD DOMINION UNIVERSITY

School of Continuing Education

Prepare for Systems Engineering Professional Certification with ODU

Demonstrate your competence through
the most recognized global certification in the Engineering Industry
International Council on Systems Engineering (INCOSE)

Spring 2021 Cohort begins January 19th – May 6th

Instructor: John O. Clark, CSEP

Pre-requisite Requirements
An undergraduate degree is required for this three (3) credit graduate course.
A candidate can be a non-degree seeking student,
a current ODU degree seeking student or an alumni.

Visit the link below for more details
https://www.odu.edu/cepd/engineering/incose-prep

Sector Updates—EMEA

INCOSE UK Updates

INCOSE UK Secretariat,
publications@incoseuk.org

INCOSE UK Council Changes

It is our pleasure to announce Ian Gibson is now President of INCOSE UK President. We wish him every success in the role.

The role's previous incumbent, Kirsty Akroyd-Wallis, now moves to the immediate past president role, and we thank her for her time and the contributions she made in her term as president.

We also thank Ivan Mactaggart and Hazel Woodcock, immediate past president and communications director respectively, for both their time and commitment to their roles whilst on the INCOSE UK Council.

Find more information regarding INCOSE UK Council positions and structure here.

INCOSE UK Council election results.

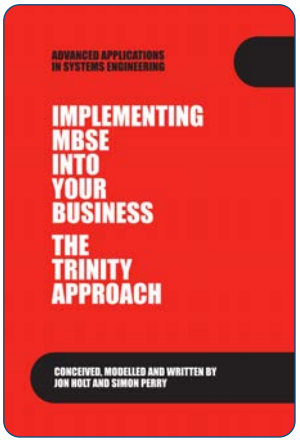
Two INCOSE UK Council roles were up for election this year, these were president elect and professional development director.

Both roles went uncontested and we delight in announcing Malcolm Thomas' appointment as president elect and Steven Turner's appointment as professional development director. Both officially assumed their respective roles at the recent annual general meeting.

You can read their personal statements on page two of the latest ePreview newsletter.

New Publication

Building on the "Don't Panic" book line success, we have launched a new in-depth book series looking at advanced applications in systems engineering. Each book will contain around 250 pages and will focus on single systems engineering applications.



The launch title is *Implementing MBSE into your business—The Trinity Approach* by Professor Jon Holt and Simon Perry.

Whilst Model-Based Systems Engineering (MBSE) theory and practice is maturing, one major obstacle in realising the full MBSE approach benefit is how to develop a strategy to plan and, ultimately, realise its implementation in an organisation.

Author Professor Jon Holt said "This book aims at practitioner level systems engineers and draws on our decades of experience applying and deploying MBSE in various companies." Simon Perry also said "It provided a toolkit to help organisations determine their reasons, capabilities, and planned evolution for an effective MBSE implementation using the Trinity Approach."

You can buy INCOSE UK's latest book by visiting the INCOSE UK online store.

"Don't Panic!" Titles Publishing Soon.

As well as the new *Advanced Applications in Systems Engineering* book, INCOSE UK has two new titles slated to publish later this year in the "Don't Panic" series. They are:

Architecture Frameworks by James Towers and Aurelijus Morkevicius:

Whether customer mandated, legislation required, good practice adopted, or process implied, developing a "system model", also known as "architecture description" or "architecture," involves using an "architecture framework." These may be formal, informal, or even implied, but are always present. Since "system models," regardless of their format or visualisation, are intrinsic to "systems engineering" so are "architecture frameworks." This book's purpose is to introduce concepts relevant to "architecture frameworks," their aims, their advantages (and disadvantages), and detail the most used formal (and standardised) frameworks.

Architects and Architecture

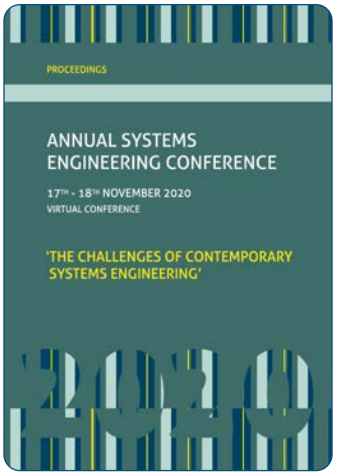
by Mike Wilkinson and Tim Rabbets:

Architecture definition is one of the two most used processes in MBSE and is critical to

successful systems engineering. Despite this, architecture retains an elusive air, perceived as abstract and difficult to understand. One barrier to novice entry is good architecting requires heavy generic approach tailoring and although there are many existing architecture works, none provide a simple 'how-to' guide to finding the right approach and then applying it to your problem. This proposed guide will fill this market gap by providing explicit step-by-step guidance for architecting different systems, calling up specific techniques and tools as appropriate.

These will also be available in the INCOSE UK online store.

ASEC2020 Proceedings now available.



After a successful Virtual Conference, we announce event proceedings are now available to purchase from the INCOSE UK online store.

ASEC took place virtually between 17-18 November 2020, but we still produced this proceedings set. We hope the proceedings will allow delegates to review/study the papers in more depth after the conference. The printed proceedings will also give the option for members unable to attend the event to get a taste of what happened at ASEC 2020 and hopefully inspire them to attend a future event. We trust the proceedings will provide a lasting benefit and fitting record of INCOSE UK's ASEC 2020 "The Challenges of Contemporary Systems Engineering."

Endorsed Training Provider Scheme.

INCOSE UK ENDORSED TRAINING PROVIDER

INCOSE UK's individual and corporate members have asked how we can provide confidence their chosen training providers have met a certain excellence level. Therefore, following extensive internal discussions and a successful pilot, INCOSE UK delightfully announces launching our "Endorsed Training Provider Scheme."

The scheme allows organisations providing professional systems engineering related training courses to apply and receive assessment to attain the "INCOSE UK Endorsed Training Provider" status. Successful applicants can use the term "INCOSE UK Endorsed Training Provider" and associated logo on its publicity and marketing material.

Find full submission criteria details, along with more information about the scheme on the website

Working Group Updates

Human Systems Integration Working Group-2020 Workshop From A Dream To Reality

International Virtual Event 27-29 October 2020

Guy Boy, ESTIA Institute of Technology & CentraleSupélec (Paris Saclay University), France, Workshop Chair

Ami Harel, End To End Systems Ltd. and The Gordon Center for Systems Engineering, Technion, INCOSE-IL, Israel, Workshop Co-Chair

Dimitri Masson, ESTIA Institute of Technology, France, Workshop IT Coordinator

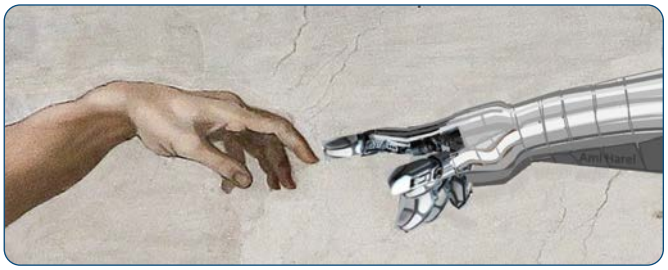
Avigdor Zonnenshain, The Gordon Center for Systems Engineering, Technion, INCOSE-IL, Israel, Workshop Professional Coordinator

The Dream for INCOSE Israel

About five years ago in Israel, Ami Harel headed the Human Systems Integration (HSI) Working Group inception based at Technion's Gordon Center for Systems Engineering and Israeli Society for Systems Engineering (INCOSE-IL).

From this initiative's start, INCOSE-IL dreamed of international activity involvement in HSI. In June 2019, INCOSE Israel approached Professor Guy André Boy, the INCOSE HSI WG chair. He was the 18 June 2019 HSI Workshop keynote speaker in Israel. He also conducted the first INCOSE International Conference on HSI, HSI2019, held September 2019 in Biarritz, France. INCOSE-IL HSI joined the conference program committee and supported HSI2019 organization, presented a lecture, and participated in a panel. INCOSE HSI WG decided to organize the International HSI Conference every two years, and workshops in between.

During INCOSE HSI2019 conference, Israel representatives met with HSI WG and proposed organizing a 2020 HSI Workshop in Israel. Professor Guy André Boy and the INCOSE HSI



WG strongly supported this initiative. ESTIA Institute of Technology also supported the initiative when we needed to plan for a virtual event following the new restrictions regarding flights and social distancing due to COVID-19 pandemic.

Organizing such a virtual international event was a challenge. We did not have enough planning and delivery experience. So, we learned from the experience of others like the Systems Engineering Society of Australia (SESA, INCOSE Australian chapter), who organized a virtual event early 2020, and INCOSE International Symposium. Our wish to organize HSI Workshop in 2020 was decisive enough with the full support of the Israeli HSI WG and ESTIA Institute of Technology team.

The Vision and the Mission

"Developing and Advancing HSI Awareness and Practices in the Systems Engineering Community."

We decided this specific workshop should attract many new members from inside and outside the HSI global Working Group, to fulfill HSI vision awareness and education.

The Israeli team discussed the HSI WG-2020 Workshop vision and consulted with the INCOSE WG. We decided on the following theme and vision for the workshop.

Human System Integration in the ERA of Global Crises-Challenges and Opportunities

INCOSE Israel, agreeing with INCOSE HSI WG, felt this theme fits the COVID-19 era, which created health, economic, mobility, social, and political challenges, significantly impacting human systems integration. Also, these crises created new opportunities from combining new

constrains with an extremely short, transient, and great uncertainty level. Additionally, we experienced the fourth industrial revolution which presents challenges and opportunities for the HSI discipline and community.
So, responding to these challenges and opportunities, we planned a workshop with six main tracks:

- The Impact of the 4th Industrial Revolution on HSI, chaired by Dr. Avigdor Zonnenshain
- HSI In Healthcare, chaired by Professor Avi Parush
- Smart Transportation Aspects of HSI, chaired by Dr. Ilit Oppenheim
- HSI and Preparedness for Disaster Management, chaired by Avi Harel
- HSI Aspects of Extended Reality Environments, chaired by Dr. Nirit Gavish
- Advanced Issues in HSI, chaired by Ami Harel

As this was a virtual international event, we planned 2 tracks of about 3.5 hours each day for three days, with timing fitting most time zones, 1400-1700 UTC/GMT.

Selected members from Israeli HSI chaired the different tracks, and their first mission was inviting experienced speakers from the international and the Israeli communities.

A memoriam ceremony for Zvi Straucher of blessed memory occured at the opening session. Zvi Straucher was an HSI founding father since 1970, a pioneer who laid a professional foundation, and an Israeli HSI Working Group member.

The workshop program is shown on the following page.

After exploring several virtual platform options, ESTIA IT team offered its Microsoft Teams platform to support the virtual workshop logistics. Dr. Dimitri Masson led the ESTIA IT team, backed by Professor Guy A. Boy. Retrospectively, this partnership among the ESTIA team and the Israeli Team was one of main workshop success contributors.

As it was a workshop event, we promoted discussions after each lecture through Q&A sessions, and a summary session at each day's end. Consequently, an open brainstorming session occupied much time each day focusing on the common aspects, trying to apply the lessons learned from one track to other tracks.

One best workshop result has been creating knowledge shared by INCOSE HSI community and beyond. More specifically, the lecture recordings are now available for all here.

Workshop Statistics

We had 6 tracks and 30 lectures. The lecturers came from 8 countries: 17 lecturers from Israel (for 16 lectures); 14 lecturers from around the world.

Registration: 352 registrants from 26 countries; Israel—206 (59%), and 146 (41%) from around the world, with countries like: Australia-8, Belguim-6, Canada-5, France-17, Germany-12, India-21, Italy-5, Sweden-7, UK-13, US-27 and more.

Main Workshop Insights

We distributed feedback forms and still need to collect some insights from workshop participants.

Each track leader summarized the main findings and insights from their track by preparing a summary report. Here are their conclusions and insights.

Track A–the Impact of the 4th Industrial Revolution on HSI

Track A focused on challenges and opportunities for HSI within the fourth industrial revolution. Participants discussed and presented advanced topics like: "Flexibility as Imperative Capability of HSI," presented by Professor Guy A. Boy; "Digital Human Models as an Important Methodology and Technology for HSI," discussed by Professor Danielle Regazzoni and Professor Caterina Rizzi; "Advanced Research on Human-AI-Robot Teaming," demonstrated by Professor Nancy Cooke; "Applying MBSE Methodology for HSI," presented by Eran Peleg; and "Human Factors Challenges and Insights in Human-AI Teams," shared by Ido Lev-Ran.

The HSI discipline can contribute a lot in designing complex systems (such as transportation and healthcare systems) in the 4th industrial revolution era, and it can benefit from advanced and innovative technologies (such as AI, Robotics, and Big Data Analytics), which this revolution includes.

Israel Time		UTC/GMT		Human Systems Integration Working Group - 2020 Workshop (Virtual Event)				
Start Time	End Time	Start Time	End Time	Human System Integration in the Era of Global Crises Challenges and Opportunities				
				Tue 27.10.2020				
1515	1530	1315	1330	Prof Guy Andre Boy (France), INCOSE, HSI WG Chair - Opening				
1530	1540	1330	1340	Memoriam: Zvi Straucher - An HSI Pioneer - Ami Harel (Israel) - HSI WG, Israel - Co-Chair				
1540	1555	1340	1355	Logistic/Coffee Break				
Start Time	End Time	Start Time	End Time	A	The Impact of the 4th Industrial Revolution on H S I	B	H S I in Healthcare	
1555	1600	1355	1400	Dr. Avigdor Zonnenshain (Israel) - Chair		Prof. Avi Parush (Israel) - Chair		
1600	1630	1400	1430	1.1	Prof. Guy Boy (France) - FlexTech: From Rigid to Flexible Human-Systems Integration	2.1	Prof. Kenneth Catchpole (USA) - Healthcare as an Adaptive Complex System	
1630	1700	1430	1500	1.2	Prof. Daniele Regazzoni and Prof. Caterina Rizzi (Italy) - Virtualization of the Human in the Digital Factory	2.2	Prof. Chris Nemeth (USA) - Current global crises in light of resilience in healthcare systems	
1700	1730	1500	1530	1.3	Prof. Nancy Cooke (USA) - HSI applied to Human-AI-Robot Teaming in the COVID-19 era	2.3	Dana Arad (Israel) - Developing online tools for training Covid-19 care teams: changing training modes in response to the crises	
1730	1740	1530	1540	Refreshment Break – 10min				
1740	1810	1540	1610	1.4	Eran Peleg (Israel) - MBSE Methodology and Tools for H S I	2.4	Dr. Shaul Lev (Israel) - Introducing new technologies to treat Covid-19 patients	
1810	1840	1610	1640	1.5	Ido Lev-Ran (Israel) - Human Factors Challenges in Human-AI Teams	2.5	Prof. Jeff Caird (Canada) - A Health system preparedness for the next "Ebola"	
1840	1910	1640	1710	Daily Summary Session				
Israel Time		UTC/GMT		Wed 28.10.2020				
Start Time	End Time	Start Time	End Time	C	Smart Transportation Aspects of HSI	D	HSI and Preparedness for Disaster Management	
1555	1600	1355	1400	Dr. Ilit Oppenheim (Israel) - Chair		Avi Harel (Israel) - Chair		
1600	1630	1400	1430	3.1	Dr. Tom Voge (Belgium) - Mobility as a Service (MaaS) – Policy and Regulation	4.1	Prof. Nancy Leveson (USA) - A Systems Approach to Disaster Management	
1630	1700	1430	1500	3.2	Prof. Glenn Lyons (UK) - The importance of user perspective in the evolution of MaaS	4.2	Dr. Carmit Padan (Israel) - Enhancing Resilience: Lessons Learned from Israeli Localities around the Gaza strip	
1700	1730	1500	1530	3.3	Prof. John Lee (USA) - Where does the person go with driverless cars - A multi-level systems analysis	4.3	Dr. Ori Nisim Levy (Israel) - Emergency assessments and management at the state or city level	
1730	1740	1530	1540	Refreshment Break – 10min				
1740	1810	1540	1610	3.4	Dr. Bryan Reimer (USA) - Challenges in the human machine transition area with collaborative driving automation	4.4	Prof. Ron Kenett (Israel) - Quality aspects of the information delivered to rescue teams and individuals for decision making	
1810	1840	1610	1640	3.5	Dr. Gila Kamhi (Israel) - Vehicles as the most perceptive mobile entity - Changing the environment and social behavior	4.5	Dr. Yuval Bitan (Israel) - Design for emergencies: How design can improve human performance during emergency situations	
1840	1910	1640	1710	Daily Summary Session				
Israel Time		UTC/GMT		Thu 29.10.2020				
Start Time	End Time	Start Time	End Time	E	HSI Aspects of Extended Reality Environments	F	Advanced Issues in H S I	
1555	1600	1355	1400	Dr. Nirit Gavish (Israel) - Chair		Ami Harel (Israel) - Chair		
1600	1630	1400	1430	5.1	Laura Militello (USA) - Design Principles for XR Training to Support Recognition Skills	6.1	Grace Kennedy (Australia) - System Resilience	
1630	1700	1430	1500	5.2	Dr. Nirit Gavish (Israel) - How Do They Change Who We Are in The Real World	6.2	Dr. John Gill (USA) - Sociotechnological Systems Engineering Framework as a possible Framework for HSI	
1700	1730	1500	1530	5.3	Prof. Doron Friedman (Israel) - VR as The Ultimate Behavioral Lab	6.3	Uri Lavi (Israel) - Motorcycles: the most challenging vehicle for human and AI assistance systems integration	
1730	1740	1530	1540	Refreshment Break – 10min				
1740	1810	1540	1610	5.4	Maj. Dr. Alex Blekhman (Israel) - The Effectiveness of Training Technicians using 3D Models and VR, final approval required	6.4	Lt. Col. Dr. Ariel Furer and Lt. Col. Barr Inbar (Israel) - Data empowerment for decision makers at times of pandemic and infodemic	
1810	1840	1610	1640	5.5	Gil Benesh (Israel) - The New Era of Reality	6.5	Helit Barel (Israel) - The role of information in managing a non-conventional event: Lessons from the Israeli experience with COVID-19	
1840	1910	1640	1710	Workshop Closing Summary Session				

Track B—HSI in Healthcare

Healthcare's complexity as a system was a key thread throughout all talks in the track devoted to HSI and healthcare in global crises era. Thus, healthcare represents a major challenge for Human-System Integration. Some complexity involves the large gap between "Work-as-Imagined" and "Work-as-Done", a concept our first speaker, Professor Catchpole, addressed. Another critical complex systems aspect is resilience, and this was our second speaker's, Professor Nemeth, topic. An important HSI component is training, and training and re-training could be an effective solution to systems, such as healthcare, complexity. Our third speaker, Ms. Arad, discussed training aspects. Technology is inherently an HSI aspect, and Dr. Shalev, our fourth speaker, presented introducing new technologies as a way to face COVID-19 challenges to the healthcare system. Healthcare is a complex socio-technical system, and human and organizational aspects are critical to effective human-system integration. Dr. Shalev also spoke about different approaches to management and leadership in crises. Finally, can we transfer experience and lessons learned from previous global crises and pandemics? Our last and fifth speaker, Professor Caird spoke about human factors lessons from the Ebola pandemic.

Taken together, a global crisis such as a pandemic intensifies system, such as healthcare, complexity. An open question for further study is whether the traditional system engineering methodologies and human-system integration techniques are adequate to deal with the increasing global crisis challenges, or do we need newer approaches and methodologies.

Track C—Smart Transportation Aspects of HSI-Conclusions and Insights

Track C focused on people's role in developing and operating smart traffic systems. In coming years, the transportation field will face vast changes. The smart transportation and mobility world include various shared, electrical, connected, and autonomous vehicle aspects, and their interface with road users and infrastructure. Addressing critical transportation challenges and practical problems facing society today will improve our daily life and specifically during global crises, meaning, increasing road safety, increasing transportation accessibility for different populations, reducing traffic congestion, and protecting the environment.

Mobility as a Service (MaaS) is quite a new concept, which shifts the traditional urban mobility perception. We discussed needing regulatory oversight and policy developments, to lock in the benefits, while avoiding negative MaaS implementation effects. The presented 'Levels of MaaS Integration taxonomy' revolves around the user perspective, as an analogy to different automation levels in road transport. A topic we all are curious about was –"Will driverless vehicles actually define users' needs, and not just satisfy them?" Furthermore, we discussed the shifting nature of what we do in modern vehicles and how it challenges what acts as distraction nowadays—secondary tasks or driving?

Last but not least, we had an opportunity to see the industry research regarding Human Future vehicles new interactions on potential exterior environment look and feel and on social behavior changes. There is no question we are in a revolution impacting us all. The road is still long and winding, we will have to overcome barriers BUT it is not all about technology. We must consider 'people-oriented' solutions, use human-centered design approaches, and consider driver, passenger, and pedestrian needs, fears, trust, and capabilities.

COVID19, where the world faced lockdowns all at once, also raises many open questions regarding the way we think, perceive, and deal with mobility, and we guess it will not be the same anymore.

Track D—HSI and Preparedness of Disaster Management- Conclusions and Insights

Traditionally, disaster managements (DM) are beyond the systems engineering scope. Recently, the systems engineering discipline has extended the systems of interest scope from technical systems to socio-technical systems (STS). With the extended systems engineering scope, it is a natural candidate for studying and

developing disciplines for assuring high quality disaster information.

Track D intended to initiate an interest in the HSI professional community which may result in studying this challenging topic. The goal was to demonstrate HSI practices may also apply to DM. Today, the available procedures for DM specifically apply to particular hazards. However, information confusion hampers the recovery from all disaster sources including: environmental disasters (floods, fire, chemical, or nuclear contamination), earthquakes, terrorist attacks, and wars between tribes and nations. COVID 19 demonstrates the need to unify domain-level models, namely, to develop a common model describing disaster information (DI) generation and use. DI must first support the medical teams, and shape the people's behaviour according to the public needs. The ultimate HSI goal for DM may be to develop inclusive DM models, and a common methodology applying to all hazards. An additional DM aspect is the information biasing by the media. This topic is beyond the traditional engineering scope; however, it is in the STS extension scope.

The STS science refers to both engineering and para engineering studies. DM engineering is primarily about resilience. DM para engineering is about standards and regulation in safety assurance. In the extended framework scope, we can tackle the biasing problem by studying the conditions enabling them, and by developing methods to control these conditions. We recommend adapting systemic approaches for safety analysis like STAMP and STPA which Professor Nancy Leveson, from MIT, developed.

Track E—HSI Aspects of Extended Reality (XR) Environment

In 1994, Milgram and Hishino stated "The next generation telecommunication environment is envisaged to be one which will provide an ideal virtual space with sufficient reality essential for communication." The term "Extended Reality" (XR) nowadays stands for various possible mixtures between real and virtual environments. Twenty-six years later, it seems Milgram and Hishino's (1994) vision has come true, and many different virtual and real world combinations along with many interaction methods are available for almost every person and every purpose. Nonetheless, identifying the ideal virtual space with sufficient reality when the user, world, system, and environment interact, remains an unsolved challenge. This track presented and explored XR environment HSI aspects as part of this effort.

Human experience in XR environments can be different from the real environment, for example being able to travel in time, transforming your body, or be in several destinations simultaneously. It is important to study how these differences affect our perception and decision making, and these beyond realism situations can serve as test beds to study behavioral measures. In addition to XR contributing to research, both Virtual Reality (VR) and Augmented Reality (AR) systems can effectively train, for example they improve recognition skills and technicians' training. However, many questions regarding interaction with XR systems remains unsolved, for example: how to effectively integrate these systems in the vision loop. In the future, the HSI discipline will benefit from addressing these important questions, contributing to both research and real implications.

Track F—Advanced Issues in HSI

In the past, system configuration formulated, developed, tested, and manufactured without regard to human factor engineering aspects during all idea formulating stages and system development. This resulted in "tailoring and improvisation." These constituted common practice, which focused on forced system implementation, or, user training for a system whose configuration is a fait accompli. Rather than fitting the human to the system, the goal must tailor the system's concept to fit the human, right from the initial dream about the system.

Track F looked at various aspects and applications emphasizing the human focus significance along all product, service, and organization life cycle stages. Grace Kennedy explored systems and organization resilience and discussed the importance of considering multiple system perspectives and drawing conclusions around the contemporary and

emerging HSI practitioner challenges. Dr. John Gill expanded our interest and responsibility area using sociotechnical systems engineering framework and includes people as an integral system element. During development process, one must extend consideration to include a system solution's impact on non-users and the environment. This contrasts to the classic approach considering the system only, and now calling for user focus. The past has not considered a newly developed system's spreading negative sociotechnical impacts enough and we must balance it if the immediate stake holder interest requirements do not include it.

Uri Lavi's initiative considers very high risk level for motorcyclists. Noisy and harsh environments are a bad human machine interaction to other road users and predicts high uncertainty related to a high number of road users. Too many other road users optimize their solution and sometimes do not consider the negative impact spread, potentially killing the motorcyclist. Uri leads an innovative first in collision avoidance systems which, by advance integration between the human and the system's AI, significantly reduces accident risk and saves riders' lives.

Lt. Col. Dr. Ariel Furer and Lt. Col. Barr Inbar used complex data empowerment for decision makers at high uncertainty pandemic and infodemic times. Data science and AI have helped fight the COVID-19 pandemic. Here the humans considered are not the classic users, but various human behaviors which, at the high uncertainty of a non-conventional event, require prediction. Helit Barel shared her experience and lessons learned from similarities to the radiological domain and the importance and information use for the current non-conventional COVID-19 event.

Professor Guy André Boy

Ami Harel

Dr. Dimitri Masson

Avigdor Zonnenshain

EWLSE Updates

Alice Squires, ewlse@incose.org

Empowering Women: An International Collaboration

Alice Squires
ewlse@incose.org

Empowering Women Leaders in Systems Engineering (EWLSE) wishes you and yours a safe and healthy new year. We continued to make progress towards our vision of a world equally representing women and men in systems engineering leadership, recognizing the global pandemic has created unique challenges for many. For the third quarter we will address the Conference on Systems Engineering Research (CSER) 2020 panel "Exploring Digitization of Human Bias;" the Japan Symposium 2020 90-minute workshop on "Systems Leadership and Diversity, Equity and Inclusion for Future of Work;" the #IamRemarkable Google initiative and associated 90-minute workshops; and booth support and activities from the Society of Women Engineers (SWE) International 2020 conference. Please see separately written articles for each event following this short update.

Other news includes: Lisa Hoverman, Alice Squires, and David Long, commencing the last initial edits for the Letters to My Younger Self (LTMYS): How Systems Engineering Has Changed my Life, an INCOSE Impactful Products improved publication. Heather Feli, Alice Squires, and Marilee Wheaton are working through several abstracts, annotated outlines, and draft chapters submissions for an engaging new addition to an existing Springer Hill book series for women authors: Emerging Trends in Systems Engineering Leadership.

For those new to systems engineering or those who have practiced for decades, if you are looking for a systems engineering mentor or ready to be a systems engineering mentee or both, please sign up here: https://bit.ly/2G6TJPL. How do you advocate for women leaders in systems engineering? Please send your stories to ewlse@incose.org.

Exploring Digitization of Human Bias: CSER 2020 Panel

Dr. Shamsnaz Virani Bhada
ssvirani@wpi.edu

At the 18th Conference on Systems Engineering Research (CSER) 2020, Dr. Shamsnaz Virani Bhada, Worcester Polytechnic Institute (WPI) assistant professor and EWLSE lead, joined a panel discussing "Exploring Digitization of Human Bias." Dr. Bhada developed the panel idea based on her research experience, and Rosalind Lewis served as the panel moderator. The panel addressed gender and racial diversity crisis amplified by Artificial Intelligence (AI). Panel members shared their outlook, concerns, recommendations, and the systems approaches role to address AI bias. The moderator (listed first) and panelists included:

Rosalind Lewis, acquisition analysis and planning subdivision principal director at The Aerospace Corporation. In this position, Lewis manages four departments supporting various activities in the acquisition decision analysis and support areas; cross program studies; modeling to include industrial base, cost, schedule, and risk analysis; and system engineering and program execution support. Additionally, she was an adjunct instructor at Loyola Marymount University for nine years in systems engineering. Lewis holds a B.S. degree from The University of Southern California (USC) in computer science, a M.S. degree from New York University in computer science, and a M.S. degree in systems architecture and engineering from USC.

Dr. Shamsnaz Virani Bhada; systems engineering assistant professor at Worcester Polytechnic Institute, earned her Ph.D.in Industrial and Systems Engineering from The University of Alabama at Huntsville. Dr. Bhada's research interests include policy content modeling and human diversity in engineering. She serves as Empowering Women as Leaders in Systems Engineering (EWLSE) lead for new faculty support for systems engineering faculty and PhD students. She dedicates her time to increasing women and minority population in engineering.

Cecilia Haskins entered academia after more than thirty years as a practicing systems engineer. Her career spans large and small firms, commercial and government projects, and employee and entrepreneur work. During the mid-1990's she actively participated in the tool creation community creating early model-based systems engineering products. Her educational background includes a B.S. in chemistry from Chestnut Hill College, and an MBA from Wharton, University of Pennsylvania. This combination contributed to her understanding issues with an insider's view of both the business environments and the technical solution domains. She has received recognition as a certified systems engineering professional since 2004. After earning her PhD in systems engineering from NTNU she developed and teaches an overview course with a novel lab. Her research interests include engineering education and innovative systems engineering applications to socio-technical problems, such as those encountered in software intensive systems, sustainable development, and global production systems.

Dr. Donna H. Rhodes is a principal research scientist in the Sociotechnical Systems Research Center (SSRC) at Massachusetts Institute of Technology. She is MIT's Systems Engineering Advancement Research Initiative (SEAri) director, leading a research group focused on advancing the theories, methods, and effective systems engineering practice applied to complex sociotechnical systems. She teaches systems architecting applied to enterprises,and model-based systems architecting and engineering graduate courses. She is the principal investigator for numerous sponsored research projects and advises graduate students in multiple MIT programs. Dr. Rhodes researches innovative approaches for architecting complex systems and enterprises, digital engineering transformation, human-model interaction, model curation, and social systems engineering.

Thomas A. McDermott Jr. is Systems Engineering Research Center's deputy director. Tom McDermott is a leader, educator, and innovator in multiple technology fields. He currently serves as the Systems Engineering Research Center's (SERC) deputy director at Stevens Institute of Technology in Hoboken, US-NJ, as well as a consultant specializing in strategic planning for uncertain environments. He studies systems engineering, systems thinking, organizational dynamics, and the complex human socio-technical systems nature. He teaches system architecture concepts, systems thinking and decision making, and the composite skills required at the leadership and engineering intersection. He has over 30 years' experience in technical and management disciplines, including 15 years at the Georgia Institute of Technology and 18 years with Lockheed Martin.

Dr. Mark L. McKelvin, Jr. is an engineering specialist in systems and software engineering at the Aerospace Corporation. In this role, Dr. McKelvin advises customers on model-based engineering techniques and develops solutions to architecture design challenges in cyber-physical and software-intensive systems. His interests comprise engineered system modeling, analysis, and design application, including cyber-physical, embedded, and software systems. He holds a PhD in electrical engineering and computer sciences from the University of California, Berkeley emphasizing in elecetronic design automation.

The panel focused on the gender and racial diversity crisis in most STEM disciplines. The Artificial Intelligence (AI) sector amplifies this crisis. Only 18% percent of authors at top conferences in the field are women and more than 80% of AI professors are men. 2.5% of Google's workforce is black, while Facebook and Microsoft hover at 4% (West et.al. 2019). These personnel disparities will likely yield systems replicating gender and racial bias, which will deepen historical inequality as more systems move toward AI. The discussion questions for the panel were:

- Will systems engineering face the similar issues as AI?
- Will MBSE and digitization amplify bias or does it serve as an equalizer in systems engineering?
- Can we define or measure MBSE bias?
- What strategies should serve as check and balances for gender bias?

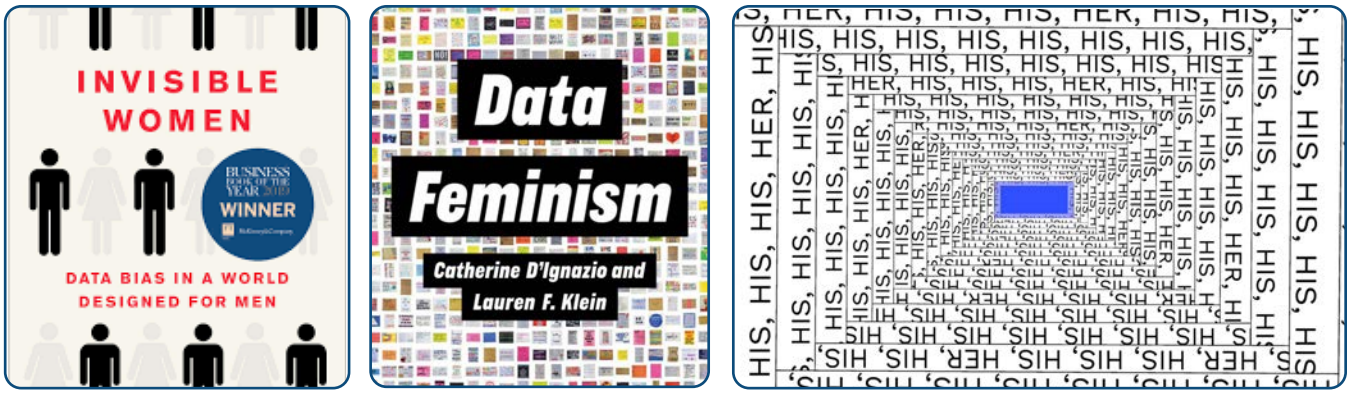


Figure 1: Popular Books Reviewed by Dr. Shamsnaz Virani Bhada

After Rosalind introduced the panelists, Dr Bhada established the problem with three popular books: Invisible Women by Caroline Criado Perez, Data Feminism by Catherine D'Ignazio and Lauren F. Klein, and the New York Times article "We teach AI everything including our biases" (see *Figure 1*); therefore, identifying AI bias amplification has multiple negative impacts and case studies showing populations not represented in the training data sets. The opportunistic companies such as Alegion exploit this issue with short term solution slogans such as "this blueprint to vaccinate yourself against bias in data." Long term solutions recommended by several universities and McKinsey involve diversifying the AI workforce by developing curriculums around the AI4ALL theme. Dr. Bhada, as a systems engineering educator, wants to inform her students about all human bias types appearing in the data used for digitization, especially in human systems integration area using AI in facial recognition systems to car safety systems. She also wants students to develop a skill to question the data provenance, validity, and neutrality along with universality. In the end, she urged the systems engineers to develop methods, approaches, and analysis for data

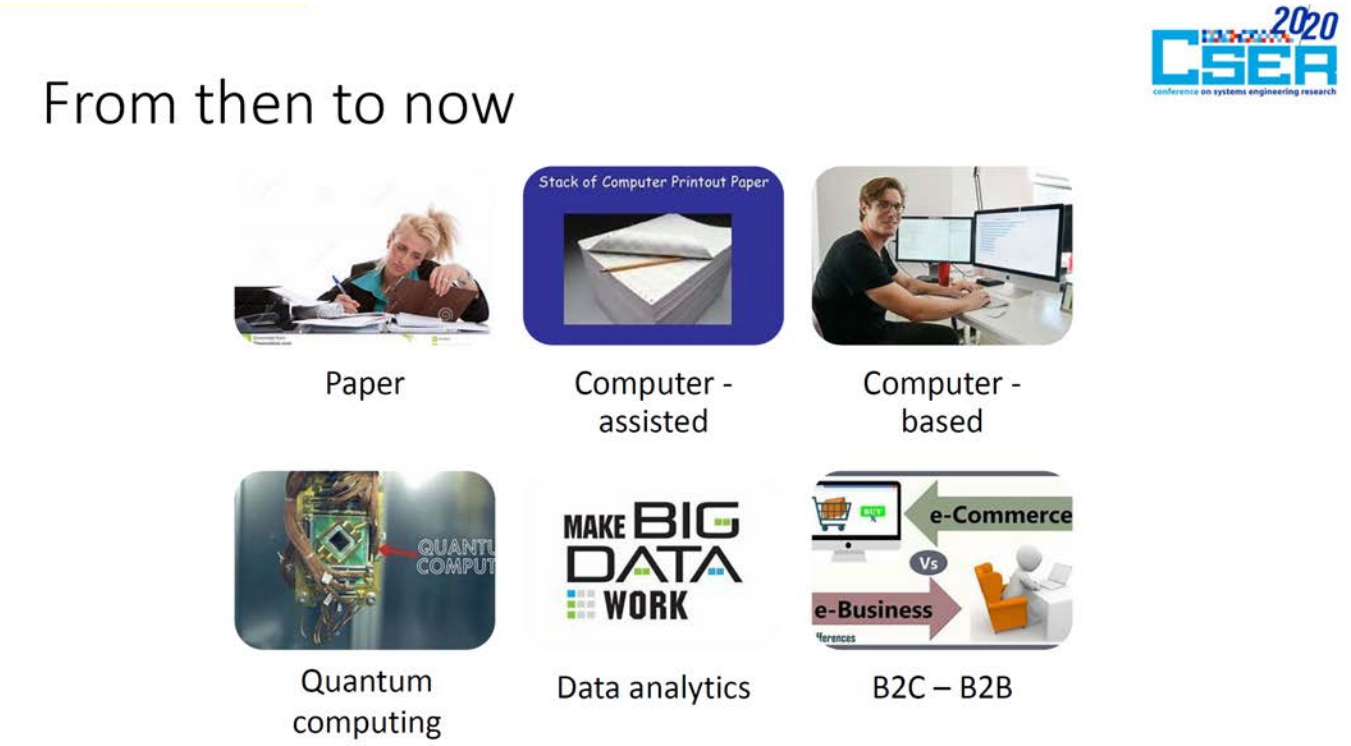


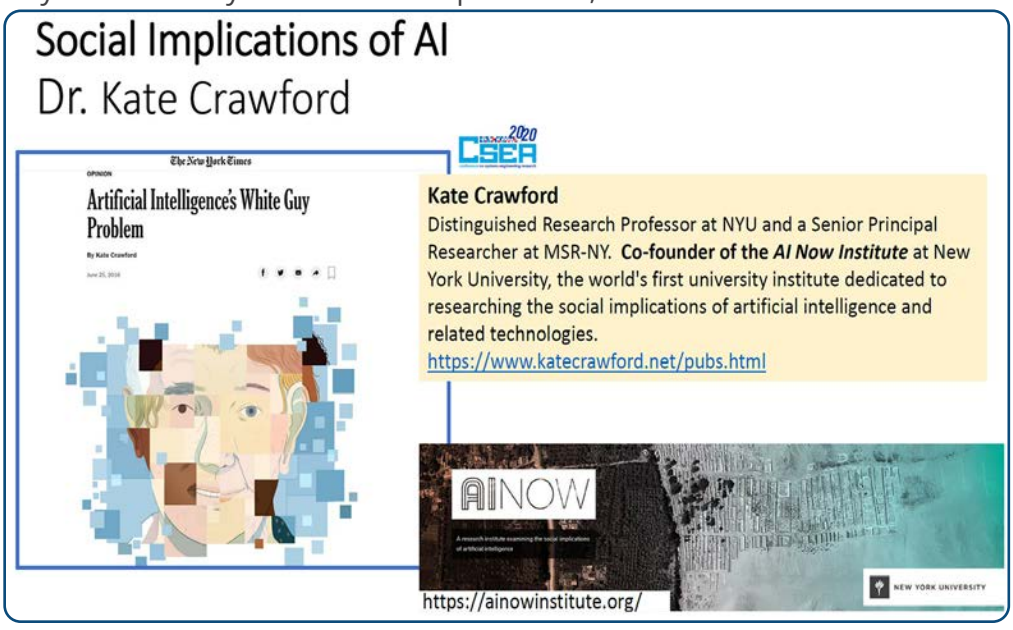
Figure 2: Dr. Haskins' Historical Perspective of Computers

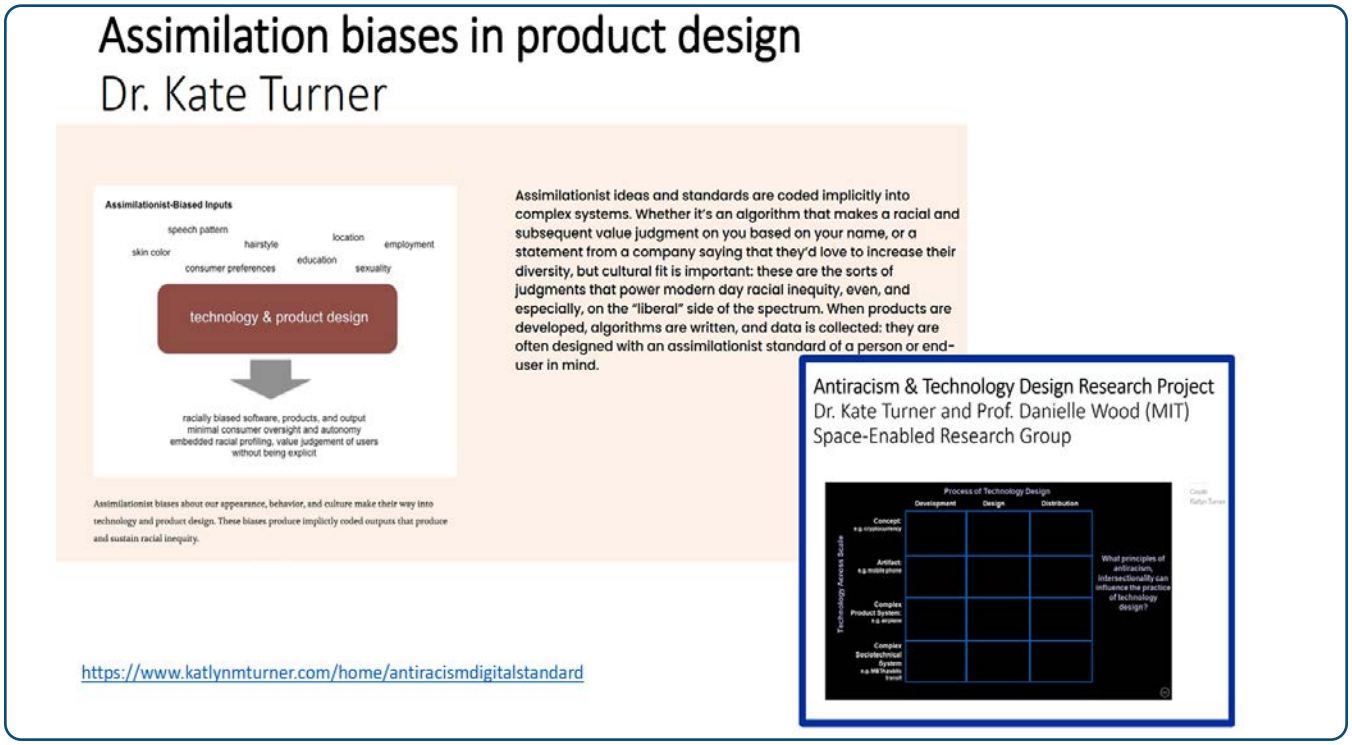
bias and its impact on system design. Perhaps we too need an AI4SE4ALL.

Dr. Haskins presented a historical computer and their influence on design decisions perspective based on her long systems engineering career and 15 academia years. She had many different experiences with this topic. Being a "dinosaur" in systems engineering, she has worked in digitization since 1968 when the workplace introduced computers. At this time, the machines doing work faster and with fewer errors than people idea gained popularity among her colleagues especially as a potential assistance to do their jobs better. For clerical type tasks, accounting or preparing reports, a computer-assisted approach became standard workplace process. Then Dr. Haskins described moving to computer-based data processing. But machines still determined how we designed our systems and what 'allowances' we had. Then machines became faster, with more memory; and people started talking about new business methods. Computing had arrived. Relying on websites, businesses could work with others through computing, and data processing through different storage devices became the new normal. The attention now moved to capitalizing on all this data and calling it data analytics. Now there is more and more human influence where biases occur, and we might not even notice them. Quantum computing helps people analyze medicines, develop anti-bacterial treatments, and nitrogen cycles, beyond what anyone could have perceived, but these are subject to human bias introduction. However, they are also more computation focused and closer to the science but may fall into other pitfalls.

Dr. Haskins focused her bias perspective on human beings, skills can help us become better—imagination and critical thinking, creativity and empathy, adaptability and sustainability—factor out bias, but schools do not teach them. She called for action to examine "how we educate people for the future. If they do not receive the true baseline skills they need, we will continue to see biases introduced in application development. Our computer-based community is aware of a need for developing unbiased applications and development. Perhaps a good starting place would be treating these needed skills as hard skills. The training data mirrors how people think—bias is introduced there. We must look beyond the technology for bias sources—so people can reach their potential."

Next, Dr. Donna Rhodes introduced the current research state in human bias impacting engineering systems area. Her position was that this is a critically important topic for the systems community. That is, human bias in engineered systems is a multi-faceted challenge we have the means (and responsibility) to help address. She argued systems engineers lack the deep knowledge to do bias research but it is our responsibility as individuals and as a community to educate ourselves on this topic and work together to raise awareness and promote strategies designing engineered systems, supporting models, and tools without bias. She highlighted several main researchers: Dr. Kate Crawford, Artificial Intelligence's White Guy Problem, Dr. Kate Turner, Prof. Danielle Wood, and Dr. Emily Wall (see *Figure 3*). These researchers impact the digital bias future in their





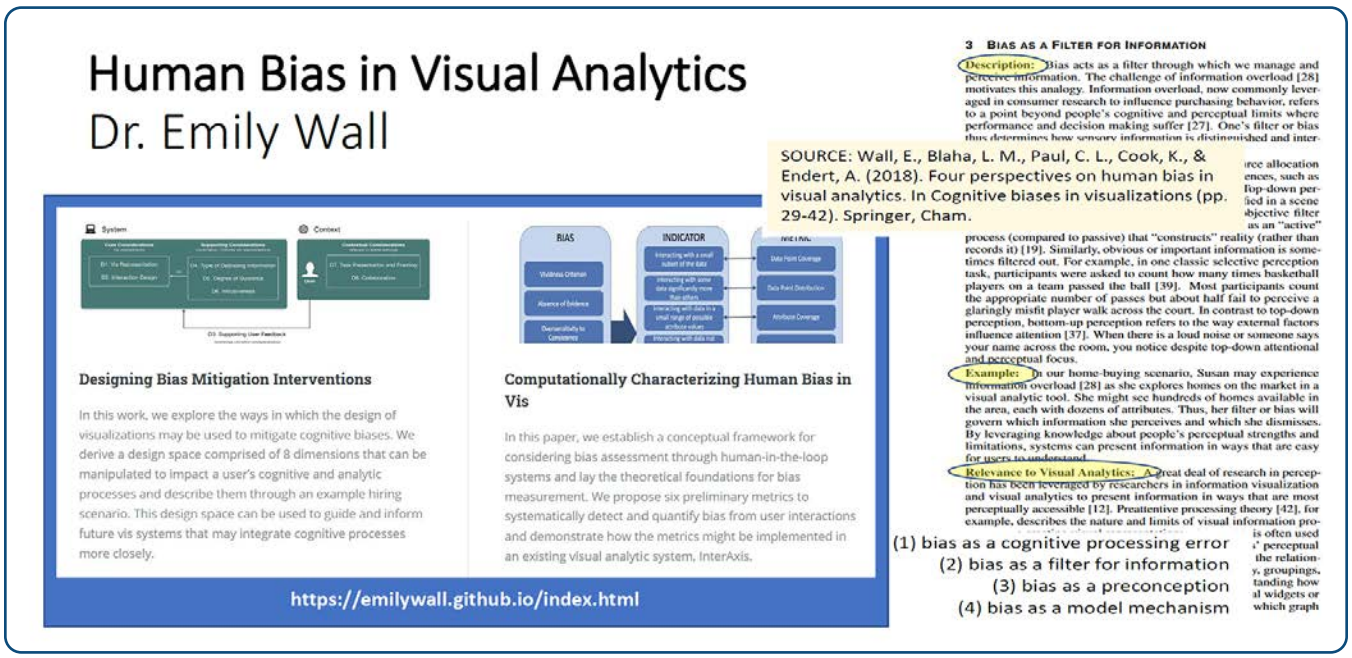


Figure 3: Researchers Reviewed by Dr. Donna Rhodes

disciplines. Dr. Turner researches AI's social implications by introducing mechanisms for evaluating data provenance along with machine learning model specificities. Dr Turner has developed evaluations to catch product design assimilation biases. Dr. Wall designs bias mitigation interventions by adopting visualization to catch cognitive bias.

Dr. Rhodes concluded her position stating "It is our responsibility as individuals and as a community to educate ourselves on this topic and work together to raise awareness, and promote strategies designing engineered systems, models, and tools without bias."

Tom McDermott based his position on how the data and engineered system decisions introduce bias (see Figure 4). He describes the

excitement around AI as bringing customers in by "if you nail two things together—someone will buy it from you." His deep learning and neural networks interpretation was that it is the statistical algorithms and learning software combination; machine learning is not new but is combining and not necessarily producing the correct value. Industry has framed and called it AI—creating a buzz but they fail to have insight into where it all comes from. He then explained rules-based systems distinguish between a tank and a truck. Machine learning gives us more accuracy, but these algorithms already build in bias. We want accuracy for tanks and to not blow up trucks, resulting in a probability-based recommendation. The challenge is they might not always give you the real probability, but the probability based on biased data. The bottom line is AI augments do not replace human intelligence or expertise. Mr. McDermott cautioned us about our AI over-dependence. Bias is always present in human produced rules, human programmed metadata, or the data itself. In his closing remarks he stated "We need to understand the data is probabilistic and we need to program the data accordingly." He suggested we need a second opinion comparing two to three alternatives. We depend on labeled (biased by hired people) and unlabeled data (biased by data you give it—Twitter images). We must consider systems data engineering and the requirements. He encourages the following questions: Who labels the data? Where does the data come from? He summarizes by stating AI, machine learning, and deep learning rest on many different approaches and there are not many experts in this space, rather, there is a huge knowledge and skills gap. Systems engineers may understand trades and use cases, but they do not always understand the underlying technology.

Dr. Mark McKelvin presented the harsh historic data reality which, although accurate, may not represent present workforce and culture. As technology becomes more pervasive in systems intended to improve human living, the systems engineering community will face racial and gender bias issues manifesting in the produced systems unless we take systemic actions to increase diversity and inclusion reflecting the users of the systems we build. To do so, the systems engineering community must identify biases and adopt strategies to correct biases when identified throughout an organization at all levels. He concludes "Systems disproportionately affect women and people of color."

There are people behind code development, there are people behind algorithm training, but people are the bias source and also the complexity in our systems.

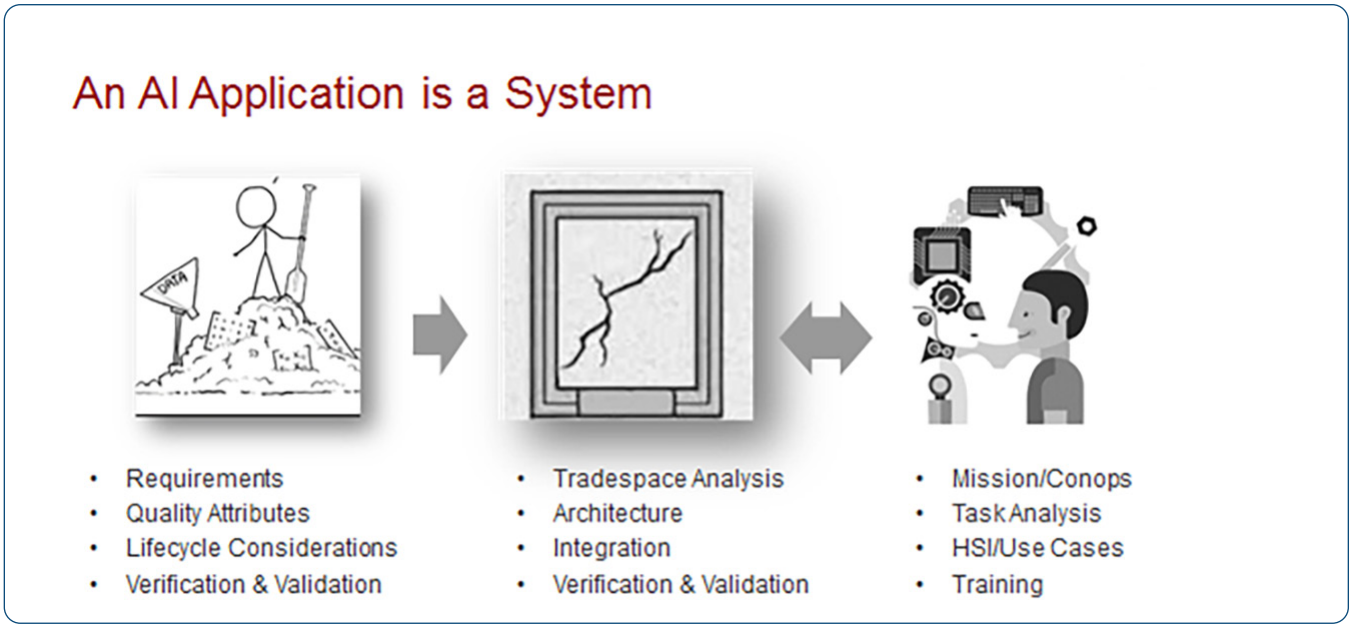


Figure 4: Tom McDermott Overview of an AI Application as a System

We can improve a lot.

- Increase diversity in decision making. Decision makers consider how decisions affect others. Economic, racial, and cultural.
- Day to day, be an advocate. See something say something. Hear something say something. Stamp it out. Be an advocate.
- Race, religion, politics—stay away because they create conflict but these are who we are. These come out in the bias our products portray.

Dr McKelvin points out bias comes from the historical information, if you even collected such data. Take as an example reports where law enforcement responds to communities. If you report something in a certain area, your report reflects in the data. But what if you do not report? This is a hard problem to deal with. As systems engineers it is necessary to be more aware of the social and cognitive biases. He cites Kahneman's Thinking Fast and Slow identifying more biases such as confirmation, sampling (relevant), and attribution biases. As technology becomes more pervasive, systems engineering will face challenges with racial and gender bias unless we take systemic action. Dr. McKelvin, along with several other panelists, requests systems education to identify, address, and correct these biases.

The panel generated a dynamic and engaging discussion on how systems engineering is at the cusp of recognizing bias digitization and one key outcomes Alice Squires stated was "Listening to this panel was energizing. I sense a multi-pronged approach led by the systems engineering community, for proactively identifying and systematically eliminating negative unintended biases from our digitized systems models and designs, and beyond."

In closing, the panelists and audience agreed to continue the conversation in their institutions and INCOSE. The unanimous recommendation was not only bias education but also its presence in current machines, along with introducing political and social sciences and soft skills in the systems engineering curriculums. Needing conscious technical leadership in the murky "bias digitization" water, seems to be a new frontier for systems engineering and INCOSE at large.

The Future of Work: EWLSE at the Japan Symposium 2020

Stueti Gupta
stueti.gupta@incose.org

The two-day Japan Symposium, held 2-3 September 2020, theme was "Beyond Traditional Systems Engineering Domains and Regions." Stueti Gupta, EWLSE lead for Asia Oceania, organized a 90-minute workshop on "Systems Leadership and Diversity, Equity and Inclusion for Future of Work." The current industrial revolution era—also known as 'Industry 4.0' which has brought disruption with digitalization technologies, a global operating landscape, and the gig economy's emergence—motivated the workshop theme. As Industry 4.0 progresses, Japan leads the way in architecting a human centered society also referred to as imagination society, Society 5.0. With this as the backdrop, Stueti talked about systems leadership and why diversity, equity, and inclusion (DEI) matters as designers conceptualize Society 5.0. During the workshop, two breakout sessions allowed participants to interact and experience diverse discussion perspectives. These breakout sessions proved very insightful for the participants and the discussion facilitators. Stueti also walked through several scenarios often seen in teams or workplaces and what leaders can do to boost DEI. Several research reports in this area show organizations are more profitable and efficient; this organizational performance level cannot happen with just a few initiatives but requires a systems lens. The session ended with a brief INCOSE overview, including a Systems Café summary as a great forum to participate in diverse topics, and the EWLSE working group focus and initiatives. Around forty participants attended the workshop.

#IamRemarkable Workshops in India, Japan, Mongolia

Stueti Gupta
stueti.gupta@incose.org

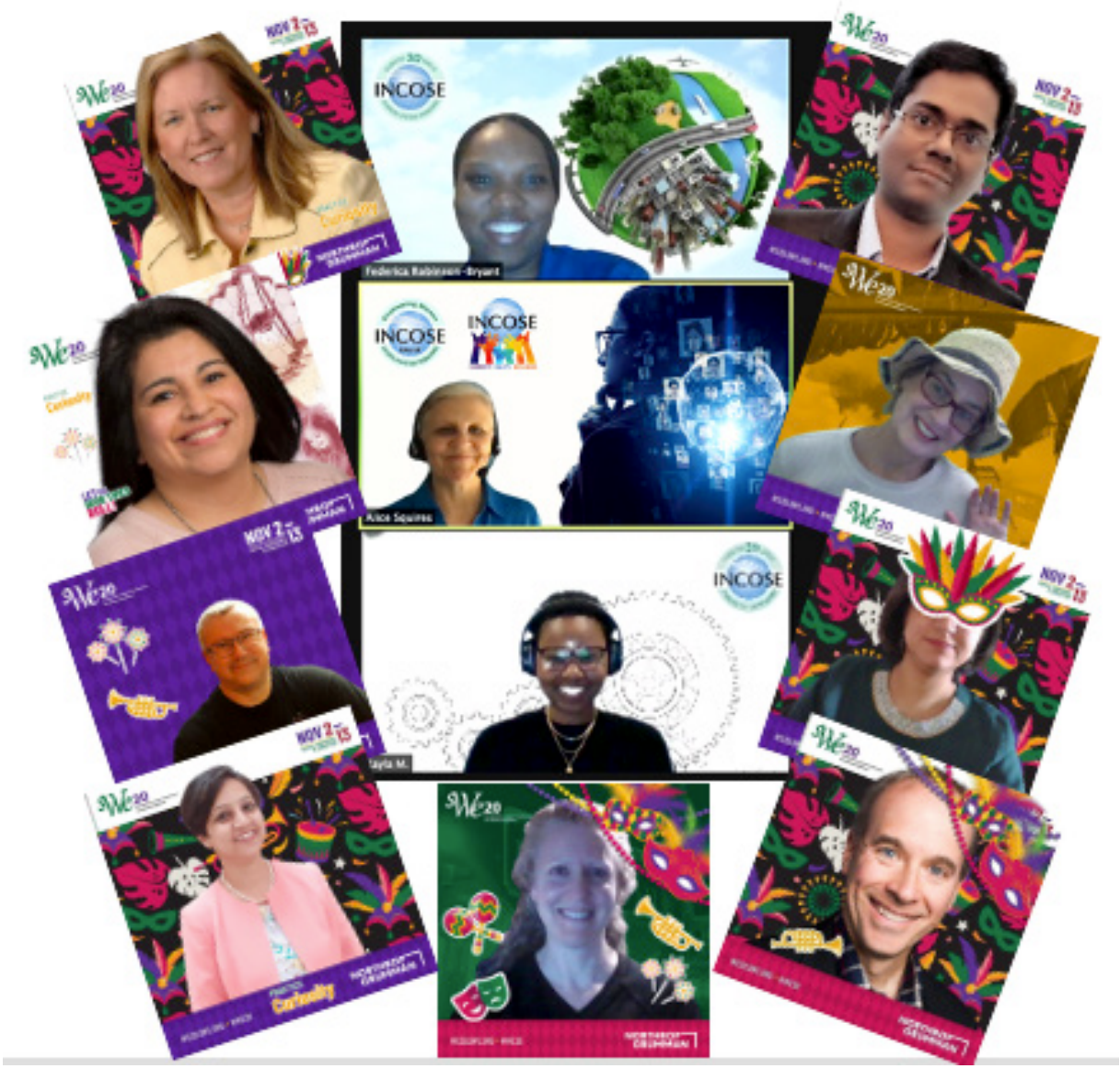
#IamRemarkable is a Google initiative empowering women and other underrepresented groups to celebrate their workplace achievements and beyond. This workshop aims to improve women and

underrepresented groups' self-promotion motivation and skills, and challenges the participants self-promotion social perception. This is a 90 minute workshop where participants learn self-promotion importance in personal and professional life and equip tools to develop this skill. The participants grown through engaging exercises and peer interactions. Stueti Gupta, EWLSE Asia Oceania Sector lead, is a silver tier facilitator with the program and has facilitated seven workshops so far. Four workshops are for EWLSE participants in the Asia Oceania sector. Keep a look out for #IamRemarkable sessions at upcoming INCOSE events!

Society of Women Engineers Conference 2020: EWLSE Update

Alice Squires
ewlse@incose.org

For the last three years, Empowering Women Leaders in Systems Engineering (EWLSE) has sponsored an INCOSE EWLSE booth at the Society of Women Engineer's conference, although this year was quite different! As the conference went virtual, the EWLSE team expanded from 4 to 12 supporters as SWE expanded the free registration number for booth supporters and modified a two-day event to span a two-week long event from 2-13 November. For many EWLSE team attendees, this was a first-time experience at SWE and



doubly the first time for all attendees as a virtual experience. As those who attended virtual conferences can attest, there has also been quite a challenge in how to engage participants in a virtual fair! As an additional challenge, for SWE, participants often look for work (paid) opportunities. EWLSE members from around the world came together to answer questions about 'what is systems engineering', 'how does systems engineering relate to my field', 'what opportunities are available to me in INCOSE', 'why should I consider certifying in systems engineering', and many more, with guest visits from many INCOSE members otherwise attending the SWE event.

Marilee Wheaton led the overall SWE booth activity, and Lisa Hoverman led the amazing booth setup (see Figure 5) with links to INCOSE, EWLSE, the System Cafés, INCOSE *INSIGHT* Diversity issue, INCOSE SEP certification, and videos celebrating INCOSE's 30th anniversary, about INCOSE, and how to network with INCOSE. The twelve EWLSE booth supporters (see Figure 6) included: Marilee Wheaton, Federica Robinson-Bryant, Shamsnaz Virani Bhada, Erika Palmer, Stephanie Chiesi, Lauren

Stolzer, Kerry Lunney, Ramki Raman, Kayla Marshall, Stueti Gupta, Alan Harding, and Alice Squires. We also had a special guest appearance from Enanga Daisy Fale from the Minnesota North Star chapter.

See you next year at SWE 2021!

INCOSE®

INCOSE Certification

See why the top companies are **seeking out INCOSE Certified Systems Engineering Professionals.**

Are you ready to advance your career in systems engineering? Then look into INCOSE certification and set yourself apart. We offer three levels of certification for professionals who are ready to take charge of their career success.

Apply for INCOSE Certification Today!

Visit www.incose.org or call 800.366.1164

INCOSE ASEP · INCOSE CSEP · INCOSE ESEP

SEANET Holds 15th Event Online

Cecilia Haskins, cecilia.haskins@incose.org
Alejandro Salado, alejandro.salado@incose.org

SEANET 2020 was the 15th event held for PhD researchers in systems engineering. Traditionally, SEANET took place the day before CSER 2020, rescheduled from March to 8-10 October, hosted by the INCOSE LA chapter. This year USC sponsored SEANET and organized the registration and online connections. SEANET stands for Systems Engineering and Architecture Network, and its founders and earliest organizers, Donna Rhodes and Ricardo Valerdi, received the Outstanding Service Award during INCOSE's International Symposium 2020 recognizing this important contribution to expanding the systems engineering body of knowledge.

This year SEANET participants included 6 students from Clemson, University of Alabama Huntsville, USC, and Virginia Tech. This year's organizers Alejandro Salado (VT) and Cecilia Haskins (NTNU), as well as Donna and Ricardo supported them. Christophe Aix from Thales joined for the second

consecutive year. Clement Smartt, a previous SEANET attendee, gave this year's traditional presentation covering his PhD journey.

SEANET 2021

SEANET encourages PhD candidates to share and learn during three roundtable discussions revolving around research methods, research design and validation, and publishing and defending their research. As part of establishing a year-round network, a Microsoft Teams platform is under development. Next year SEANET 2021 will be online to maintain continuity while the next CSER will take place in 2022. We encourage any PhD working toward these objectives to express their interest to cecilia.haskina@incose.org.

FYI
Information and Tools for Now

Training Working Group (TWG)

The Training Working Group needs volunteer members to provide webinars and/or training on systems engineering topics, specifically on the systems engineering functional areas to help advance our best systems engineering practices and provide training to potential INCOSE professional certification candidates. If you have a systems engineering topic for which you can provide webinars and/or training, please consider volunteering and earning Professional Development Units (PDUs) which can apply towards your certification renewal requirements. Contact our TWG leadership (see contact information below) and get your session scheduled today!

Contact either:

gabriela.coe@incose.org, Chair
john.clark@incose.org, Founder, Co-Chair

FYI
Information and Tools for Now

INCOSE IS 2020 Proceedings Now Available

The INCOSE Papers & Presentations Library now has the published proceedings from the virtual International Symposium 2020. Check it out here.

Contact either:

Robert Cloutier rcloutier@southalabama.edu
David Endler de@davidendler.de

Highlighting 30 Working Groups for the INCOSE 30th!

Lisa Hoverman, marcom@incose.org

This year at the INCOSE International Workshop (IW), the premier conference to contribute meaningfully to the state of the art in systems engineering, 47 Working Groups (WGs) spanning topics from Artificial/Augmented Intelligence to Configuration Management to Digital Engineering to Empowering Women Leaders in Systems Engineering to Model-Based Systems Engineering, to Natural Systems, to Smart Cities, to Social Systems, to Telecommunications, and more gathered in Torrance, CA to work on the big and complex challenges facing our planet.

The working groups self-organize and self-report at the end of the workshop. Most working groups are open sessions so new members can attend, learn about the work, and engage at the level that is right for them. The work the group does at the IW and reports on from their time spent working together at the IW is available on the INCOSE website here. If you are a new member, or a member looking to get involved in a working group, this is a wonderful place to start learning about what INCOSE is up to, and where you might want to contribute!

As part of our 30th year celebration, we are going to highlight 7–8 working groups each Newsletter in 2020 to showcase their work, provide insight to what we do technically in INCOSE and how we contribute back in a big way to the larger Systems Engineering Community! In this issue, we are highlighting 7 working groups we hope you enjoy learning about and will potentially join!

WG23—Critical Infrastructure Protection and Recovery

Chair: Daniel Eisenberg, daniel.eisenberg@nps.edu
Co-Chairs: John Juhasz telepath.juhasz@yahoo.com
Anthony Adebonojo, anthony.adebonojo.ctr@mda.mil

Members: 212 members

Purpose/Mission

The Critical Infrastructure Protection and Recovery (CIPR) Working Group's (WG) purpose is providing a forum for applying, developing, and disseminating systems engineering principles, practices, and solutions relating to critical infrastructure resilience against man-made and natural events causing physical infrastructure system disruption. The CIPR WG acts as a link among infrastructure related INCOSE WGs, the US Federal government, academia, and international partners.

Goals

This WG will create opportunities to exchange systems engineering approaches to identify and manage critical infrastructure system vulnerabilities both within INCOSE and with external organizations sharing similar interests and goals.

Scope

The CIPR WG scope includes systems comprising 16 critical infrastructure sectors the US Department of Homeland Security defines and vulnerability analysis methods ranging from reliability to game theory, optimization, and cognitive systems engineering.

IW Outcomes

At the INCOSE International Workshop 2020, the CIPR WG completed the following:

- Established new WG Chair and introduced chair to INCOSE leadership
- Determined updates to WG charter
- Reviewed CIPR materials for special INCOSE *Insight* issue (planned June 2020)
- Reviewed current modeling and outreach efforts
- Established shared goals with Telecommunications and Transportation WGs
- Supported the new Smart Cities Initiative

- Established next INCOSE International Symposium 2021 preparation steps

Planned Activities
- Weekly WG coordination calls
- Monthly CIPR International seminar presentations
- Outreach CIPR-related INCOSE WGs
- Outreach to new international partners

Planned Work Products
- INCOSE *Insight* special issue (planned June 2020)
- CIPR Primer (in conjunction with Telecommunications Primer)
- INCOSE International Symposium 2021 special session submission
- Microgrid reference model
- Resilient hospitals reference model

Why join the Critical Infrastructure Protection and Recovery WG
- Lots of collaboration opportunities with other working groups
- Large membership and well established
- Long term projects planned

WG24—Human Systems Integration

Chair: Guy Andre Boy, guy-andre.boy@centralesupelec.fr

Members: 28 members

Purpose/Mission
Human Systems Integration (HSI) is the interdisciplinary technical and management process ensuring proper addressing and integrating of a system's human elements throughout the wider systems engineering lifecycle and management approach to a project.

Integrate Technology, Organizations, and People in Systems Engineering Practice

Goals
- Move HSI from a "side effort" to a central part of systems engineering and development.
- Integrate Systems Engineering and Human-Centered Design during the whole Human-Machine System life cycle.

Scope
- Address:
  - Design and Engineering practices
  - Certification and Legal Issues practices
  - Product Usages and Maintenance practices

IW Outcomes
- Consolidate IEA, ACM and IEEE cooperation
- Set-up a recurring HSI webinar
- Have HSI Session(s) at IS2020
- Organize HSI2021
- HSI workshops Fall 2020
- HSI chapter for Systems Engineering Handbook
- Maintain HSI webpage

Planned Activities
- Chapter for future Systems Engineering Handbook
  - After IW2020, first draft review (email)
  - 6-7 April 2020: Workshop at Continental, Frankfurt, Germany
  - Second review (email)
  - Beginning July 2020: second draft
  - IS2020, Cape Town meeting
  - Third review (email)
  - Dec 2020: shareable draft
- HSI workshop 2020 in Haifa, Israel, October
- Participation in IEA 2021 World Congress June 2021 in Vancouver, Canada
- HSI2021 conference: planned in California in October 2021 cooperating with IEA and ACM

Planned Work Products
- Sharable Systems Engineering Handbook Chapter draft
- Papers at IS2020

Why join the Human Systems Integration WG
- Small but well organized
- Highly relevant topic
- Human Centered

WG25—Knowledge Management and Ontologies

Co-Chairs: Jean Duprez, jean.duprez@airbus.com

Robert Nilsson, robert.nilsson.2@volvocars.com

Members: 16 members

Purpose/Mission

The Knowledge Management Working Group's (KM WG) purpose is to expand and promote the application, education, and theory of knowledge management (in all possible knowledge representation schemas, including Ontology) for systems engineering to reduce or eliminate existing system engineering practice barriers.

Goals

We propose applying knowledge management (using ontology and other knowledge representation structures) as a driver within systems engineering practice enabling process, method, and tool harmonization. More specifically, this working group intends to create outcomes enabling initiative, process, or activity harmonization and interoperability; and to remove or overcome existing barriers (computational, social, linguistic) among them.

Scope

Activities relating to best Knowledge Management practices:

- Applying knowledge management process activities to concrete industry implementations
- Knowledge Organization Systems (KOS)
- Ontologies Definition, Construction, and Representation
- Models and knowledge information Indexing and Retrieval
- Knowledge Comparison, Visualization, Access, and Trace
- Ontologies Management and Evolution
- Ontologies Verification and Validation

IW Outcomes

- New chairs' presentation
- Refreshed Charter
- Primer/white paper 2019 work status review
- Collaboration with other working groups; SoS, Architecture, and System Science deepened
- Open discussion of principles and case of applications

Planned Activities

- WG meetings—first "kick off" for further planning, 11 February, 10-11 am, contact-person for participation Jean Duprez
- Contact with other WG members
- "Upper ontology" feedback discussion to share knowledge across WGs deepened; SoS, Smart City, and Architecture
- Practical Use Case for using ontology for applying semantic approaches to MBSE, contact-person KM WG is Jean Duprez
- Filling in TPP for Knowledge Management Primer/Product
- Set up KM homepage at INCOSE properly
- On request, support TechOps with a first WG-graph-setup, contact-person KM WG is Robert Nilsson
- Collaborate with ArchWG on a How to Use Arch standard 42020 guide, contact-person KM WG is Robert Nilsson

Planned Work Products

- Knowledge Management Primer to release 2020/2021
- Knowledge Management White Paper to release 2020
- Paper for IS2021

Why join the Knowledge Management and Ontologies WG

- Help control and improve knowledge management and dissemination
- Interact with numerous aspects of systems engineering

WG26—Measurement

- **Chair:** Paul Frenz, paul.frenz@gd-ms.com
- **Members:** 48 members

Purpose/Mission

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

Goals

- The Measurement Working Group supports various measurement initiatives including supporting INCOSE measurement products (Measurement Primer, Metrics Guidebook, Technical Measurement Guide, Systems Engineering Handbook) as well as joint measurement products (Systems Engineering Leading Indicators Guide, PSM Guide).

Scope

- The Measurement Working Group supports various measurement initiatives including supporting INCOSE measurement products (Measurement Primer, Metrics Guidebook, Technical Measurement Guide, Systems Engineering Handbook) as well as joint measurement products (Systems Engineering Leading Indicators Guide, PSM Guide).

IW Outcomes

2020 Focus

- Work with PLE WG to produce a joint PLE measurement guide—Team members and lead selected—2020 product
- MBSE Measures—After discussion, the team decided to wait for SERC MBSE Measures report and determine action. Following discussions indicate MBSE Measures are still developing and it is likely we will start with draft measures covering:
  - Model goodness
  - Project modeling performance
  - Organizational transition to DE progress
- Updated Measurement Guide 2005—Garry Roedler has password to source file. Garry will need to weigh in on team members and timeline when he is ready.
- Reviewed Agile effort presented to Geoff Draper

Planned Work Products

- Work with PLE WG to produce a joint PLE measurement guide—Team members and lead selected—2020 product
- MBSE Measures—After discussion, the team decided to wait for SERC MBSE Measures report and determine action. Following discussions indicate MBSE Measures are still developing and it is likely we will start with draft measures covering:
  - Model goodness
  - Project modeling performance
  - Organizational transition to DE progress
  - Update Measurement Guide 2005

Why join the Measurement WG

- Project and Product focus
- Support various systems engineering aspects
- Education centered

WG27—Natural Systems

Co-Chairs:
Curt McNamara, curtmcn@gmail.com
Randy Anway, randy@new-tapestry.com

Members: 35 members

Purpose/Mission

Evaluate changes to systems engineering processes and communications to take advantage of Natural Systems, including broader relationships between systems engineering—science—technology.

Goals

- Assess State-of-the-Discipline regularly
- Cultivate a NS Community of Practice
- Share Best Practices and Success Stories
- Investigate systems engineering practice enhancements
- Grow in numbers and scope.

IW Outcomes

- Sessions:
  - Natural Systems Working Group Introduction and Overview
  - How Does Nature Respond to a Changing Climate?
  - Joint session with Social Systems and Complex Systems Working Groups
  - Function and Bio-Inspired Design
  - How Do Engineers Respond to a Changing Climate?
  - Patterns and Spatial Abilities
  - Natural Models: Joint Session with Systems Science WG
  - NSWG and SocWG Future Planning

Planned Activities

- Patterns in Nature for systems engineers
- One day tutorial on natural systems for systems engineers
- Contribute to handbook revisions
- Collaborate with NASA for bio-inspired design workshop

Planned Work Products

- Create Natural Systems Primer first draft for systems engineers

Why join the Natural Systems WG

- Environmental focus
- Help systems engineers learn from and include designs from nature
- Growing working group

WG28—Power and Energy Systems

Chair: Ray Beach, Raymond.f.beach@nasa.gov

Members: 67 members

Purpose/Mission

Charter currently in revision. Prior purpose statement is:

The Power and Energy Working Group (PESWG) seeks to organize experts from within INCOSE as well as other professionals in the energy economy sector to facilitate a systems approach to effective energy solution analysis and future development.

The PESWG's purpose is to direct expertise and a systems focus to support decision makers in the critical challenges of developing future energy systems

Goals

- Identifying viable candidate energy systems for PESWG studies/activities (this includes viable Aero and Space Power systems, as well as terrestrial applications)
- Define standard system methods for assessment and life cycle development process
- Comparative system behavior and effectiveness assessments (model-based)
- Recommendations on system methods and key priorities for future energy development

Scope

Scope comprises interest areas and group member relevancy in Power Technology, Electric Grid architecture, Microgrids, and related matters. Model-Based Systems Engineering methods and model development are fundamental to all endeavors.

IW Outcomes

At IW2020, PES participated in multiple cross working group collaboration discussions including relevant power applications and challenges in:

- Critical Infrastructure Protection & Recovery WG
- Telecommunication Systems WG
- Model-based Systems Engineering Workshop
- Smart Cities Initiative
- Discussion on EnergyTech areas of interest for above

Planned Activities

- Continue collaborative efforts across multiple working groups supporting Power Systems
- Expand agenda for EnergyTech 2020 to include multiple interest areas to INCOSE WG
- Develop WG Primer for member interest
- Organize efforts for Microgrid MBSE developments

Planned Work Products
- Primer (in work)
- Microgrid Reference Model (in work)
- Planned contribution to INSIGHT pub
- Planned attendance at Microgrid Knowledge conference, spring 2020
- EnergyTech2020 conference

Why join the Power and Energy Systems WG
- Future focused
- Integral aspect to systems engineering
- Well organized

WG29—Systems Engineering Quality Management

Chairs:
Barclay Brown, barclay@barclaybrown.com
William Scheible, wgscheib@gmail.com
Co-Chair: Hazel Woodcock, hazel.woodcock@uk.ibm.com

Members: 80 members

Purpose/Mission
The Systems Engineering Quality Management (SEQM) Working Group's overall purpose is to foster quality management definition, understanding, and practice in the systems engineering profession. Establishing quality management as a professional development cornerstone adding value to the Systems Engineering profession will achieve this purpose.

Quality Management is one of the Organizational Project-Enabling processes found in the INCOSE Handbook Section 7.5 and ISO 15288:201

Goals
- Initial publication of a key definitional article on Systems Engineering Quality Management
- Training SEQM Working Group leaders in Quality Management (QM) (continuing)
- Continued delivery of regular SEQM webinars and tutorials
- SEQM leadership training development for INCOSE members (Training WG)
- Enable and encourage SEQM WG leadership to achieve certification as Systems Engineering Quality Managers from the QMI
- Launch research efforts on to further develop SEQM and document the results.

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

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

IW Outcomes
- Building on 2019 and increasing engagement and partnership with other INCOSE WG
- Deliver "SEQM" Primer in 2020
- Two or three SEQM impact papers based upon industry research and reporting
- Proposed IS 2020 panel discussion submitted

Planned Activities
- Monthly teleconference meetings to discuss ideas, observations, and paper/idea developments
- SEQM leadership reaching out to other QM organizations for sharing and exchange
- SEQM leadership and members reaching out to other INCOSE WGs to offer QM knowledge and understanding on possible impacts/improvements to the WGs.
- Member papers for publication, with at least one for *INSIGHT*
- QM guidance/awareness submission(s) to the Systems Engineering handbook review committee.

Planned Work Products
- SEQM Primer
- Paper on QM loss and impacts on an aerospace company (Scheible)

- Paper on SEQM including and considering change/organizational management needs (UNK)
- Paper on QM methods (planned) (Stanfield)
- Creating/submitting QM section for Systems Engineering handbook
- Possible inputs on QM for SEBOK reference materials
- White papers "Hackers vs Slackers" (Ring) and "Loving Errors" (Brown)
- QM Symposium paper submission (waiting approval) (Largent)

Why join the Systems Engineering Quality Management WG

- Very active working group
- Collaboration is key
- Can improve other areas of systems engineering by growing

WG30—Space Systems

Co-Chairs:
David Kaslow, david.kaslow@gmail.com
Alejandro Levi, alejandro.g.levi@ieee.org

Members: 100 members

Purpose/Mission

The Space Systems Working Group (SSWG) purpose is expanding the systems engineering body of knowledge as it applies to space systems. Specifically, the SSWG purpose is to:

- Promote using systems engineering principles, techniques, and practices in government, academic, and private industry organizations which identify with space applications
- Provide a forum in the professional INCOSE network pertinent to professionals in the space systems community

Goals

- An overarching SSWG goal is increasing the technical and professional information quality and scope available to its members and to enhance the information interchange between its members.
- A specific SSWG goal is developing a CubeSat Reference Model distributed to and adapted by CubeSat projects and covers an entire CubeSat project life cycle from concept to retirement

Scope

The SSWG will address applying systems engineering to space systems in government, industry, and academia.

IW Outcomes

- Brief IW Community of the CubeSat System Reference Model current status
- Gather feedback
- Gather suggestions as to future work the SSWG can accomplish

Planned Activities

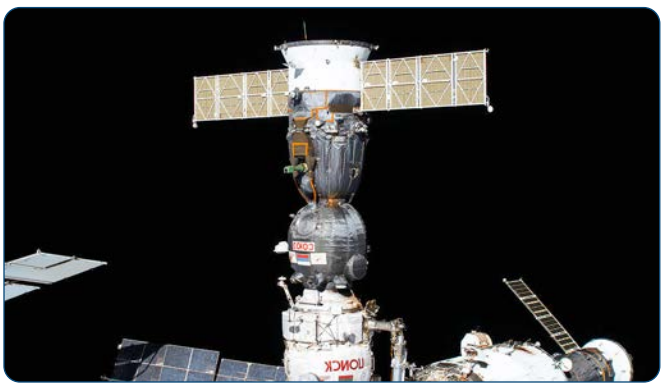
- Continue outreach activities through presentations at relevant conferences
- Pursue cross-WG collaborations with the Systems of Systems and others

Planned Work Products

- Vetting completion of the CubeSat System Reference Model (CSRM) by the Object Management Group (OMG)
- Establishing the CSRM as the first model-based (vice document-based) OMG Standard

Why join the Systems Engineering Quality Management WG

- Space
- Actively involved with current established organizations (INCOSE and OMG)



Stanley Irwin (Stan) Weiss

October 27, 1925–March 6, 2020 (age 94)

Prof. Heinz Stoewer
INCOSE Past President and Fellow

Stan Weiss; engineer, executive, and teacher passed away on 6 March shortly after moving from the San Francisco Bay Area to the Seattle/Tacoma area. Stan was a systems engineering and space developments giant. He spent 50 years in industry, government, and academia in many engineering and executive functions.

Stan and I first met when he was Chief Engineer of NASA and I served as Head of Systems Engineering and Programmatics of the European Space Agency's Technical Center in The Netherlands. We immediately became close friends, sharing many professional experiences and personal interests.

Stan, while an MIT professor, taught for numerous years in our TU Delft international post grad master program for space systems engineering, "SpaceTech." He immediately became an admired faculty member, creating a big "student fan club." Our diverse students from Europe and beyond greatly appreciated his straightforward, experience-based teaching.

Stan introduced me to INCOSE. During a visit at MIT in the late 1990s, he asked whether I would like to accompany him across the river to a "systems engineering club" just transforming from NCOSE to INCOSE. The rest is (good) history!

Stan and I subsequently met in many different places in the world, including many INCOSE meetings. Stan was always inspirational and stimulating. Our meetings often included his wife Catherine, known as Kitty, and my wife Ingrid who intensely shared in our friendship. Stan and Kitty were a wonderful couple. Both highly educated and broadly interested in so many things. Kitty outlived Stan by only 2 months; she died on 28 May. They had moved to the Seattle area earlier to be closer to 2 of their 4 daughters. Their family bond was extraordinarily strong. Stan and Kitty were immensely proud of their daughters and very close to them and their families.

Stan's obituary (https://www.havenrest.com/obituary/Stanley-Weiss) noted:

> "Whether Stan was working on satellite programs at Lockheed Missiles and Space Company or analyzing systems at NASA in preparation for the first Space Shuttle launch, Stanley's curiosity led him in search of innovative solutions to complex problems. Motivated by public service, he committed to developing people wherever he worked."

Stanley spent his early career in the Midwest where he developed and analyzed aircraft design at Goodyear Aircraft Corporation and the Aircraft Products Division at Kawneer Company.

He moved to California in 1957 and began his long association with Lockheed Missiles and Space Company, where he started as product manager for the Polaris Missile project.

He held various positions over the years including assistant program manager and then development program manager for satellite reconnaissance programs; assistant general manager for special programs; and vice president, engineering and development.

Stanley interrupted his work at Lockheed to serve in the government from 1978 to 1983, first as Deputy Assistant Secretary for Utility and Industrial Applications in the Department of Energy. He later worked at NASA as Associate Administrator for Space Transportation

Operations and later as Chief Engineer, where he oversaw Spacelab development and Space Shuttle operational preparation. He received the NASA Distinguished Service Medal in 1983.

He returned to Lockheed in 1987 as vice president of engineering and general manager of research and development, positions he held until his retirement in 1990.

After retiring from Lockheed, Stanley began a 20-year academic career dedicated to helping develop the next generation of engineers and forging connections between universities and industry. At MIT, he was Jerome C. Hunsaker Visiting Professor in Aeronautical Engineering and co-principal investigator for the Lean Aerospace program. Upon returning to the west coast he became a consulting professor at Stanford University in the Aeronautics and Astronautics department. During this time, he wrote *Product and Systems Development: A Value Approach*.

Stanley Weiss, born in New York City on 27 October 1925, was the son of Maurice Weiss, a lawyer, and Malvina (Toffler) Weiss.

He graduated from Rensselaer Polytechnic Institute at Troy, New York with B.S (1945) and M.S. (1947) degrees in aeronautical engineering. He received a Ph.D. in theoretical and applied mechanics from the University of Illinois at Urbana (1949) and is a graduate of Harvard University's Advanced Management Program (1969). His military service was with the Navy.

While traveling in Europe, he met his wife of 68 years, Catherine Jordan. His four daughters (Ann, Audrey, Janet, Marion), four grandchildren (David, Andrew, Laura, Lindsey), and one great-grandchild (Dalton) survive Stan and his wife.

Stanley participated in a variety of government panels and advisory committees. He was a fellow of the National Academy of Engineering, the American Institute of Aeronautics, and Astronautics (AIAA), and the International Council on Systems Engineering (INCOSE)".

When our INCOSE Fellows learned of Stan's death, their reactions were full of admiration and very personal. Some excerpts include:

"It is so sad to watch the Giants of Systems Engineering pass away. It was an honor to know Stan and to hear his remarks on various systems engineering topics."

"What a beautiful life...what a beautiful man. Service with a smile, a gentleman in all aspects of being. Boundless energy and humility, making all feel welcomed and heard. A teacher, mentor and mensch...we will miss him."

"Sorry to hear about Stan & Kitty passing away. They were a wonderful and loving couple."

"Spending time with Stan and Kitty was always so much fun. They were true role models as individuals, and as a couple. What a wonderful life they enjoyed together."

"He was one of the most memorable and genuinely kind people I will ever know."

"Stan was always so much of a kind man and had the best interests of everyone at heart. He was so smart and knowledgeable."

"He was such a sweet and gentle man—always such a joy to see at IW or IS."

"He was a great scholar and outstanding leader in Systems Engineering. I learned a lot from him and had many great discussions on engineering and systems engineering with him in every INCOSE meeting. He had great vision."

"Stan was an outstanding leader in our field and a wonderful colleague."

The INCOSE family and especially his fellow Fellows will dearly miss Stan. He has left a vivid legacy for all of us!

Our thoughts are with his 4 daughters and their families of whom he and Kitty were so proud.

Note From the Editor

Lisa Hoverman, newsletter@incose.org

Welcome to the final Newsletter of 2020. Wow! What a year. As we prepare to safely celebrate year's end, we both look back on all we accomplished and look forward to everything 2021 will bring. 2020 not only brought countless challenges with the global pandemic and adapting our lives accordingly, it also revealed numerous opportunities for our members to shine as they converted to a digital workspace. INCOSE met the challenge commencing virtual cafés for systems engineers around the world to collaborate on important topics and transitioning events to virtual platforms such as Zoom, changing the way we interacted but still facilitating meetings and collaboration.

INCOSE developed 7 new alliances and 3 new certification academic equivalency agreements while maintaining the work from our working groups and other established organizations. Overall, despite global problems restricting travel and interaction, INCOSE had a very productive year.

2021 promises to be equally productive. First up will be the first ever virtual INCOSE International Workshop (IW). After the Virtual INCOSE International Symposium's success we look forward to meeting again online and furthering our collaborations and expanding our reach to those who could never attend in person. 2020 also gave us many opportunities we plan to continue into 2021 such as our virtual cafés and many other collaboration opportunities. We look forward to sharing knowledge through the Newsletter. Please keep sharing your publications with us as we continuously work to improve. I hope you see some of your suggestions and contributions in this issue. As always, we welcome feedback and contributions at newsletter@incose.org. We look forward to seeing you participating, networking at, or presenting 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 December, stay healthy and I really hope to see you online at the upcoming IW!

INCOSE Member Newsletter

Publication of the International Council on Systems Engineering

Editor: Lisa Hoverman, newsletter@incose.org

Member Services: INCOSE Administrative Office
info@incose.org

+1 858 541-1725

On the Web http://www.incose.org

Article Submission newsletter@incose.org

Publication Schedule. The INCOSE Member e-Newletter is published four times per year. Issue and article/ advertisement submission deadlines are as follows:

- Q1 Newsletter, General Content (GC): 15 Feb, Late
- Breaking News (LBN): 25 Mar
- Q2 Newsletter, GC: 15 May, LBN: 25 May
- Q3 Newsletter, GC: 15 Aug,, LBN: 25 Aug
- Q4 Newsletter, GC: 15Nov; LBN: 25 Nov.

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

© 2019 Copyright Notice. Unless otherwise noted, the entire contents are copyrighted by INCOSE and may not be reproduced in whole or in part without written permission by INCOSE. Permission is given for use of up to three paragraphs as long as full credit is provided. The opinions expressed in the INCOSE Member e-Newsletter are those of the authors and advertisers and do not necessarily reflect the positions of the editorial staff or theInternational Council on Systems Engineering.

Who are we? INCOSE is a 17,000+ 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.

Follow us

INCOSE®

7670 Opportunity Rd, Suite 220
San Diego, CA 92111-2222
USA
info@incose.org
www.incose.org
+1 858 541-1725