December 2022

INCOSE MEMBERS NEWSLETTER

The International Council on Systems Engineering

A Better World Through a Systems Approach

In this issue:

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Editor's Letter

Honor Lind, Director for Marketing and Communications, honor.lind@incose.net

We are thrilled to end the year with a global impact as INCOSE membership skyrockets to over 21,000 with new chapters, corporate partners and universities recognizing our systems engineers.

The future of systems engineering is brighter than ever as the FuSE Initiative outlines a proactive roadmap to realize the vision of systems engineering, creating a new path to implement the Systems Engineering Vision 2035. We invite you to join the discussion to transform the narrative at the annual INCOSE International Workshop (IW) in 2023 in Torrance California. We are proud of the hard work our chapters, working groups and initiatives have done, launching SySTEAM, the Systems Engineering Vision 2035, FuSE, the Mentoring Program, and several new publications such as SE Principles, Letters to My Younger Self, Smart Cities, Natural Systems, Requirements Guides and more coming soon at the International Workshop 2023.

Be sure to read about what the INCOSE Foundation has been working on to extend membership to those in underrepresented countries, providing them with the resources they need to make their mark in the systems engineering industry. We have new and exciting news to share from the Student Divisions that will improve value to all. INCOSE is your professional society for career advancement for systems engineers. We are here to provide you with the tools and resources you need for development at any stage of your career.

Just ask our global chapters what they think and read about what they are doing from the Japan Chapter (JCOSE) to Korea (KOSSE), United Kingdom (INCOSE UK), Germany (GfSE), Australia (SESA), Singapore (INCOSE Singapore), Brazil (INCOSE Brasil), and New Zealand (INCOSE NZ) -- not to mention our Western State Regional Conference. INCOSE is always buzzing with activity! Be sure to check out our website, www.incose.org, to stay up-to-date on all the exciting news and events we have to offer.

We have so much to share in our Q4 Members Newsletter! Read about the transformation from IT to the world of AI with large language models, learn about the newly released Natural Systems Working Group primer, and find out how to optimize your career skills for professional development with the PDP and Social Systems. We can't wait for you to join in the conversation and continue to connect, learn, lead, and prosper in your career as a professional systems engineer!

Thank you again for being part of the INCOSE family.

Honor Lind

INCOSE

CONNECT

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PROSPER

INCOSE is the premier choice of systems engineers for professional development.

With over 30 years of experience, we are shaping the future of systems engineering.

We interact with systems engineers across the globe on a daily basis to set standards.

21,000
Members and CAB Associates

130
Corporate Members

52
Working Groups

65
Chapters Worldwide

76
Countries with Active Members

The International Council on Systems Engineering

www.incose.org

A Message from INCOSE President, Marilee Wheaton

As we come to the end of 2022 and I am now in my eleventh month as INCOSE President, it feels like the right time to reflect on the last 12 months, as well as looking forward to 2023. It's fair to say that is exactly what this edition of the members newsletter does.

Just a note that the Annual Impact Statement will be issued in February 2023. The mid-year statement was published after the International Symposium, enabling us to reflect on the outcomes from the Symposium. This was well received, and I asked the Marketing and Communication Team to take the same approach to the Annual Impact Statement and issue it after the International Workshop 2023, so it can include the outcomes from IW2023. I know many of you will be interested to see how INCOSE has grown in the last six months of the year, the statistics are available in the previous page.

This last quarter of the year has been a busy time for many of our chapters, with Brazil, Germany, France, the UK all holding their own conference as well as the Western States Regional Conference here in the US. Speaking of key milestones, the German Chapter, GfSE, turned 25 this year and celebrated with a cake at their Day of Systems Engineering Conference!

Several INCOSE products have been launched in the quarter, including Letters to My Younger Self: How Systems Engineering Changed My Life and SE Principles; two products that I know were a labor of love for all involved. It is great to see how well they have been received by INCOSE and the wider systems engineering community globally. Hot off the press just this month is the Springer Book Emerging Trends in Systems Engineering Leadership: Practical Research from Women Leaders featuring 26 INCOSE authors.

A surprising highlight was the social media post celebrating Systems Engineer Day, which has been reposted 155 times, been liked, loved, or celebrated by 2053 individuals and commented on 96 times, and counting. The post asked followers to 'Let us know what you love about being a Systems Engineer'. Make sure to see the post to read all the inspirational and insightful replies. Looking ahead to 2023, you will find several articles in this edition which focus on the coming year. There are a couple I would like to highlight, firstly the article outlining the mentoring pilot that starts in February 2023. If you would like to help pay it forward for those just starting into the world of systems engineering, then I recommend you have a look at this.

Secondly, be sure to read 'FuSE Initiative Paves the Way to Reach Goals of SE Vision 2035' which highlights the upcoming plans for the Future of Systems Engineering (FuSE) Initiative.

Lastly, I would like to wish all our INCOSE members across the globe Happy Holidays, enjoy this festive season with family and friends, and here's to a healthy and successful 2023.

Warm regards,
Marilee Wheaton

FuSE Initiative Paves the Way to Reach Goals of SE Vision 2035

***"The future belongs to those who prepare for it today,"* said Malcolm X in 1962. If that's the case, then the future belongs to systems engineers.**

The INCOSE Future of Systems Engineering initiative – FuSE – began officially in 2018, but it is really getting its moment in the sun at IW2023 in California. According to the IW planning team, *"The IW 2023 goal is to frame the structural relationships, workflows, cadence and value models to realize the SE Vision 2035."*

"The goal is to realize the vision," said William Miller, FuSE lead. *"Just because we published the vision doesn't mean it's going to happen. We need to be proactive in ensuring that the vision is going to happen."*

INCOSE President-Elect Ralf Hartmann said, *"With the SE Vision 2035, we have given to the world and to ourselves an extraordinary piece of inspiration and ambition for the future. This vision expands the perspective and focus of systems engineering in an unprecedented form."*

The SE Vision 2035 has roadmaps to "grand challenges." Thomas McDermott, INCOSE director of strategic integration, said, *"Our discipline is in a major transition. That transition is being driven by digital technologies primarily, and will continue to be."*

"Think today in terms of the global context of systems engineering, the scale of systems, the interconnectivity of everything," Miller said. *"Everybody is a stakeholder. How do we engineer systems to behave the way we want them to behave with all of these factors?"*

One of the goals of SE Vision 2035 is to expand research. The FuSE team advanced this initiative with the publication of SE Principles earlier this year.

One of the objectives for the research is that it should be "practicable," according to Miller. *"Research should be directed at recognized problems, not just somebody in an ivory tower speculating about something."*

The FuSE team has other goals as well. *"When we think about what FuSE looks like, it ought to be informing in INCOSE on where to focus its strategies in the changing world,"* McDermott said. IW2023 is a place for INCOSE members and working groups to do just that.

In preparation, McDermott suggests that members read the SE Vision 2035 and familiarize themselves with the grand challenges and the implementation roadmaps.*"[Identify] real things that INCOSE can work on within its membership,"* McDermott said.

"We can really contribute as an organization to solve grand challenges," said Tom Strandberg, the FuSE stream lead in SE application, said, *"We need to broaden the application of systems engineering in new domains. I think the world has come to the insight that we need systems thinking. Particularly, we need to take a systems approach to solve our problems."*

Beyond IW2023, the FuSE team has even bigger plans. *"In the next year or two, I think success for me would be that systems engineering is more on the agenda of governance and influential organizations,"* Strandberg said.

Ultimately, he said he wants to see INCOSE at the World Economic Forum. *"It's important that INCOSE is seen and heard in that kind of a context where we can bring our knowledge and experience in how to solve grand challenges that we have facing us today,"* he said.

Hartmann agreed. *"Now we are even suggesting that systems thinking and SE-related methodologies are key to meet the social, economic, environmental and political challenges on Planet Earth,"* he said.

By Beth E. Concepción

SE Vision 2035 Webpage

IW2023 to Offer Additional Opportunities to Make a Difference in the Future of Systems Engineering

The annual INCOSE International Workshop in 2023 will feature the usual working group activities of planning products, revising charters, updating webpages, etc., but this year will also feature something new: A focus on FuSE, the Future of Systems Engineering.

"The most original part of it this year is the opportunity to contribute to the future of systems engineering by being an actor within the FuSE initiative and the FuSE workshops that will take place during IW," said Olivier Dessoude, deputy tech director with INCOSE.

Attendees of IW2023 January 28-31 in Torrance, California, will hear from two keynote speakers: Olivier De Weck and Nancy Leveson. De Weck will address FuSE while Leveson will address model-based systems engineering.

"The focus [usually] is on what we can do here that we cannot accomplish on our own during the year," said Christopher Hoffman, INCOSE Technical Director. "All of that is still there. [This year attendees will] help take our SE Vision 2035 and put it into next steps. Having that serve as a focal point to the larger IW. That I guess is the difference this year. Bringing together folks for a particular purpose."

IW2023 will offer virtual and hybrid sessions, but there is value added for people to travel to the event to be there in person.

"If we are asking people to travel to Torrance, it is because they are going to have an experience. They are going to bring something. They are going to discover something," Dessoude said. "Going to that workshop in person is an effort from various respects. It really has to bring value to the people who go there and bring value to INCOSE."
Those who cannot attend IW2023 in person can still participate in FuSE as there will be virtual sessions after the January event.

Visit the website for the full schedule of events.

By Beth E. Concepción

IW 2023 Website

2023 Annual INCOSE international workshop

HYBRID EVENT

Torrance, CA, USA

The Venue
Torrance Marriott Redondo Beach
3635 Fashion Way
Torrance, California 90503 - USA

Dates
Saturday 28 –
Tuesday 31 January, 2023

IW2023 focus

- **Future of Systems Engineering (FuSE)**
  - Hybrid keynote by Dr. Olivier De Weck
  - In-person and open working sessions on Vision & Roadmap, Foundations, Methodology, and Application Extension.
  - Virtual sessions will be held after IW to continue this important effort.
- **Model Based Systems Engineering (MBSE)**
  - Hybrid keynote by Dr. Nancy Leveson
  - A full day of critical MBSE updates (SysML v2, MBSE standards, liaisons, ...)
  - Hybrid workshops on AI/Machine Learning and System Safety
- **Multi-working group sessions, mobilizing participants from different horizons. For example:**
  - An afternoon hybrid session with all Application domain Working Groups reflecting upon the morning FuSE workshop session.
  - Smart Cities Initiative who collaborate with MBSE, Architecture, Social Systems, CIPR, System of Systems, Infrastructure, Transportation, and local chapter working groups to progress their efforts.
- **Outreach sessions, raising awareness beyond each group to increase engagement including:**
  - INCOSE Service Operations and how partnering with Services contributes to INCOSE products, Working Group effectiveness, and systems engineering.
  - the Social Systems working group reaching out to domains beyond traditional systems engineering areas.

Hybrid event

The International Workshop 2023 will be held as a hybrid event allowing for in person and virtual participation, subject to session hosts. Hybrid sessions will strive to include virtual attendees as much as possible, yet individual experiences will vary

Sessions

Planned sessions will be published on the website as these become available and scheduled via the meeting request tool found at https://submission.conflr.com/IW2023/meetings.conflr.

Sponsorship

Different sponsorship opportunities available to involve your company in the IW2023!

VISIBILITY

Unique brand of recognition and visibility for your organization

SPOTLIGHT

Put a spotlight on your organization's competency in Systems Engineering

ASSOCIATION

Be associated with the highest culture of professionalism and innovation

Registration

In person registration

• Full Registration **Member**	**$550**
• Full Registration **Non Member**	**$695**
• Full Registration **Senior Member**	**$175**
• Full registration **Student Member**	**$175**

For in person attendees & their guests, the INCOSE Foundation will host a Wine Soirée. This festive evening features an open wine bar and an opportunity to taste wines from INCOSE Sectors, plentiful hors d'œuvres and the opportunity to mingle with your colleagues.

Virtual registration

• Full Registration	**$150**

The Technical Leadership Institute Offers Personal and Professional Growth and Networking

The INCOSE International Workshop 2023 in Torrance, California will launch the annual call for nominations for INCOSE's Technical Leadership Institute (TLI). Those accepted into the two-year program embark on a journey of self-reflection, networking, and understanding of complexity and how to handle it/lead through it. TLI has its roots in Systems Engineering Vision 2025.

"It was clear that to really achieve that vision, we needed more and probably a slightly different kind of systems engineering leader, not necessarily for INCOSE, but for the community at large," said David Long, one of the founding TLI coaches, along with Mike Panotti, Patrick Godfrey and Don Gelosh.

The group started the TLI in 2015. Suja Joseph-Malherbe, Senior Systems Engineer at Letter 27, was one of the members of the inaugural cohort. *"For me it was the networking opportunity -- just learning from each other,"* she said. *"Are we encountering the same problems? Are we thinking the same stuff? Are we thinking different things?"*

TLI is now on its eighth cohort with 23 participants. There are 123 people affiliated with TLI, including inductees, coaches and current participants, and they represent five continents and more than 10 countries.

Erika K. Palmer, Senior Lecturer of Systems Engineering at Cornell University and a member of cohort six, was recently inducted. *"She's a poster child of the TLI experience,"* said Long, president of Vitech.

Palmer credits her TLI experience with spurring her to join technical operations as Deputy Technical Director beginning in January 2023. *"I would never have even applied for that (before TLI),"* she said.

Palmer said she plans to use her TLI experience in her new role. *"Seeing how I can create a shared vision is probably one of the most powerful things I've gotten out of TLI,"* she said. Palmer is a great example of how TLI helps participants develop leadership skills. *"It's really building up this solid foundation for future leaders of INCOSE and Systems Engineering in general,"* she said.

Such is the case also for Joseph-Malherbe, who is returning to TLI as a coach. She brings to the table her experience in TLI, leadership in general, and a coaching mindset. Joseph-Malherbe said she is focused on creating an 'engagement space'. *"How to design the space so they are comfortable to soundboard their ideas and also believing they are the experts in their spaces,"* she said.

Erik Wilkinson, Ball Aerospace Chief Systems Engineer, has been a big supporter of TLI over the years. *"Several Ball Aerospace team members have participated in the TLI cohorts,"* Wilkinson said. *"These participants have been able to take lessons learned through the TLI and quickly apply the skills into a real-world setting, which benefits our customers, leadership and fellow team members."*

TLI used to be primarily in person, but changed to virtual meetings during the pandemic. This switch benefitted the TLI demographics. *"Now it doesn't matter if you are from Washington, D.C., or Cape Town, South Africa, or pick a place around the world – you can participate in this,"* Long said. *"It's experiential. It's global. It's cross organizational boundary. It enriches it for all."*

By Beth E. Concepción

TLI Webpage


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https://specinnovations.com

EWLSE launches 'Letters to My Younger Self How Systems Engineering Changed My Life'

Empowering Women Leaders in Systems Engineering (EWLSE), an INCOSE initiative that started in 2015, has recently launched "Letters to My Younger Self: How Systems Engineering Changed My Life."

It's the brainchild of Alice Squires, EWLSE's founder and leader, and former INCOSE Marketing and Communications Director Lisa Hoverman.

"How can we appeal to the younger generation in a way that is engaging and explain to them what it's been like for us in SE and why we love it so much and why we're so passionate about it?" Squires said of developing the idea for LTMYS. "How can we do that without everybody lecturing?"

Squires said she thought of how people speak differently to younger people like their children or nieces/nephews. "You're more invested," she said. "You talk to them more endearingly, not lecturing because, first of all, they wouldn't put up with that."

They hit upon the idea of letters to younger selves. "Kind of like giving yourself advice, but telling yourself what you loved about systems engineering," Squires said.

David Long, a Past President of INCOSE, joined the group, creating the three member co-editorial EWLSE team that gathered letters from INCOSE members all over the world for the publication. Each of the editors also contributed their own letter to the publication.

"We were amazed by the open and inspiring contributions we received from members around the world," Long said. "We may have targeted our younger selves, but the journeys and stories are valuable for readers of all ages – those shaping their own journeys and those leading others."

The EWLSE team gathered letters from INCOSE members all over the world for the publication. Lisa Hoverman said she hopes it is just the first version of many. "I hope that it keeps going," she said. "That it has great readership and feedback and that we keep moving down the next generation of INCOSE. We want more iterations of the book to stay current and show how systems engineering evolves."

The goal is to inspire future leaders in INCOSE and systems engineering as a whole.

"I hope people will read the books and are inspired," Hoverman said. "And that they make a difference in systems engineering."

By Beth E. Concepción

Download the eBook

EWLSE In Conversation With SPEC Innovations

SPEC Innovations is proud to spotlight how they are inspiring women in the workforce, and we get an insight as to why they were so keen to sponsor the new INCOSE publication 'Letters to My Younger Self: How Systems Engineering Changed My Life'. SPEC innovations also actively engages with the Empowering Women Leaders in Systems Engineering (EWLSE) Initiative.

In a virtual meeting Cindy Mahugh-Dam, CEO of SPEC innovations spoke with Erika Palmer, EWLSE Americas Sectors lead, and co-author of the book 'Letters to My Younger Self: How Systems Engineering Changed My Life' about SPEC Innovation's and Cindy's passion to empower diversity within her own company.

SPEC Innovations was founded and is owned by husband-and-wife team, Cindy Mahugh-Dam and Dr. Steven Dam. After years of frustration with never seeing each other due to late hours and constant traveling, they founded SPEC Innovations together. They combined Cindy's decades of experience in business and finance with Steve's decades of experience in science and engineering, and proposal development to bring high-quality consulting, training, and software to their customers. They strive to create a culture that fosters innovation and creative thinking by providing their employees with respect, equality, and a true work-life balance.

Erika posed the following questions to Cindy:

The LTMYS book that you so kindly sponsored is all about what we would say to ourselves when we were younger – what advice would you have given to yourself?

"I would tell myself to keep working hard and not to worry about the roadblocks that are in the workplace and that it will get better– to persevere!"

Why is INCOSE a great partner for you and your organization to help support people, the SE community, and other organizations in System Engineering?

"I believe that INCOSE is an excellent forum for Systems Engineers to get together, discuss new ideas and new processes. It also allows networking all around the world and viewpoints from all employees."

What motivated you to create a company that encourages women?

"I wanted a company that could give to women the support that I did not have. One that fosters a work/home environment, to be comfortable working as well as having a family. This was all new when I started, and it means everything to me now to see the difference that we have made to women in SPEC Innovations."

"From a business perspective it would be a lost opportunity if we did not have a diverse workforce. I can't imagine a company that does not work that way; it is the natural order and the way it should be." Cindy Mahugh-Dam

What kind of workplace environment does SPEC Innovations have?

"We have a very open and collaborative environment, we encourage and are open to new ideas, employees are valued and encouraged to grow. My door is always open."

How does your company help foster diversity?

"When recruiting, SPEC ensures that job descriptions are gender neutral and interviews are based on skill set. It is important that all people are comfortable working with us. From a business perspective it would be a lost opportunity if we did not have a diverse workforce. I can't imagine a company that does not work that way; it is the natural order and the way it should be. They are missing out, so much can be brought to the table if you just allow it."

Both Erika and Cindy agreed that in the same way the life cycle of any engineered system in either SE or any innovation. If you only look at a one world view of a situation you miss important things and can have serious issues with quality and robustness. You need a diverse workplace.

How do you suggest we can all encourage younger students into Systems Engineering?

"I believe the biggest thing that we can do is to let them know what a huge and exciting field it is. Show them what they can do, create and give to society."

View the full video with Cindy using this link https://youtu.be/XjYVUjaBWio

A huge thankyou to Erika Palmer, Cindy Mahugh-Dam and all at SPEC Innovations for their time in participating in this interview.

This is one of many INCOSE spotlight interviews that we will be conducting in the coming year with thought leaders in all areas of Systems Engineering – if you have a discussion that you feel could be part of our new series 'CALLING ALL SYSTEMS', please contact INCOSE MarCom at marcom@incose.net

Watch the Full Interview

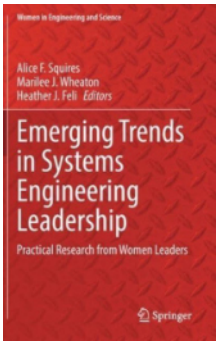
An Update from the EWLSE Leadership Team

Alice Squires, EWLSE Lead

Please enjoy the fourth quarter EWLSE update below. INCOSE members are also welcome to join the Empowering Women Yammer community to share your positive news and examples of empowered women leaders in systems engineering – we would love to hear from you! Please feel free also to follow up with the EWLSE leadership team with greetings, queries, comments or stories to ewlse-leaders@incose.net.

Empowering Women Leaders in Systems Engineering (EWLSE), in collaboration with three editors, 25 letter writers from 9 different countries, and an awesome INCOSE marketing, communications, and headquarters team are happy to announce that the "Letters to My Younger Self: How Systems Engineering Changed My Life" is available for download by the public at: www.incose.org/ltyms. Please do take a look and consider sharing with others whom you think might be interested in learning about our love of systems engineering through the engaging thoughtful reflections on 25 unique systems-focused journeys.

EWLSE sponsored a workshop "Emerging Trends in Engineering Leadership" at the Oct 4-6 American Society of Engineering Management conference in Tampa, Florida, led by Alice Squires and G. Todd Vanek. The workshop focused on areas of



emerging trends as outlined in the newly released "Emerging Trends in Systems Engineering Leadership: Practical Research from Women Leaders". Workshop attendees discussed how technological trends, social trends, and shared (technological and social) trends have driven change in competencies, and especially essential (soft) skills, that leaders need to be effective in today's world. Workshop attendees also discussed challenges they were currently facing in leadership; and brainstormed enablers and inhibitors in the workplace. As the final outcome, workshop attendees walked away with one short term and one long term action that they personally intended to pursue, and were encouraged to develop an engineering leadership vision. Anyone interested in a copy of the final report, please email alice.squires@incose.net.

On October 20-22, 2022 EWLSE, with support from Outreach, sponsored an INCOSE and EWLSE booth at the Society of Women Engineering (SWE) annual conference in Houston, Texas. The hybrid event was attended by more than 16,000 registrants. In person booth visitors were interested in learning more about systems engineering, INCOSE, intern and company positions in systems engineering, and the INCOSE SEP certification process, as well as how to get involved in INCOSE in their local areas. VJ Jhaveri from Outreach was the booth leader with support from Pallavi Jhaveri, Heather Feli, Tony Williams, and Alice Squires.

For EWLSE related feedback, suggestions, or question, please email: ewlse-leaders@incose.net.

EWLSE America
Erika Palmer, Americas Sector Lead

EWLSE will be holding a reception at the INCOSE IW 2023. This will be a Diversity, Equity and Inclusion (DEI) / EWLSE combined networking event. We will hold it after we have an EWLSE working session and an EWLSE outreach session. The topics for these sessions will be posted in the IW program, but we will be discussing the Emerging Trends book during the IW sessions. Stay Tuned for the INCOSE IW 2023 EWLSE events.

In other news, EWLSE Americas Lead will be the new Deputy Technical Director INCOSE TechOps!

EWLSE EMEA
Anabel Fraga, EWLSE EMEA Sector Lead

In the EMEA sector, EWLSE and DEI are working to create a network of interested women and men to promote the mentoring system in EMEA for women in Systems Engineering.

STEAM activities promoting Systems Engineering in Elementary Schools and High Schools will start next year in Spain. But the focus will be Elementary Schools because High Schools already have a network of institutions promoting STEAM and SySTEAM in Spain.

Anabel will be the Technical Program Co-Chair for IS2023, in Hawaii, and the Technical Program Chair for IS2024, which will be held in France. Also, she is the Event Chair of the INCOSE EMEA WSEC 2023 event to be held in hybrid mode in Seville, Spain (www.incose.org/emeawsec2023).

A presentation for promoting Systems Engineering and EWLSE will take place in Madrid on November 30th. Anabel will present the advances in Systems Engineering in Spain and the efforts in EMEA and EWLSE to engage practitioners and disseminate the value of the discipline.

Cohort 6, Erika and Anabel, who are part of it, will make a presentation on dealing with a very complex projects and the possibilities of developing a feature in the project culture that could help facilitate challenging communication and overall project work. November 9th at 5:00 pm CET, an interactive workshop presenting Cohort 6's IS 2022 poster content took place. On November 30th, Anabel presented INCOSE Vision 2035 and values on the IV Iberoamerican Congress on Systemic Solutions for Organizational Transformation in Madrid.

Anabel started to collaborate with the Technological Woman Association of Spain, finding pilot elementary schools for promoting STEAM initiatives and books. Additionally, the INCOSE Spain Chapter is collaborating with SESGE to create a summer school about Systems Engineering next May 2023 in Madrid, Spain.

EWLSE Asia Oceania
Stueti Gupta, Asia Oceania Sector Lead

Plans are underway to offer the "I Am Remarkable" Google-based training event at one or more INCOSE related events in 2023, with our own Stueti Gupta as host and facilitator of the training. Stueti previously completed the requirements for this workshop and is ready to share the experience with the INCOSE community. Stueti is also leading plans for EWLSE related activities to be held at AOSEC 2023. Please stay tuned!

Joint Actions

The EWLSE leads are now part of the INCOSE Technical Institute of Leadership's (TLI) journey in preparing to become the best version of themselves in continuous collaboration with the TLI.

We are preparing events for EMEA WSEC 2023, IW 2023, IS2023, and AOSEC 2023. We will keep you posted!

Special Thanks

EWLSE thanks SPEC Innovations and Caltech for their support as the EWLSE Sponsor.

EWLSE Webpage

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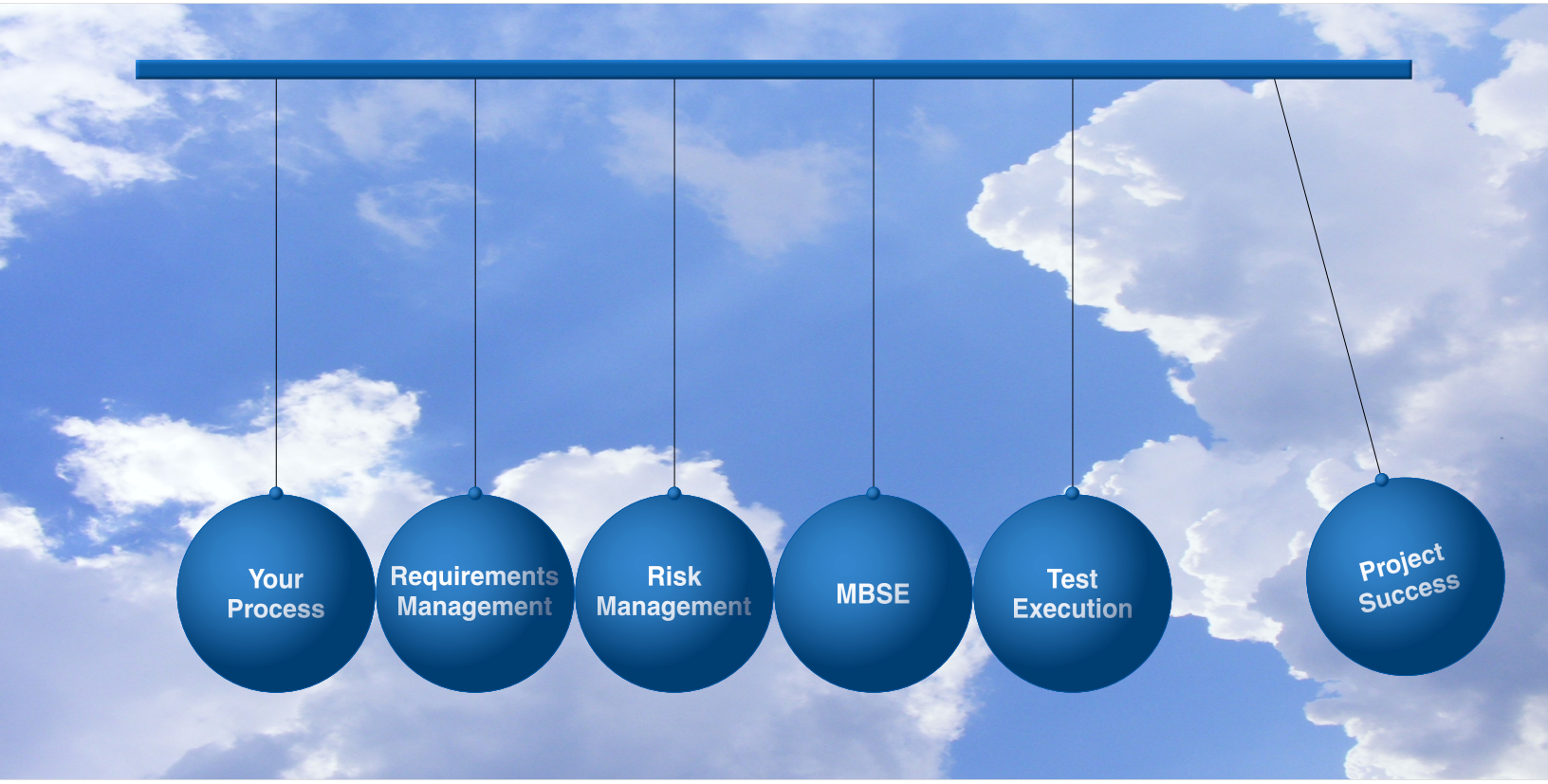

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The Value of INCOSE Certification for Systems Engineering Career Development

As a Systems Engineering Manager, Coach and Trainer for 10+ years, I strongly value and appreciate the achievements made by INCOSE in establishing the systems engineering certification program.

Firstly, it can be particularly challenging and confusing for both junior and senior systems engineers to deduce, based on their skills and experience, where they are on the "Systems engineering professional development spectrum". There are many difficult questions to answer such as:

- What skills do I need to further my career?
- How do I progress into more advanced systems engineering roles?
- What do systems engineers in other industries know that would be useful for my projects and organization?

Secondly, irrespective of the age or experience of a systems engineer, there always exists the need to improve in a competence area. I often say, "Systems engineers never stop professional development". The discipline is so broad that any one competence area could take a lifetime to master.

The INCOSE certification program – including INCOSE's Professional Development Portal (PDP) - effectively enables and supports continued professional development for systems engineers across all industries, especially those needing the skills, methods, and tools to succeed with developing and supporting complex technical systems.

Furthermore, it offers a holistic assessment of competencies, which considers knowledge, performance, and hands-on experience, encouraging versatile practice and improved performance both of which can result in leveraging you into more senior/technical and leadership roles. Attendees of our SE courses often remark that by practicing Systems Engineering in moderated workshops, they are far more able and confident to apply systems engineering in their projects.

ASEP and CSEP are the most industry-recognized accreditation you can gain as a systems engineer. If you are considering having your systems engineering capabilities formally recognized, my advice is choose INCOSE.

By Mike Johnson, Co-Founder SE-Training GmbH

Certification Webpage

INCOSE Certification is valuable because it is independent and because it defines a progression throughout the career of an engineer.

Independence matters so that the certification requirements and levels do not change frequently within or across organizations. The stability and global perspective that have gone into defining the certification requirements make them a good framework upon which organizations can depend. The progression is useful in distinguishing between capabilities of engineers, to know who can be a valuable contributor on a team versus a leader, and who is capable of working independently on a smaller project or as part of a group. Together, the independence and progression define the path to systems engineering leadership for engineers across a broad variety of domains and cultures. New graduates can look ahead at their future certification levels and choose their work and professional development activities to prepare them to qualify for ESEP.

INCOSE Certification is a valuable program for the entire engineering community, as it helps guide the next generation of chief engineers. It is also making a difference, particularly through Academic Equivalency, by inserting systems engineering awareness in the education of engineers across a variety of disciplines. INCOSE is growing in global awareness, as is the demand for systems engineering training. All of this is moving INCOSE toward achieving its vision of "a better world through a systems approach."

Courtney Wright, INCOSE Certification Program Manager

CSER 2023

conference on systems engineering research

20 YEARS

Systems Engineering Toward a Smart and Sustainable World

March 16-17, 2023

KEYNOTE SPEAKERS

Dr. Victoria Coleman

Chief Scientist,
United States Air Force

Dr. Rick Kazman

Danny and Elsa Lui Distinguished Professor of Information Technology Management, University of Hawaii

Ms. Emily Kagan Trenchard

Vice President, Digital and Innovation Strategy, Northwell Health

Dr. Merve Unuvar

Director, AI Platforms and Automation Thomas J. Watson Research Center, IBM Research

Dr. Kathryn W. Jablokow

Program Director, National Science Foundation & Professor of Engineering Design and Mechanical Engineering, Penn State

The Conference on Systems Engineering Research celebrates its 20th year where the first conference was held: Hoboken, NJ. This premier conference focused on research across the systems engineering community brings together hundreds of faculty, researchers, and students to share results and ideas.

CSER.INFO/CSER2023

Visit the CSER website to learn more about the conference.

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SYSTEMS ENGINEERING RESEARCH CENTER

Building STEAM: The Continuing Work of the INCOSE SySTEAM Initiative

The holidays are nearly upon us, and the genteel and subtle (or sometimes, boisterous and not-so-subtle) encroachment of festive décor into, onto, and around neighboring homes and shops as the season progresses provides a steadfast reminder that 2022 will soon be coming to a close.

The end of the year always provides ample opportunity for partaking in the traditional few sparkling scintillas of annual retrospection, usually in equally scintillating company. While SySTEAM has not always been known to be a stickler for custom and traditional values – especially given SySTEAM's commitments to accessibility, inclusivity, and openness to individuals from non-traditional personal and academic backgrounds, including our colleagues & community members in the arts and humanities – looking back on a productive year in the company of colleagues in the broader INCOSE community is certainly a new tradition that SySTEAM hopes to establish for itself in the years to come.

2022: A retrospective

The year 2022 has been a busy one for INCOSE SySTEAM, marking, among other things, a number of milestones and accomplishments for the initiative, including:

- The initiative's first appearance at a formal INCOSE event (the INCOSE International Workshop in January);
- The commencement of SySTEAM's General Body Meetings (GBMs); a series of community meetings – each with a distinct discussion theme – revolving around developing recommendations for integrating systems thinking and systems engineering competencies into education and training;
- The milestone of SySTEAM's 10th community meeting, held on November 10, 2022;
- Formal expansion of the SySTEAM name and mission to explicitly include the arts and humanities alongside STEM and address the significance of interdisciplinary education;
- The launch of the new SySTEAM name/branding and logo (thanks to assistance from the kind folks from the INCOSE Marketing Committee!);
- SySTEAM's debut article in the INCOSE newsletter (in the Quarter 1 issue earlier this year);
- The launch of the SySTEAM webpage (incose.org/systeam) and subsequent bespoke page redesign;
- Contribution of content to the annual INCOSE Impact Statement; and,
- Initial outreach and liaison work with representatives of other INCOSE working groups and professional organizations.

With everything that has happened, it is difficult indeed to believe that INCOSE SySTEAM was founded only just over a year ago. Over the past year, our community has absolutely blossomed, transforming from a tiny group of nary a handful of members into an online global community of hundreds of educators, industry professionals, advocates, and students, all linked via SySTEAM's email, listserv and Discord community hub. It is our hope at SySTEAM that we can not only continue to expand our community in the coming year, but continue to bring our existing community members closer together through a continued combination of community discussions, workshops, and other SySTEAM events.

End-of-year workshop

Our recent November 10th end-of-year workshop was one such event, which provided SySTEAM community members with an opportunity to not only engage in discussions over the course of a more in-depth three-hour meeting session, but to also review many of the discussion points that the SySTEAM community has been probing over the past year. Our community members then condensed these points into a draft preliminary report highlighting SySTEAM's findings regarding:

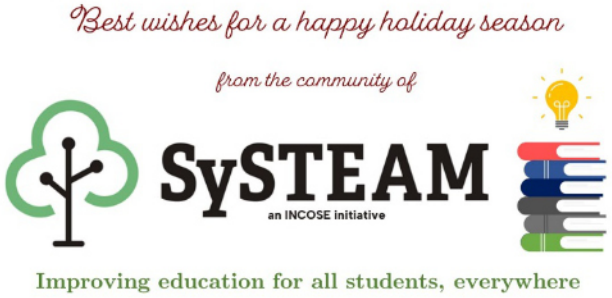
1. the current state of systems thinking/systems engineering education, inclusive of current gaps and issues in education, training, and certification;
2. recommendations for potential long-term solutions to those identified issues; and
3. short-term action items that our stakeholders could potentially consider working towards within the next year.

This preliminary document will serve as a starting point for SySTEAM's work when our community resumes its general body meetings after the holidays; the next SySTEAM meeting is scheduled to be held in the new year on Thursday, January 26, 2023, from 10AM to 12PM Eastern (Zoom registration link: bit.ly/3B8Waf7).

A potential mini-conference

SySTEAM has also been looking for further opportunities to engage its community in the coming year, and is seeking to potentially put together a mini-conference sometime in mid- to late 2023. The idea for the conference is to provide members of the SySTEAM community and other interested individuals with the opportunity to showcase their projects, ideas, and efforts on SySTEAM-adjacent topics in a community of peers, along with providing participants the opportunity for their abstracts to be shared with the broader public via a written SySTEAM report or publication documenting the proceedings.

SySTEAM has an active interest in a wide range of topics adjacent to its mission of integrating systems thinking/systems engineering into education, as well as in topics such as case studies in performing STEM outreach, new ideas for integrating interdisciplinary education into the classroom, ideas for improving industry training/education standards, etc.; the mini-conference would provide SySTEAM with the opportunity for community members to share and discuss conference-style content of anything similarly related to SySTEAM's mission, vision, and goals in a welcoming environment. Individuals potentially interested in attending and/or contributing to a SySTEAM mini-conference (even if they are not currently SySTEAM members) are encouraged to fill out the interest form available at the following Bitly link: bit.ly/3A3J5oa and to join the SySTEAM Discord (bit.ly/3oy1GmF) if they have not done so already.



Looking forward

With everything that SySTEAM has planned for the coming year – what with a fresh start on our general body meeting series, a new preliminary report to work off of, and a potential mini-conference to plan – SySTEAM seems poised to jump off of a tremendously successful first year and into an equally productive second. Thus, even as all of us at SySTEAM reminisce and celebrate the initiative's successes this winter season, our community looks with eagerness to what looks to be shaping into an exciting spring quarter for SySTEAM.

In the words of the poet Shelley: if winter comes, can spring be far behind?

By Caitlyn A. K. Singam, SySTEAM Program Director, caitlyn.singam@incose.net

SySTEAM Wepage

Join the SySTEAM Discord community hub.

Click the following link: https://bit.ly/3oy1GmF or scan the QR code.

SCAN ME

An Introduction to the INCOSE Outreach 'Champion Proposal'

INCOSE Outreach is currently developing the 'Champion Proposal'; a one-page proposal from any INCOSE member with suggestions for a potential collaboration that they would like to create between INCOSE and another organization or professional society.

For members whose cases are accepted, there will be financial support to aid with setting up the collaboration. Cases will be accepted based on their ability to create meaningful connections and building collaboration experiences between INCOSE and the other organization.

Applications are open to all INCOSE members.

What to include in your one page proposal:

- GOALS (identify)
- Describe your project. (a paragraph or two)
- Motivation
- Proposed Actions you will take.
- How you will evaluate whether your action contributed to your goal or not.
- Identify Milestones.
- Estimated timeframe for pertinent milestones.
- Ultimate results you want to achieve.

Please submit you proposals to Julia Taylor on julia.taylor@incose.net

Dr. Julia Taylor, Director for Outreach, julia.taylor@incose.net

INCOSE Welcomes Four New Members to the Leadership Team

Don York

Secretary
(2 Years)

Alejandro Salado

Director for Academic Matters
(3 Years)

David A. Long

Director for Strategic Integration
(3 Years)

Sven-Olaf Schulze

EMEA (Sector II) Director
(3 years)

Opinion: Not For Women Only

I am increasingly disturbed by the trend toward universities rating their faculty's performance based on their adherence to Diversity, Equity, and Inclusion (DEI) principles.

Johns Hopkins University hasn't gone fully down that path yet, sensibly, in my opinion, focusing on diversity and inclusion while leaving the stickier equity element out of the equation, at least for now. The University of Colorado at Boulder encourages units to consider all three DEI elements, but does not require that they do so. Amherst, Miami University, and the University of Michigan all appear to have gone full bore – and those were only what I found after a few minutes searching the internet. I am sure there are more.

Interestingly, none of these schools say how these characteristics will be measured, at least not publicly, but that is the aspect that concerns me most. For those of you who may have been on another planet for a while, **diversity** refers to the range of human differences that distinguish people from one another. Diversity includes gender, race, ethnicity, sexual orientation, age, and religious beliefs among others. It should probably also include diversity of thought and educational background but most definitions that I have seen do not mention those kinds of things. **Equity** is the fair treatment of and provision of access, opportunity, and advancement of all people. It involves eliminating barriers and removing participation gaps to achieve equitable outcomes. **Inclusion** is the provision of practices in which everyone respects, supports, and values others. It encourages everyone to participate equally.

Do not get me wrong. I am all for diversity and inclusion. Equity, too, as long as it is defined in terms of equity of opportunity. I just think we must be careful in how we roll them into the performance evaluation process. When it comes to diversity, the problem is that the professor has no control over the composition of his or her classroom – s/he gets whoever enrolls. So, grading them on the diversity in their classrooms doesn't seem quite right. Rather, metrics, like questions on instructor evaluation forms, should focus on the extent to which the professor showed respect for students from different ethnic and cultural backgrounds, genders, etc. and treated all students equally.

Evaluation of inclusion requires an assessment of whether the faculty member encourages and supports class participation by all students regardless of their backgrounds. This could also be evaluated by including a question on this in the student feedback questionnaire.

Evaluating equity is the tricky one, because most definitions are focused on equity of outcomes, rather than equity of inputs, which I believe is where the focus must be if we are ever to address disparate outcomes. Unfortunately, the professor only has control of some of the inputs, like fairness in exam administration, perhaps by allowing non-native speakers extra time, for example. Other inputs, like student effort, interest, etc. are entirely out of the professor's control. If there are disparities here, any actions to address inequitable inputs taken by any entity other than the students themselves will likely only be minimally effective.

Take as a case in point a minority student I had in a graduate level engineering management course I taught in Spring 2022. S/he had not done well for most of the semester, missing assignments and not scoring well on the mid-term exam. At finals time, the student was sitting with a D+. A few days before the final, s/he contacted me and said that the family had all come down with COVID and asked for an extension. I willingly granted that, extending it to the last day that I could change grades to give the student maximum recovery time. The day of the rescheduled exam, the student contacted me again and said that s/he had a computer problem and asked for another extension. This time, I declined though I did agree

to move the exam to later in the day and suggested that the student borrow a computer from a friend. The time for the exam came and went and no student signed in, so I sent an email asking what was happening. It turned out that the only computer than the student could borrow was a Mac and s/he did not like Macs so decided to take the grade that had been entered. Should I have given the student the class average grade to ensure a more equitable outcome? Heck no! But had I been being evaluated on the equity of outcome criterion, I likely would have taken a ding. Thankfully my school isn't yet "woke" so there were no repercussions.

Maitland Jones Jr. was not so lucky. Jones was fired from New York University after giving low grades to students who performed poorly in his organic chemistry class. This was clearly a case where a professor was punished harshly for perceived inequity in outcomes. Jones was quoted in the New York Post (October 20, 2022) as saying that he had noted a decline in class attendance and participation over the last several years, effectively pointing the finger at inequity in inputs on the part of the low-performing students.

Though I focused on faculty evaluation both because I am an adjunct faculty member myself and because the recent events surrounding Dr. Jones has brought the issue to top of mind, the cautions above can apply equally well in corporate environments, where there have been numerous cases of top executives being fired for DEI-related transgressions. I am not saying that the firings were not warranted. I do not know enough about the details of the cases to judge that, but the number of cases that have been in the news lately make me suspicious that at least some of those fired could be proven to have been victims of woke cultures.

By Heidi Hahn, EWLSE Outreach

Editor's Note: The views expressed in this commentary are the author's own

News From Student Divisions

A new policy for Student Divisions

A new policy (ADC-102) for establishing and sustaining Student Divisions has been approved by the BoD. The policy has the goal of improving the value that INCOSE provides to its Student Divisions by harmonizing the information provided to Student Divisions and improve the visibility that INCOSE has over what Student Divisions accomplish each year.

Existing Student Divisions are encouraged to review the policy as soon as possible to incorporate the necessary requirements to their operations. Student Divisions that do not meet the conditions for sustainment will be considered dormant and will be eventually withdrawn. Please, contact Dr. Alejandro Salado, Assistant Director for Student Divisions to answer any question you may have and/or provide guidance on how to implement the new policy.

A new Discord Server. We have established a new Discord Server dedicated for Student Divisions. With the goal of improving the value that INCOSE provides to its Student Divisions, the Discord Server is envisioned as an enriching community where Student Divisions can network with other Divisions, share and find networking and job opportunities, share and find learning and educational opportunities, and find ways to collaborate with each other, among others. INCOSE oversight of the Server will be minimal. The Server should ultimately be managed and grow as deemed valuable by the students. Please, contact Dr. Alejandro Salado, Assistant Director for Students Divisions to request a link to join the Server.

News for SEANET

Welcoming a new organizing member! After several years of relentless and dedicated service, Dr. Cecilia Haskins has decided to step down as an organizing member of SEANET. She has been instrumental to keep SEANET alive and healthy over the last years. So many PhD students have been lucky to benefit from the workshops organized under her leadership! We are grateful and wish her the best… and her continued involvement as a mentor! But SEANET remains in good hands. Dr. Erika Palmer (Cornell University) has agreed to replace Cecilia and will serve with Dr. Alejandro Salado (University of Arizona) as organizing member of SEANET. Our next event will take place at the Conference on Systems Engineering (CSER) 2023, so stay tuned!

A new Discord Server. We have established a new Discord Server dedicated to SEANET. With the goal of improving the value that SEANET provides to doctoral students, the Discord Server is envisioned as an ongoing extension of the traditional SEANET workshops, where doctoral students can network and interact with each other and with senior mentors in a safe environment beyond their program and department in between workshops. Please, contact Dr. Alejandro Salado to request a link to join the Server.

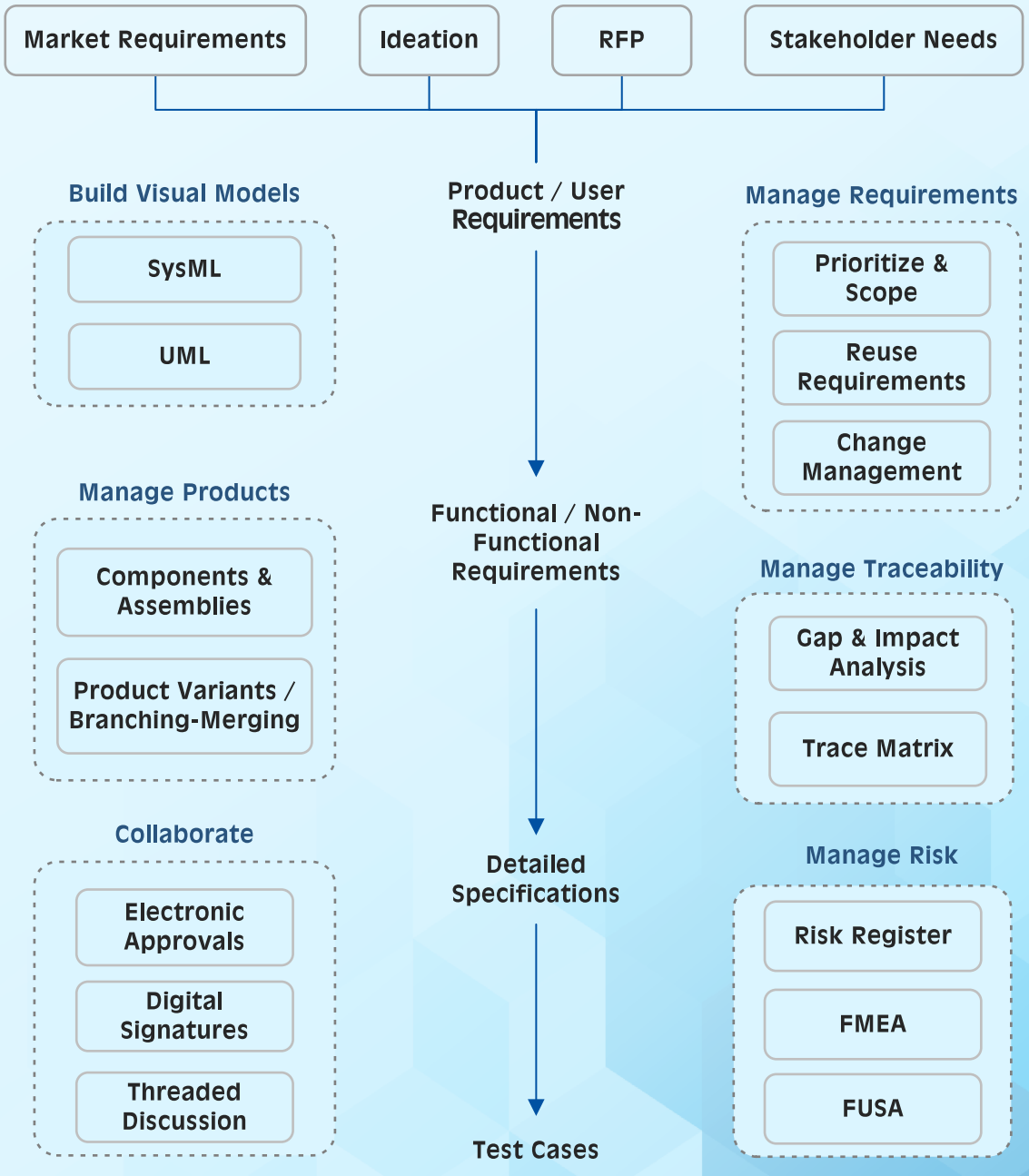
By Dr. Alejandro Salado, INCOSE Director for Academic Matters

Academic Council Webpage

About the Academic Council

Academic Council members form the branch of the Corporate Advisory Board facilitating discussion and exploration of issues relevant to academia and setting a path for achievement with strategic collaborations within INCOSE. The Academic Council is active in advancing the state of the art of systems engineering through academic programs.

Daunting...



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CHAPTER UPDATES

Click on the chapter logo to go straight to their update

Australia Chapter: SESA

SESA Systems Engineering Test & Evaluation Conference 2022 – A Return to the Physical!

SESA SETE 2022 was held between the 12th and 14th September at the QT hotel in Canberra as the first SESA return to physical events, with some trepidation after a three-year COVID-induced hiatus! With a theme of "Enabling Resilience through Disruption" the conference continued a long-standing tradition and was jointly delivered by SESA (the Australian Chapter of INCOSE) and the Southern Cross Chapter of the International Test and Evaluation Association (ITEA).

The conference program was developed around a vision of advancing the understanding and application of Systems Engineering and Test and Evaluation towards enabling the efficient and effective translation of complex concepts into tangible, safe, secure, sustainable, and resilient capabilities, and comprised a mix of key-note presentations, tutorials, presentations, panel sessions, workshops, and off-site visits across Systems Engineering and Test and Evaluation domains.

Keynotes were presented by Major General Kathryn Toohey AM CSC, Head Force Integration and Christopher C. Collins, Exec Director of Developmental Test, Evaluation, and Assessments, US Department of Defense as well as Enrico Palermo, Head of Australian Space Agency, Prof Emma Sparks, UNSW Canberra, Andrew McNaughton, Aczel and the Hon. Senator David Faucett.

Conference registrations came in fast and had to be capped a week-out from the event at around the 250 mark. Delegates were spread across defence, industry and academia. The Tutorial Day was held on the Monday and was also very well attended with over 100 tutorial registrations. In particular, the Beginner's Guide to Model Based Systems Engineering tutorial, was so well subscribed (44 delegates) that it had to be moved to a larger room! This is suggestive of a strong (and growing) interest in MBSE.

As well as a plethora of presentations, panels and workshops, many delegates attended site visits at Canberra Light Rail Depot, NASA's Canberra Deep Space Communication Complex and ANU's Space Simulation Centre.

The welcome drinks in the gala dinner were also well received, with entertainment from the Spectrum Big Band.

Thanks to our keynotes, presenters, participants and to the SESA and ITEA SETE 2022 Organising Committee and Engineers Australia for helping make SETE 2022 a landmark maxed-out return-to-physical systems event – we are now working towards delivering the first return to physical Australian Systems Engineering Workshop (ASEW) in late August 2023.

By Jawahar Bhalla (JB) – SESA President & Thomas Manley – SESA Technical Director.

SESA Website

Japan Chapter: JCOSE

September saw three large JCOSE events take place.

1. The Japan Symposium 2022 hosted by JCOSE took place online on September 6th, with just over 170 participants. With more Japanese content compared to our previous symposium, the Q&A was lively and continued into our Café sessions.
2. VISION FOR A BETTER WORLD presented by Sandy Friedenthal on September 8th. Also a well-attended event, mainly hosted by Keio University; we saw many graduate students join in the conversation.
3. A two-day introductory course on Systems Engineering took place on September 28th – 29th. The course was delivered to JSAE audience. JCOSE will be collaborating again in the new year for a mid-level course on application of Systems Engineering to Automotive Industry.

In October, a "recommended SE reading list" webpage for JCOSE audience was released. We are open to suggestions for addition, especially latest publications!

By Maz Kusunoki, m.kusunoki@jcose.org

JCOSE Website

Singapore Chapter: INCOSE Singapore

East Meets West

On 15th November 2022, by happy coincidence, Cecilia Haskins and Terje Fossnes (both from Norway Chapter) found themselves in Singapore on the same day as Stueti Gupta (India Chapter).

Our guests were all hosted by Yip Yew Seng (from Singapore Chapter) for a view of the Marina Barrage and lunch. Marina Barrage is a systems engineering achievement where a freshwater lake was created from sea waters, leveraging on natural processes and local conditions. The Barrage also functions as tidal barrier for flood control. The building and the lake are also lifestyle attractions.

It was a wonderful opportunity to meet and become better acquainted and to explore similarities in the challenges that INCOSE chapters encounter now in the post-pandemic times. We have agreed to keep in touch and continue the dialogue.

With thanks to Dr. Haskins for her kind words.

By Meng Seng TOH, MengSeng.Toh@incose.net

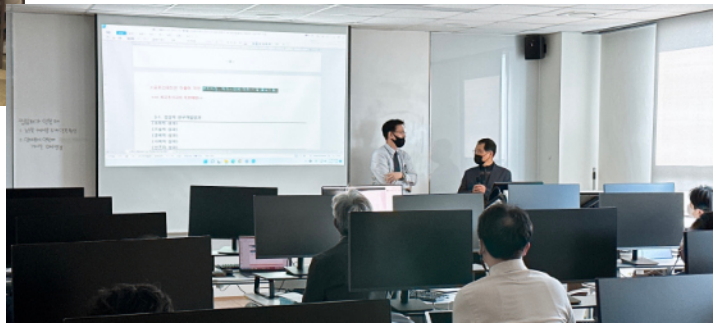
Korea Chapter: KOSSE

The Korean System Engineering Conference was held on November 8-9 in Jeju Island with the theme of "Meeting of Artificial Intelligence and Unmanned Vehicles".

The event feature 6 congratulatory speeches, including the Vice Minister of Industry, and 7 keynote speeches. In addition, there were 22 paper presentations, discussion sessions on 3 special topics and 23 posters were exhibited.

By Joongyoon Lee, leejy@ajou.ac.kr

KOSSE Website



New Zealand Chapter: INCOSE NZ

New Zealand Chapter Increases Membership Through Speaker Series

Question: What country has more per-capita INCOSE members than America?

Answer: New Zealand.

That's according to New Zealand chapter secretary Steven Wallace, Program Lead, Transportation and Infrastructure, for Shoal.

The chapter now has about 50 members – enough to hold their first proper elections.

"We're going to get fresh ideas and fresh blood in there," Wallace said. *"I think that is a really good milestone to show that we're actually getting a really healthy community that people want to contribute to."*

One of the reasons for the success is the breadth and depth of their guest speaker series.

"Over the past six months, we've had great speakers who have talked across the spectrum," Wallace said.

For example, the topic of the May event was horticulture. From the event information:

"Agriculture is facing a period of unprecedented change resulting from the requirement to feed c. 10 billion mouths by 2050, while operating in an environment of labour shortages and increasing sustainability expectations. To meet these challenges many are looking to industry 4.0 technology as a solution, specifically the combination of Artificial Intelligence (AI), Internet of Things (IoT), in-field and digital twins."

The talk explained how the systems engineering and the horticulture industry could increase innovation and scale adoption.

Russell McMullan, General Manager Assurance and Integration for City Rail Link Limited, gave a presentation in August about the systems engineering value proposition.

"I just tried to bring out to the normal systems engineers a different lens on how they can add value and take away pain for their clients," McMullan said. *"That seemed to resonate quite well."*

Wallace said that systems engineering in New Zealand is relatively young.

"It usually refers to the IT sector," he said.

The reality is that people have been doing systems engineering for years, but the practice isn't coined that way. Wallace said the role of the members now is to build up that community and awareness.

By Beth E. Concepción

INCOSE NZ Website

Brazil Chapter: INCOSE Brasil

INCOSE Brazil Chapter 2022 Annual Conference

The INCOSE Brasil Conference 2022 occurred between 24 and 28 October 2022; expanding knowledge and networking with different industries and institutions and with great discussions. The conference took place over five days with two-session presentations. Each session consisted of a 45-minute presentation and a Q&A session. Thanks to the event sponsors, the Capella MBSE Tool offered a free course in which event participants were able to use the tool. The prize recipient was the author of the best-published post on LinkedIn.

Here is a brief description of this fantastic week:

24Oct22 - The evolution of INCOSE Brazil and Systems Engineering's Vision for 2035

In the first session, George Sousa, Systems Engineering co-founder of INCOSE Brazil, talked about "The ten years of creation and evolution of INCOSE Brazil." In his presentation, he identified the main events in the chapter's creation, its alignment with INCOSE International, and the evolution of proposals to accomplish its proposed mission.

The second session presented "Engineering a Better Tomorrow: SE Vision 2035 and Beyond," lectured by David Long. He is the Executive Leader of Blue Holon, a Strategic Systems Thinker, Systems Engineering, MBSE, and Digital Engineering Expert. He rescued the 2025 Systems Engineering Vision and its challenges and compared it to the increasing complexity of the challenges proposed by SE Vision 2035. Due to the explosion of complexities and expectations, there are differences between SE's focus of the past on products and the current one focusing on social, environmental, and economic sustainability. It related this focus shift to the evolution of industry paradigms since mechanization 1.0, mass production 2.0, automation 3.0, and the emerging industry 4.0 of cyber-physical systems. This focus shift means another engineering that allows you to represent all the limited complexity if it is performed in document-based models. The possibility of connecting the engineering lifecycle with model-based and connecting concepts and operations embracing human and machine, model, and data emerge. Finally, he synthesizes responding to 21st-century needs with 21st-century SE, advancing the discipline to be knowledge-based, value-centric, and fit-for-purpose in the collaborative engineering of systems.

25Oct22 - Reinforcement Learning and Cerebral Hemispheres

The day's first speaker was Dr. Ramakrishnan Raman, Ph.D., ESEP, Fellow at Honeywell Aerospace, IEEE Distinguished Lecturer, INCOSE Outstanding Service Award Recipient, and Technology & Systems Leader. The theme presented was "Reinforcement Learning for Behavior Evolution in Complex System-of-Systems." He explained that technological advances drive the integration of multiple modern systems to form complex system-of-systems. There is a pressing need to ensure that individual systems collaboratively and safely operate in a Systems-of-Systems (SoS) context. Reinforcement Learning is a promising approach to inculcate adaptable intelligence in constituent systems to adapt their behaviors in tandem with the evolution of emergent behavior at the SoS level. With a didactic approach, he presented the concepts of Complex Systems and SoS, Reinforcement Learning, and your relationships.

The second speaker was Adail Retamal, Electronic and Software Engineer, CSEP, and Professor spoke

about "The Cerebral Hemispheres and Systems Engineering."

The speaker summarized the importance for Systems Engineers in balancing the relationship between trade-off analysis versus synthesis. He explained how practitioners of Systems Engineering need to simultaneously meet the detailed (analysis) and holistic (synthesis) aspects of the system design, development, implementation, and operation. He presented the theory of neuroscientist Iain McGlichirist who studies how our brain is organized: the left hemisphere as the field of analytical cognition and the right hemisphere as the field of synthetic understanding.

26Oct22 - Systems Engineers

The undergraduate and the Ph.D. Bruna Silva Queiroz is a newly graduated systems engineer from the Federal University of Minas Gerais (UFMG). Her capstone project is entitled "Application of Systems Engineering Methodologies for the Life Cycle of PdQSat I - Academic CubeSat of UFMG." The PdQSat is a project developed by students of Aerospace Engineering at UFMG, a satellite of the CubeSat category. Thus, the application of Systems Engineering aimed to present the methodologies for needs assessment, understanding of the problem space, a survey of the solution, knowledge of risk scenarios, and writing of requirements using the PdQSat project. Exquisite work had applause from the audience, demonstrating how Systems Engineering can be a difference for junior engineers entering the labor market and the academic world.

Ph.D. Jubaer Ahmed, recipient of the highest academic law this year by Montana State University – Industrial and Management Systems Engineering and continues a Post-Doctoral Research Fellow 2022, Colorado State University – Department of Systems Engineering, presented the theme "Human Factors in the Design the Complex Systems." In his speech, he gave the cases of studies of the disasters of Bhopal (1984) and Three Mile Island (1979), explaining the causes of human error. He also explained the goals of Human Factors Engineering, which implies optimizing safety, performance, and satisfaction in the various domains and design considerations.

27Oct22 - Brazilian Navy attends conference: Life Cycle and Mission Modeling

In the first block, the theme "Systems Life Cycle Management" was presented by Lieutenant Commander Rogério Comello Machado, Electrical Engineer, MSc in Systems Engineering at Cranfield University (UK) and ASEP. He showed in detail the concepts, scope, objectives, normative references, and good practices of systems lifecycle management based on technical regulations and the current INCOSE Handbook, pointing out the theoretical concepts with practical examples of his experience as a systems Engineer of the Brazilian Navy. About System Lifecycle Management (SLCM) proposes how the planning, organization, command, coordination, and control of the set of life cycle processes of a system. Thus, SLCM would be responsible for seamlessly all system life cycle processes, integrating them to obtain a cohesive and efficient system.

In the second block, the theme "Mission Modeling used Model-based Systems Engineering" was presented by Lieutenant Diego Custódio Rangel, Naval Architect, and MSc in Systems Engineering by the Naval Postgraduate School and ASEP. He gave highlights of his Master's thesis in which he used the MBSE approach to develop an executable model of the mission of a spatial system integrating the Cameo Systems Modeler tool with MATLAB's Simulink.

28Oct22 - Brazilian Girls Systems Engineers Attend the Conference: "Wicked Problems" and Urban Air Mobility

Daiane Carolina Silva, BS in International Relations from the University of São Paulo, trained in Complexity Sciences and Systemic Thinking from the Systems Innovations Institute of London, and member of the System Dynamic Society in Brazil and the System Innovation São Paulo hub. Daiane presented the lecture "Systemic Thinking Applied to the Resolution of Wicked Problems," in which

she demonstrated the importance of multi-level analysis with real-life cases in Brazil, focusing on critical areas such as education, health, and structural problems. Systemic maps were presented with their respective causing-loop diagrams, allowing the visualization of the influence of each of the variables on the studied phenomena.

In the second presentation, Natalia Ezagui Garcia Rocha, Electronic Engineer at the National Telecommunications Institute (INATEL), a Master's degree in Cybersecurity from the Aeronautical Technological Institute (ITA), MBA and works as a Systems Architect at EMBRAER. She presented the "Application of Systems Engineering for the Design of Urban Air Mobility Systems." She explained that parts of the Urban Air Mobility (UAM) ecosystem could involve complex solutions such as autonomous vehicles, air traffic management, new concepts, infrastructure, and support services.

As can be seen, the diversity of topics made this event a great learning opportunity for everybody who attended. Besides, the participation of the external public was remarkable, especially considering the high level of discussion during the Q&A sessions.

Diego Rangel, Communications Director, INCOSE Brasil, diego.rangel@incosebrasil.org.br

INCOSE Brasil Website

US Western States

WSRC 2022 – Sept 30th -Oct 2nd 2022, Golden, Colorado

Several chapters within the America's sector came together to host the Western States Regional Conference (WSRC) in Golden, Colorado. The WSRC is an annual conference that rotates venues and hosting between INCOSE chapters. In-person attendees were invited to a hike on Saturday morning and a private tour of Dinosaur Ridge on Sunday afternoon

This was a successful event in person and virtually with the attendance of over 130 participants. The theme for the conference was Climb Above the Buzzwords, which we feel we achieved. Participants came from the local Denver metro area, University of Colorado, Air Force Space Command (Colorado Spring) and cadets from Air Force Academy. We conducted a poster session with few students from the Air Force Academy and the University which was very successful. The event had three tracks and around 40 presentations, including keynote speakers.

German Chapter: GfSE

After a long break from in-person events, it was time for a reunion for the TdSE (Day of Systems Engineering). From 16th to 18th November 2022 participants connected and caught up on the newest Systems Engineering topics. The three days were filled with different tutorials, seven tool-vendor projects were introduced, presentations, and social activities.

It was the first time that a workshop for doctoral candidates was offered. Prof. Dr. Lydia Kaiser allowed the opportunity to exchange and discuss the participants' topics. Also, the Social Media Award was awarded for the first time. The three winners received free tickets to next year's TdSE, a GfSE workshop, or the systems.camp. Every year, the winners of the study award are announced.

Besides interesting presentations, a CTO talk about "Systems Engineering and Sustainability – an Undefeatable Team?", Keynotes were given by Dr.-Ing. Jan R. Seyler about "Generative System Design: Can AI build machines?" and Prof. Dr. Lydia Kaiser about "Systems Thinking – The Magic of Systems Engineering".

This year's TdSE was special because the GfSE celebrated their 25th anniversary. On occasion of that, the founding member Ruediger Kaffenberger gave a speech to give an insight into the starting phase and the highlights of the past 25 years. But there was another celebration; the GfSE Working Group Systems Architecture Framework (SAF) had its 5th birthday this year.

Here is what Daria Wilke, Vice Chairwoman had to say about the event:
"For me it was the first TdSE conference as an organizer and I am still overwhelmed by the impressions and the positive feedback. I felt directly very well welcomed; a very familiar feeling. It was so nice to observe how happy all participants were to finally meet and exchange in presence again. Especially I am happy that there were also many young faces and that the amount of women has increased.

Thanks again to Rüdiger for the insight into the past 25 years of the German chapter. I will contribute my part to the Systems Engineering community for the coming 25 years. It was an honor for me to moderate the anniversary conference."

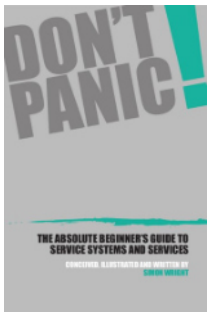
Ruediger Kaffenberger, Treasurer adds:
"I hadn't had the experience of a real Tag des Systems Engineering (TdSE) for four years. So, it was great to be reunited with my fellow systems engineering community and to see many new young faces in the crowd. Our team of organizers was a mix of a few seasoned and a majority of new members but the whole event went through smoothly as we had dearly hoped for our 25th anniversary. We not only had a great and extremely well attended program but took the chance to walk out guests, who in average had less than five years of GfSE experience, through the 25 years of the German Chapter and showed how GfSE is embedded in the INCOSE family of systems engineers."

By Fenja Schulze, INCOSE Intern

GfSE Website

UK Chapter: INCOSE UK

New Publication



INCOSE UK is pleased to announce the release of another addition to the 'Don't Panic!' book series: Don't Panic! The Absolute Beginner's Guide to Service Systems and Services by Simon Wright.

Services and Service Systems are all around us, and in the UK they contribute 80% of its GDP. This new publication shows, using many real-world examples, how an initial understanding of service systems and services can be achieved.

The author, Simon Wright, says "We often forget to incorporate the need for services into our systems thinking. This may be because systems engineers tend to be overly equipment orientated and often miss the service viewpoint to the detriment of the holistic view they are expected to have".

He continues "The good news is that services, and the systems that support them, can be readily analysed and therefore understood by using a tailored set of the tools and techniques that systems engineers often use."

You can buy a copy of Don't Panic! The Absolute Beginner's Guide to Service Systems and Services by visiting the INCOSE UK online store.

INCOSE UK Council Changes

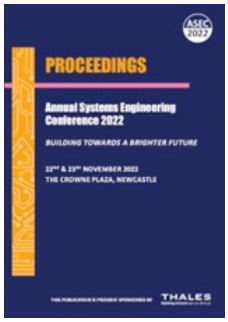
We are pleased to announce that Malcolm Thomas is now President of INCOSE UK. We wish him every success in the role. The role's previous incumbent, Ian Gibson, now moves across to the Immediate Past President, and we would like to thank him for his time and the contributions he has made as President.

We would like to welcome Andrew Pemberton into the role of President Elect and congratulate Jon Holt in maintaining his role as Technical Director.

We would also like to thank Kirsty Akroyd-Wallis, Immediate Past President, for her time and commitment to her role whilst on the INCOSE UK Council.

More information regarding INCOSE UK Council positions and structure can be found here.

ASEC2022 Proceedings Now Available



After a successful Annual Systems Engineering Conference 2022 (ASEC 2022), we would like inform you that the ASEC 2022 Proceedings are now available to purchase from the INCOSE UK online store.

ASEC took place between 22 - 23 November 2022, and the proceedings present the best of the papers from this year's submissions. The printed proceedings will give the option for those who were not able to attend the event to be able to get a taste of what happened at ASEC 2022, and hopefully inspire them to attend a future event. We trust that the proceedings will provide a lasting benefit and fitting record of INCOSE UK's ASEC 2022 – Building Towards a Brighter Future.

By INCOSE UK Secretariat,
publications@incoseuk.org

INCOSE UK Website

33rd Annual INCOSE international symposium

hybrid event

Honolulu HI USA

The Venue

Hawaii Convention Center
1801 Kalākaua Ave
Honolulu, HI 96815 - USA

Dates

Saturday 15 July, 2023
Thursday 20 July, 2023

- From now: Make your hotel reservation
- December 2022: Sponsorship registration open
- March 2023: Registration fees available
- April 2023: Registration open Final program on-line
- June 2023: Virtual platform open
- July 2023: Event (15 - 20 July 2023)

Sponsorship Opportunities

Why become a sponsor?

VISIBILITY

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Access to the latest thinking relevant to the practice of Systems Engineering

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Put a spotlight on your organization's competency in Systems Engineering

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Be associated with the highest culture of professionalism and innovation

SUPPORT

Demonstrate organizational support to INCOSE's mission

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Put a spotlight on your organization's competency in Systems Engineering

INCOSE's Impact

18000+ Members
65+ Chapters
77+ Countries
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Social media

1,950 members | 3,750 members | 470 members | 21,500 members | 3,220 members

https://www.incose.org/symp2023

Artificial Intelligence Systems Working Group

Large Language Models Could Revolutionize AI

Large language models are a new type of artificial intelligence that can learn from exposure to large volumes of text. Rather than being given explicit rules of grammar, word definitions, and principles of sentence structure, large language models simply take in large amounts of text—think all of Wikipedia, thousands of books, and almost all text on the Internet. While we don't ask our children to read the entire Internet to learn to talk, large language models learn in a similar way. By just taking in lots of language and creating elaborate models of how words are used with other words to form text, the model learns enough about language to be able to produce new language in response to a prompt.

Systems engineering approaches can help to manage the complexity of these large language models. GPT-3 is a large language model that was developed by OpenAI. It is based on a Deep Learning approach called a Transformer. GPT-3 can be used to generate text, images (see the image from DALL-E2 above), and other types of data. Transformers work by first representing the data as a series of vectors. These vectors are then transformed into a new vector space. The new vector space is then used to represent the data in a more abstract way. This allows the Transformer to learn how to represent the data in a more abstract way.

Large language models are great for dealing with large sets of text information like documents, articles and reports since they can read and understand them just as a human would. They don't really understand language the way humans do, and they do lack common sense, but they can still perform many tasks that require understanding text.

Once a large language model has read and understood a body of text, it can do many things including:

1. Translating the text into another language
2. Summarizing the text
3. Generating new text based on the information in the text
4. Finding new connections between pieces of information in the text
5. Identifying important concepts in the text
6. Recommending similar documents or articles

Large language models can also answer questions about a text, such as questions about historical or current events, science, philosophy or even cooking. The answers will be based on all of the information on the Internet. Strictly speaking, the language model is not "thinking up" an answer to the question—it is predicting which words would logically follow after the given question, which would of course be an answer to the question. It has taken in enough language that it can respond to an amazingly wide range of requests. I just asked it to write a limerick about AI and large language models and it came up with:

There once was an AI model
So large it could process any text
But it was quite slow
And often got things wrong
So they scrapped it and started anew

As you see, it does better on rhythm than on rhyming. For a more extensive example of a poem, see the wonderful Dr. Suess style poem on Elon Musk at https://arr.am/2020/07/14/elon-musk-by-dr-seuss-gpt-3/.

The MIT-IBM Watson AI Lab is working on a research project to develop systems engineering approaches that will help to manage the complexity of these large language models. They are currently working on creating a new type of data model for these language models. This data model will help us to better understand how these models work and how to control them (https://mitibmwatsonailab.mit.edu/).

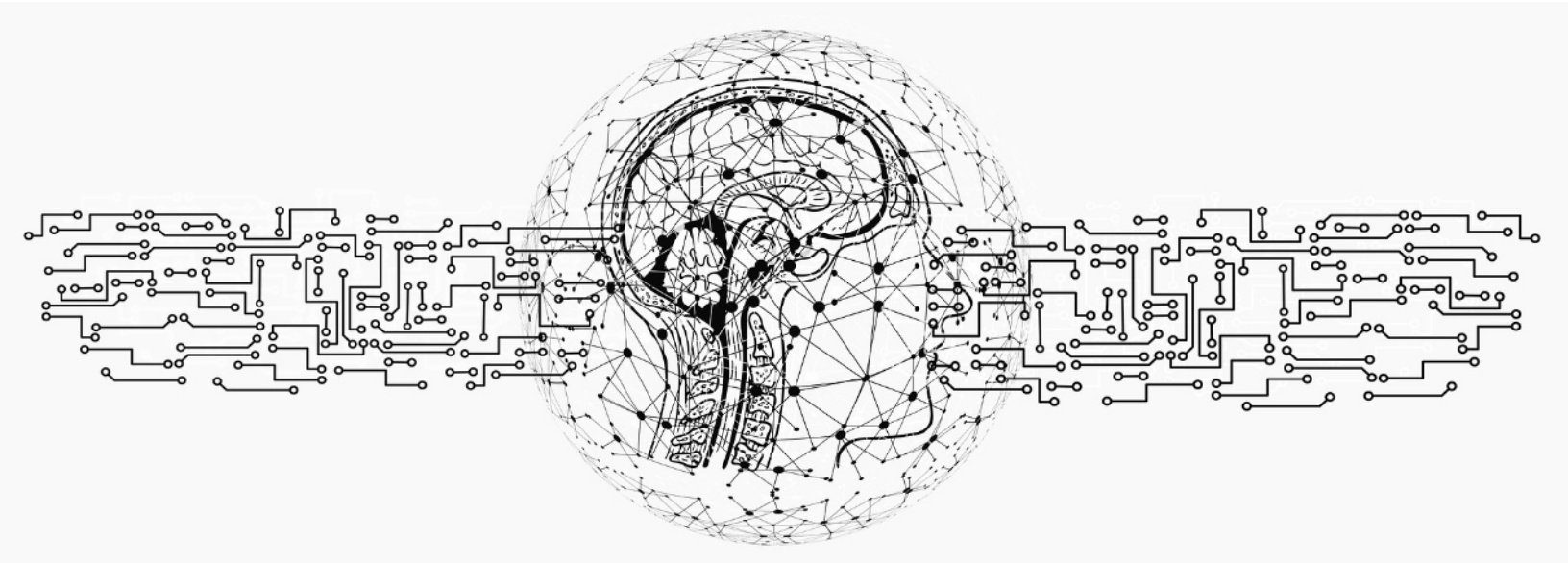
Another surprising discovery about large language models is that they can learn multiple languages and translate among them—even languages like programming languages. Models asked to "translate" a description of software into program code have produced surprisingly good results (https://www.forbes.com/sites/janakirammsv/2022/03/14/5-ai-tools-that-can-generate-code-to-help-programmers/?sh=16969be35ee0).

Since systems engineers deal with large amounts of text all the time, it is likely that large language models offer a technology useful in building applications to process and automate text-based tasks. To try out a large language model yourself, see https://beta.openai.com/playground. Oh, and by the way, about half of the text in this article was generated by the GPT-3 large language model.

Please join us for the AI Explorer events, produced by the AI Systems Working Group. See www.incose.org/ai for all the details.

By Barclay R. Brown, Ph.D., Chair of INCOSE AI Systems Working Group, Assoc. Dir AI Research, Collins Aerospace

AI Systems WG Webpage



Information Communication Technology Working Group (ICT WG)

Join INCOSE's ICT Working Group at IWCE 2022! March 27-30, 2023 Las Vegas NV USA

INCOSE's ICT WG (Information Technology Communication WG, previously Telecommunications WG) is working on its third Memorandum of Understanding with the International Wireless Communications Expo (IWCE).

ICT WG is focused on systems and technologies that support the transfer of information between people and things. Communications networks underlie all technology-based systems - it is the thread that connects us together. Pretty much everyone owns and/or uses at least one communications device (cell phone, laptop, etc.) yet there are very few who manage, maintain, design, or deploy these systems.

ICT WG's focus is to bring INCOSE systems engineering to the critical communications industry by defining frameworks on how to model networks as systems and how to apply SE concepts across the industry.

International Wireless Communications Expo (IWCE) https://iwceexpo.com/ is held annually in the March-April timeframe at the Las Vegas Convention Center. IWCE attracts close to 5,000 in-person participants through training opportunities and its exposition hall which showcases over 200 vendors associated with critical communications products and services.

IWCE's focus is on the people and technologies where voice and data information sharing between people and things is critical to life safety operations. Industries include public safety first responders (law, fire, EMS, SAR, others), emergency operations centers, utility companies, transportation agencies, and others.

INCOSE's ICT WG has a barter agreement with IWCE to share marketing materials and encourage membership and attendance between the two organizations. ICT WG will host us at booth at the event and will offer an INCOSE discount code (20% off) available to registered attendees. We encourage INCOSE members whose work touches communications networks in any way to consider attending the conference. Please reach out to Susan Ronning at susan.ronning@incose.net Co-Chair of INCOSE's ICT WG if you are interested in helping with the booth or plan to attend the event.

By Susan Ronning, P.E., Co-Chair, INCOSE Information Technology Communication WG

ICT WG Webpage

Natural Systems Working Group

Natural systems are those not designed by humans. They include living systems, and systems such as wind, water and geology.

The Natural Systems Working Group is dedicated to advancing the use of natural systems inspiration in products, processes, and projects. It was started in 2013 by George Studor, a NASA engineer who felt that the work of systems engineers would benefit by using inspiration from nature.

Inspiration from natural systems has been used in thousands of successful products. System engineers can gain advantage by using it to improve their projects, practices, and products. See the NSWG primer for details.

The NSWG has:

- Presented webinars from leaders in the field.
- Connected SE practitioners with academics.
- Conducted joint sessions with other WGs.
- Collaborated with NASA in conducting biomimicry conferences.
- Created material for the upcoming SE Handbook.
- Written a primer to help systems engineers implement natural systems inspiration.
- Served as a meeting place for diverse communities involved in the area. These connections have led to joint projects and collaborations.

By the time you read this, we will have moved our webinar recordings to the NSWG internal page so that all INCOSE members can view them. They range from experts in the field to the application of NS tools and techniques.

In 2023 we plan to:

- Continue with our webinar series.
- Present tutorials on natural systems for systems engineers.
- Explore how models from nature can benefit SE modeling and design activities.

Please visit our page, connect on Yammer, and send a note to get connected! We look forward to your participation. Email us at nswg.info@incose.net

By Curt McNamara, Natural Systems WG Co-Chair, curtmcn@gmail.com

Natural Systems WG Webpage

The Professional Development Portal (PDP)

Providing Systems Engineering Learning Resources

The Professional Development Portal (PDP) is a comprehensive solution for Systems Engineers and other professionals who want to enhance their systems engineering knowledge and skills. The PDP Minimum Viable Service (MVS) was complete on 27 July 2022, and the Initial Operating Capability launched on 3 October 2022 (www.incose.org/pdp). The main initial capabilities available were the ability to (1) conduct a competency self-assessment based on INCOSE's System Engineering Competency Framework (ISECF), (2) browse and search the PDP Catalog to find needed learning resources, (3) Save browse/search results on their "bookshelf," and (4) provide feedback.

But that is just the starting point! More capabilities and additional content are planned to provide an even better resource as the comprehensive solution to enhance systems engineering knowledge and skills.

If you haven't had the opportunity to check out the PDP and are not sure what to do when you do, each page has basic information describing how to navigate on that page. Because everyone learns differently, the PDP provides this information in four different ways: webpage text, downloadable detailed instructions, downloadable FAQs, and short 5-10 minute videos.

The PDP is working towards Full Operational Capability at International Symposium 2023 in July. In order to get there, these capabilities are the planned to be completed before the International Workshop 2023 in January:

- A PDP & Certification page describing how the PDP can help users achieve their certification and provide PDUs for certification renewal;
- The ability to download and complete a 'Professional Development Completion Report' to submit to their managers;
- A 1 to 5-star feedback capability to rate the learning resources. Then the resulting 5-star resources can be included in the trending learning resources section on the home page;
- The ability to sort learning resources on the three new pages within the bookshelf (Just Added, In Progress, and Completed);
- Additional search capabilities to search by media format, cost or not, and language, including the ability to save searches and browsing filters;
- Including the systems engineering heuristics content created by the INCOSE Fellows as learning resources in the PDP Content Catalog.

The PDP is an agile service, so new capabilities will continue to be added even after the Full Operational Capability. Keep checking the PDP. In the PDP Operational Status section just below the banner on the Home Page, we will list new capabilities when they are added.

Content can be added at any time. The MVS was created with primarily INCOSE Products available to all members on INCOSE Connect, i.e., the main INCOSE webinars, the GfSE (German) Chapter webinars, some working group tutorials, every page of the Systems Engineering Body of Knowledge (SEBoK), plus some textbooks and International Symposia papers. Since then, the PDP has added micro-courses from Worcester Polytechnic Institute (WPI) for their Systems Engineering Awareness Digital Badge, courses from the Defense Acquisition University (DAU), courses from certification training providers, and other learning resources. For content to be discoverable in the PDP Content Catalog, the PDP Team will work with content providers to classify (or tag) their learning resources per the PDP Taxonomy.

If you are interested in providing content, please contact the PDP Project Manager Kirk Michealson at kirk.michealson@incose.net.

To learn more about the PDP and provide input on what the PDP should include in the future, please join us at the International Workshop in Torrance, CA from 28-31 January 2023. The PDP Team is planning to conduct three workshops.

1. PDP WORKSHOP # 1 – *"Getting to Know the PDP"* Professional Development and You, a "Hands-On" Demonstration
2. PDP WORKSHOP # 2 – *"Future Capability Needs for the PDP"* What capabilities would users like to see after Full Operational Capability (FOC)?
3. PDP WORKSHOP # 3 – *"Providing Content for the PDP"* Getting involved with the PDP by providing content

You can check out and experiment with INCOSE's Professional Development Portal at www.incose.org/pdp. Remember, the PDP is your resource center for professional development. If you have any comments, questions, or recommendations, you can enter feedback (bottom left of each page on the PDP) or you can send an email to the PDP PM Kirk Michealson at kirk.michealson@incose.net.

By Kirk Michealson, PDP Project Manager

Access the PDP

Social Systems Working Group

Social Systems Working Group Leadership Team Creates New Pathways

The old saying "too many cooks spoil the broth" does not hold true for the three-person leadership team of the Social Systems Working Group. In fact, the co-chairs -- Shamsnaz Bhada, Charlotte Dunford, and Dana Polojärvi -- are making it work since they joined together in June 2022.

"It seems to be working well," said Polojärvi, Professor at Maine Maritime Academy. *"We are making progress on all of the things we set out to do."*

One of those things is the Social Systems Primer. It has been slower going than they would have liked, however.

"There's no existing literature that we can find," said Dunford, Project Systems Engineer at Rolls-Royce. *"We can't write the primer if the fundamental research hasn't been done."*

They have been working on various journal articles to help build the literature resource.

"Social systems engineering is a new discipline in many ways," Polojärvi said. *"Our goal is to provide outreach, to provide a center where people can come and help us articulate what the outcomes might be, what the processes and techniques of social systems engineering might be. That's what the primer is for."*

In addition, they are seeking to collaborate with other groups such as Human Systems Integration and promote a larger conversation about the role of social systems in engineering.

"All engineering is social," said Bhada, Assistant Professor of Engineering, Worcester Polytechnic Institute. *"Of course [engineers] have to be technically aware but the social skills [are] what make or break a project. Understanding of the social system they are in is also super important. That's why I feel it is essential to investigate and curate these skills, research methods, techniques for INCOSE."*

"There's another side to that story from my perspective. I come to this group from outside of engineering. I'm a designer by training and a system dynamicist," Polojärvi said. *"Very often engineers are not included in the solution to [social systems problems] through policy. I find that the systems engineering policy problem-solving process is very useful to solving complex systemic problems of any kind."*

Polojärvi said the Social Systems Working Group is important in both of those directions: helping systems engineers use social systems thinking and also use systems engineering to help solve large social systems problems.

Dunford agreed. *"Engineering is something that is done in teams to meet human needs,"* she said. *"We need to better integrate the social sciences in with engineering practice like the natural sciences. If we could learn what other applied scientists do – particularly in healthcare – that would be really good to learn from them."*

By Beth E. Concepción

Social Systems WG Website

What's Happening with the INCOSE Website These Days?

As INCOSE members, we're all familiar with the INCOSE website, www.incose.org. It's where we originally joined this global community; it's our portal to INCOSE's content, resources, and collaborations, and it's our official "front door"—the face that we put out to the world. In short, it's an important and highly visible piece of INCOSE's brand, identify, and culture.

What you might not know is that, while INCOSE.org is a long-standing and reputable source of truth for systems engineers, it is also always changing. This constant evolution of INCOSE content is managed and maintained by a wide-ranging group of volunteers, elected and appointed officers, contractors, and employees. It is truly a group effort.

Upgrades and updates to the website are a key component of INCOSE IT's Community Transformation Project. Over the years, we've heard a lot of feedback from INCOSE members and non-members alike about the website. The INCOSE IT team is currently working with our many stakeholders and partners to vision, plan, and execute a set of strategic enhancements to the website and we're excited to give you a glimpse of those below. Because of the scope, scale, and impact of these enhancements, we're rolling them out in phases, and in close coordination with the content and page owners. We're grateful, in equal measures, for the INCOSE community's patience, feedback, and assistance … please send it all our way.

A Modern Set of Tools & Templates

A website is a bit like a kit of Legos – no matter what you build, the final product will still look like its component pieces – unless you do a LOT of custom work, which takes time and money. In the case of the INCOSE website, the component pieces include native and custom widgets and controls, standardized content and style blocks, and a curated set of colors and text styles. Our web platform, Sitefinity, also includes a content management system (CMS) to store and organize the images and documents that are presented on the website. With these basic pieces, a user can build a page that looks and feels like it belongs within the page family.

We've updated this kit of parts to reflect a simple, modern design executed in INCOSE's signature colors and style. These page elements are now available to all INCOSE webmasters and the IT department is glad to provide assistance and resources to members who want to know more.

Intuitive Site Navigation

Being able to intuitively find the information you are searching for on a website is important. Today, seasoned visitors to our site will often head straight to the "hamburger menu", the three little horizontal lines on the top right of the homepage, to navigate to their location of choice. They know what they want, and they know how to find it and that's great. For our website update, we'll be moving away from the hamburger menu towards

a more visible navigation bar embedded in the header of every page. This type of navigation is a modern website standard and we're confident it'll help our members and visitors navigate the website with ease.
To inform this updated navigation, the INCOSE leadership team has engaged in a set of investigations, discussions, and exercises aimed at eliciting how to improve the overall organization and navigation of the INCOSE.org website. The findings from those explorations have coalesced into our plan for a new navigation bar with major content groupings that clearly reflect INCOSE's priorities, organization, and communities. Watch for this enhanced navigation on the INCOSE website in the first half of 2023.

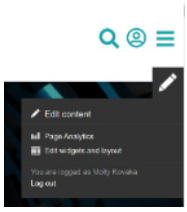
Working Group & Chapter Page Refresh

INCOSE's Working Group and Chapter communities are the lifeblood of collaboration and production within the organization. This is where engaged volunteers get together to do hands-on work, develop new products, or learn more about SE together. As such, each group deserves a nice spot on our website to highlight their mission, share their celebrations, and connect their members.

As of mid-November, each active Working Group and many Chapters have been provided with a draft page in the new INCOSE Web page style, populated with current content. To maintain those new pages, the IT team has trained several cohorts of volunteer webmasters from the communities on basic website editing skills. Training was offered in five different hour-long training sessions in August and November, with recordings available to all members. Now, it's up to the chapters and working groups to refine their draft pages into final versions and work with IT to get them launched. We're excited to see what you come up with!

Because of the sheer number of pages, we are executing the community webpage refresh project in phases. The rest of the Chapters and all other organization, community, and initiative groups will receive new pages and webmaster training in Q1 and Q2 of 2023.

Role-Based Editing Permissions: The Big Pen

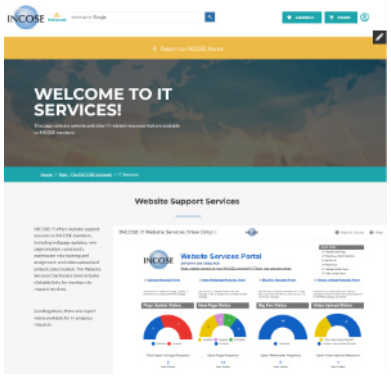


With each new page we're developing, we're offering the content owner the option to become a webmaster and to "hold the Big Pen". They are then assigned an editing role specific to that community and the communities pages, so that they can have full editing rights on their own pages without being able to edit other members' pages.

The Big Pen is a reference to the icon (actually a small pencil!) that appears on the righthand side of INCOSE webpages when a webmaster is logged into their profile. Webmasters can click the icon on their own pages as a shortcut to access the editing menu.

Webmaster training resources and a link to request webmaster permissions are both pinned in the IT Yammer community page.

IT Website Services



With all of the activity going on these days on the website, the IT team recognizes the need for an organized method to field and track requests for all types of website services, from simple corrections, to issuing permissions, to developing entire new webpages. We've launched our new Website Services Portal to provide access and insight into website-related requests. It can be accessed on the IT Yammer community in the Pinned links section, or by visiting our new IT intranet page at incose.org/inet/it-services. But please make sure you're signed into your profile on the INCOSE webpage, since it's a members-only intranet (iNet) page.

By Molly Kovaka, INCOSE IT Project Manager

INCOSE Mentoring Service

INCOSE has initiated a pilot mentoring service which will run from December 2022 to May 2023. INCOSE is seeking both mentors and mentees, so please enroll if interested!

Background: Since mentoring can be a vital component of personal professional development, INCOSE is starting a central pilot mentoring program to match mentees with a mentor. The purpose of the pilot is to check and collect feedback on the process, as well as initiate new or extend existing mentor/mentee relationships. The pilot mentor/mentee matching system is designed to assign one mentee per mentor entry.

The planned schedule for this effort is:

- November 2022 - Recruit mentors
- December 2022 - Open pilot to prospective mentees
- December 2022 to May 2023 – Run pilot program
- February 1, 2023 - Send out first survey to obtain mentor and mentee feedback
- April 1, 2023 - Send out second survey to obtain mentor and mentee feedback
- June 1, 2023 - Send out final survey to obtain mentor and mentee input for revisions to the mentor matching program
- July 2023 - Present pilot results at the INOSE Symposium
- August 2023 - Launch INCOSE mentor matching program

The process used to match mentors and mentees is as follows:

1) When each mentor registers, they are asked a few questions. Each mentor is asked to provide a short (5 - 15 line) summary of what they want to offer as a mentor. Each mentor is also asked what mentee background they are willing to accept. The mentor may select one or more of the following possible backgrounds:

a. a student
b. a person transitioning into systems engineering from another field
c. a systems engineer with under 5 years of experience
d. a systems engineer with 5 or more years of experience

2) When a mentee registers, they are shown only the short summaries of all available mentors who are willing to mentor a person with their background. Names are not communicated until a mentor accepts a mentee's request. The mentee then selects one mentor to request.

3) An email is sent to the requested mentor, giving them a week to either Accept or Decline the mentoring request. If the mentor does not answer within a week, the request is automatically declined.

4) If the mentor accepts, email is sent to both mentor and mentee congratulating them on their new mentoring relationship and giving them each other's email address. Then both are sent feedback surveys on the dates shown above.

5) If the mentor declines, the mentee is notified that the requested mentor is not currently available and is shown a list of available (remaining) mentors and asked to make a new choice.

There are already mentor-mentee pairs in INCOSE, including those paired through the past EWLSE program and TLI. The pilot program offers these existing pairs the opportunity to participate in the pilot by registering, and they will then be asked for feedback on the schedule above.

Action: If you are interested in the mentoring program, go to the INCOSE Mentoring webpage at www.incose.org/mentoring, and take one of the actions below. Note that you must log into the INCOSE website for the links on the website to work correctly.

- Volunteer to Mentor
- Request a Mentor
- Register Existing Mentoring

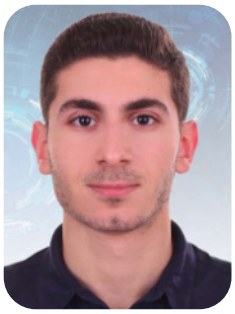
If you have any questions about this mentor matching pilot program, please contact the leads above. Thank you tremendously for considering this opportunity to help INCOSE!

INCOSE Mentor-Matching Pilot Team:
Heidi Davidz, Dorothy McKinney, Alice Squires, Don Gelosh, Eric Specking, Kirk Michealson, Richard Beasley, and Shakila Khan.

By Heidi Davidz, Team Lead,
Heidi.Davidz@incose.net & Dorothy McKinney, Implementation Lead,
Dorothy.McKinney@incose.net

Mentoring Webpage

The INCOSE Internship: A Great Way to 'Get a Foot in the Door'



When you're an intern, it can be hard to see the big picture. You're focused on a project—and that's good! However, you also want to make sure that what you're doing is useful and meaningful. That's where the INCOSE internship program comes in.

The INCOSE internship not only allows students to learn about the organization and develop their skills and knowledge, but also gives them the opportunity to build their professional network. Interns can expect to network and work with Systems Engineering professionals within the organization, helping them to form strong professional connections.

INCOSE holds two internship programs per year. The first session is held June through August, and the second one December through February. The program is open to second-year or beyond engineering students. This summer, INCOSE welcomed two interns: Anthony Abi Badra and Mrunmayi Joshi.

Anthony is pursuing a Master's of Science in Aerospace Engineering at ISAE-SUPAERO in France. He is majoring in Systems Engineering. His current research focuses on applying a Model-Based Systems Engineering (MBSE) approach to formalize the mission of an Unmanned Aerial Vehicle. He holds a Bachelor's Degree in Mechanical Engineering and has experience in both the mechanical and aerospace domains. He has also worked in business development.

When asked why he chose Systems Engineering, Anthony replied: *"Systems Engineering provides the big-picture view with an interdisciplinary approach. The more I read about it, the more I saw that this is the major that fits me best. In my Systems Engineering program, I am learning how to develop, improve, and optimize a complex system, how to use systems engineering methods and processes, how to assess and make a decision by taking into account customers' requirements and functional and non-functional constraints. In addition to that, I am also developing and sharpening my soft skills such as team building, communication skills and leadership skills."*

Mrunmayi is an Associate Systems Engineering Professional (ASEP) and a current Masters student in Aerospace Engineering at ISAE-SUPAERO; majoring in Systems Engineering. Her research interests include MBSE, tool integration with MBSE, and application of Systems Engineering to aerospace systems. She previously worked as a Systems Engineer for two years in the healthcare domain, and interned as a Production Engineer in automobile domain prior to her Master's. She has a Bachelor's Degree in Mechanical Engineering.

"I was working as a Systems Engineer prior to my Masters so that's where I really got to know about INCOSE," she says. "I went through the INCOSE Handbook to learn more about Systems Engineering and I gradually got to know about certification and the activities that INCOSE does. Then when I came to Toulouse for my Masters, I learned that INCOSE is pretty well known here and our university does support certification."

Mrunmayi worked as a certification intern during her two months at INCOSE. Commenting on her experience, "I learned a lot about systems thinking as a whole," she says. "I have heard that it's something we can process by starting or learning, so I think internships like this could

really help aspiring systems engineers to develop this skill set."

Anthony encourages students who are interested in Systems Engineering to apply for the INCOSE internship program.

"If I had the option to do the internship again, I would definitely do it," he says.

Learn more about the interns and their experience at www.incose.org/internship

By Anthony Abi Badra, INCOSE MarCom Intern

Internship Webpage

INCOSE MarCom Welcomes a New Intern

Introducing Fenja Schulze

My name is Fenja Schulze and currently, I am doing an internship in the Marketing and Communications department. I am a student in the field of International Business Studies at the Hochschule Harz in Wernigerode, Germany. Since my third semester, I chose to specialize in International Marketing, International Management, Planning and Organization, and Consumer Goods Marketing. Throughout my studies, we did a lot of practicing by creating our own products and coming up with marketing campaigns for them, nationally and internationally. It was always fun to come up with new ideas and creative solutions.

In many classes, we had international students from different countries such as Finland, India, and the US; especially during one of my projects which was an international fair. I was able to learn more about their culture. When creating a marketing plan, they were able to give us advice and input about their home countries.

Why an internship at INCOSE?

What attracted me the most, when finding out about the internship opportunity at INCOSE, is that it is an international organization that brings people together from all over the world to learn and create new things. Those aspects are exactly what I also want my internship to be about, learning and creating new things while connecting with people from across the globe. It is also giving me the opportunity to learn more about cultural differences, especially when marketing for different countries, which will be helpful in my future career. Additionally, I get to work on multiple projects that help bring theoretical input from my studies into a real-life context. I can practice my skills with the guidance of experienced people from different nations who can also give me input from a different perspective than my studies.

During the application process, I felt very welcomed and supported which gave me a good feeling and made me even more excited to do an internship at INCOSE. The time at INCOSE will give me a great learning opportunity and the option to share my knowledge from a different country's perspective with experts from different nations.

DAU Chooses INCOSE Foundation as Partner

"Anticipating the future" is the goal of the INCOSE Foundation, with the focus on supporting new members from underserved countries. The Foundation has a new and perhaps unexpected partner in that goal: Defense Acquisition University.

DAU provides ongoing engineering and technical management, program management, contracting, life cycle logistics, business financial management and business cost estimating, and test and evaluation training to more than 200,000 federal employees and military personnel.

DAU's mission is to "provide a global learning environment to develop qualified acquisition, requirements, and contingency professionals who deliver and sustain effective and affordable warfighting capabilities -- a workforce that procures and develops the next generation of equipment for the Department of Defense," according to Tyrone Theriot, DAU professor and department chair for engineering and technology.

Theriot oversees the scheduling, delivery and development of courses and workshops for the Engineering and Technical Management functional area. ETM encompasses Engineering, Information Technology, Production, Quality and Manufacturing, and Science and Technology Management and is responsible for training 80,000 people in this area alone.

What does this have to do with INCOSE?

The U.S. Congress passed the National Defense Authorization Act in Fiscal Year 2022, which directed DAU to support and enhance the capabilities of the faculty. DAU established a rotational program with operational acquisition organizations and extramural institutions.

"The U.S. Congress wanted to ensure that faculty members at DAU go on a rotational assignment every five years for six months to be in tune with the latest and greatest issues that our workforce is facing," Theriot said.

DAU chose INCOSE as an extramural organization partner to support this congressional mandate. *"One of the things that interests me about the INCOSE Foundation is its global outreach,"* Theriot said.

Working with the INCOSE Foundation, Theriot said he hopes to expand the number of INCOSE members from underrepresented countries so they can access and contribute to all the INCOSE resources such as working groups, technical materials and other available content, as well as increasing INCOSE Systems Engineering Professional certifications throughout these countries.

"Expanding INCOSE membership will ultimately benefit the global community of systems engineering professionals," Theriot said. "INCOSE is the conduit for individuals to be able to work together collaboratively regardless of where they are, or what organization they are with. The INCOSE Systems Engineering Professional certification provides worldwide recognition across academia and industry."

John Snoderly, chair of the INCOSE Foundation, said, *"INCOSE represents the cutting edge of Systems Engineering technological excellence and therefore [is] important not only to the Department of Defense, but to industries throughout the world in making the world a better place. The INCOSE Foundation has the same goal of improving our world through the global education of the work forces of the world."*

By Beth E. Concepción

INCOSE Foundation Soiree at IW

The INCOSE Foundation is dedicated to making a difference in people's lives by advancing the development of systems engineering practice throughout the world.

As with many philanthropic organizations, people may not think of us until we announce a round of giving or ask for support through financial contributions. Until the pandemic, we were guaranteed attention at the annual Wine Soirée at IW. As we approach the 2023 IW and the resumption of the Wine Soirée (and who doesn't love a party!) – again generously hosted by the CAB – it seems as if this is a good time to share our activities, plans, and goals.

Our greatest achievement of the last two years has been a thorough strategic examination of how we can deploy our considerable resources to create a global systems engineering community. With the full support of INCOSE, we are launching The INCOSE Foundation Global Systems Engineering (SE) Community program to engage people in geographic regions that seek to enhance their systems knowledge and information but cannot currently afford the privilege of INCOSE membership. **Phase I of our program will make this possible for participants from two universities in Africa and eventually to many regions throughout the world.**

The challenge The INCOSE Foundation Board identified was how to bring systems engineering resources to a broader global community. Currently, fifteen countries represent 95% of INCOSE's membership and Systems Engineering Professionals (SEPs). In addition, the average per capita GDP of an INCOSE member is $54,504, in contrast with the global average of $11,417. In particular, the entire continent of Africa with 1.38B people is represented by 22 members outside of South Africa and with a total of 29 SEPs in Africa (28 of them in South Africa). Similarly, Latin America with a population of 661M people is represented by a total of 17 INCOSE members outside of Brazil and Mexico and with a total of 25 SEPs in all of Latin America (21 from Brazil and Mexico).

The issue is well-stated in a book published by UNESCO. Click here to read it.

Clearly, a broad portion of the world's systems engineering community needs INCOSE resources, and INCOSE needs their perspectives, insights, and contributions.

Several INCOSE Foundation board members have taken a leading role in moving this forward. Jon Wade and Larry Strawser, in particular, have been instrumental in identifying and reaching out to the African Universities and in shaping the internal work to achieve our goals.

We are focusing on the leading academic organizations in nations which have demonstrated interest in systems engineering. As a result, Nigeria and Kenya were identified as the top candidates for Foundation outreach. The following are some of the most promising activities that can be supported by this:

- Access to:
  - INCOSE memberships
  - Webinars and other INCOSE materials
  - INCOSE international conference/workshop registration: presentations, meetings, etc.
  - Participation in technical work groups
  - Online and in-person university programs and courses
  - Professional Development Portal to include the submission of courses
- Joint regional projects with INCOSE members as partners
- Student exchange programs with INCOSE host universities
- Professional opportunities within global corporations

- Personal mentorships
- Annual opportunity for system engineers in those regions to submit work to INSIGHT and/or the SE Journal.
- Participation in the Technical Leadership Institute (coaches and nominees)
- INCOSE Certification for students, faculty, and community members

PATH FORWARD

The Foundation three-phased approach:

PHASE 1: Create an MOU with appropriate academic engineering leaders in the University of Lagos and the University of Nairobi to create a collaborative partnership and determine how to proceed on the list of activities of interest to create a global SE community in Africa. **The Foundation will cover the expenses for 20 participants within the MOU.**

PHASE 2: Allocate the INCOSE Associate accounts to The INCOSE Foundation to allow interested participants to apply as INCOSE Foundation Members (IFM), pay a fee based on their per capita income amount, and be assigned an INCOSE Foundation email address and entered in the INCOSE system. Johns Hopkins and the University of California, San Diego are each prepared to donate 200 Associate accounts to initiate this pool.

Working Group (WG) Membership: Interested participants will be encouraged to reach out to the WG and attend meetings to determine interest. This will allow discussion, collaboration, and sharing information across existing WGs and initiative teams. This supports the goals of the WGs and Technical Operations Initiatives to create products, present panels, develop and review standards along with building expertise and contacts to advance the state of the art, and practice of systems engineering.

Technical Materials: IFMs will have free access to download the SE Handbook and other INCOSE developed technical materials, and INSIGHT can be made available to IFMs as well. Other materials can be made available on a selective basis working with the INCOSE Professional Development Portal.

Other Benefits – Certification: INCOSE Certification is recognized by academia and industry and has the greatest potential to have the largest impact for IFMs around the world. Since we want to ensure that there is a general standard of proficiency in systems engineering for Foundation Members, of course, certifying that knowledge is key. It is imperative to establish a path by which the cost of certification is reduced so that it is accessible to PPP2/3 countries.

The following fees are part of the cost of gaining and maintaining INCOSE Certification:
- INCOSE membership
- Certification application fee
- Knowledge exam fee
- Certification renewal fee

The INCOSE Certification Program recommends that universities in PPP2/3 countries establish Academic Equivalency (AE) to minimize the cost of certification for their students and encourage use of the INCOSE SE Handbook in SE coursework.

PHASE 3: Continue to work with INCOSE and the Board of Directors as the program evolves to develop the mean by which full INCOSE memberships can be made available to all despite their economic limitations to ensure global participation.

IMPLEMENTATION

PHASE 1: Underway. This work is in progress with the MOUs pending approval with the expectation of representatives from these institutions attending INCOSE IW and IS 2023.

PHASE 2: Ongoing. Our objective is to the review, update, and approve the IFM plan at the INCOSE IW 2023 meeting, and kickoff the IFM program at INCOSE IS 2023.

PHASE 3: Continue to work with INCOSE and the Board of Directors as the program evolves.

To this end Courtney Wright has been working with us to establish an understanding of the possibilities for education and AE. This is a bigger project, of course, and an interesting development

presented itself to us which is enabling us to not only gather the information we need for the success of this program but to work with the Professional Development Portal as INCOSE organizes a collection of resources that support foundational knowledge to an INCOSE standard. As we began discussions about how to best serve IFMs, we were contacted by DAU, which has been mandated by the US Congress to place DAU faculty members in rotation at institutions outside of DAU for up to 1000 hours per year. We were invited to present and we proposed a program of data gathering and also project management for the Foundation Member program. Tyrone Theriot (CSEP), Chair of the DAU Engineering and Technology Department selected The INCOSE Foundation as his Rotation and has been working closely with us for several months. His role is fully financially supported by the US Government through DAU, including his participation in the IW. NOTE: SEE THE INTERVIEW WITH TY IN THIS ISSUE OF THE NEWSLETTER.

Ralf Hartman, INCOSE President-elect, has become a strong proponent of the work we are doing to broaden the INCOSE membership to be truly global.

HOW IT WILL HAPPEN

The first cohort of INCOSE Foundation Members will come on board with support from the Foundation and INCOSE. We fully expect to have at least one University represented at IW.

We already have commitments of some funds to support this important work:

- Lorraine Wright has graciously agreed that this activity would be heartily supported by David Wright and is allowing us to designate The David Wright Fund to the Foundation Member project.
- David and Donna Long have graciously agreed to support the project with a $5000 donation/ year for three years from The Jim Long Fund.
- General donations have already brought in $4150.

Our goal is to make this a truly viable project that will endure. You will shortly receive a letter from The INCOSE Foundation asking for your help. We need your help to build a truly global SE community.

The INCOSE Foundation Board believes this program has the potential to build a global community of systems engineers. With Phase I underway, we turn our attention to the immediate implementation of Phase 2 and establishment of IFMs is integral to reaching and expanding the global community of systems engineers and achieving the goals of its strategic program.

WHAT YOU CAN DO

It is your support that makes anything and everything possible. Please make a generous gift to The INCOSE Foundation today by clicking on this link: www.incose.org/about-incose/foundation/donate-now

We think this new program will resonate with CAB companies who have a vested interest in an educated workforce worldwide. In addition to your personal donation, you can help by arranging for us to introduce this project to the appropriate people at your company or academic institution.

We welcome your participation in this forward-thinking project to extend all INCOSE has to offer to ensure success and growth in our Systems Engineering global community.

We believe this new initiative will help to build a global SE community, providing the benefits of systems engineering to a much broader cohort, while expanding the horizons for all systems engineers.

By Holly Witte

Jerry Lake Eulogy: Part Two - Jerry Lake's Legacy

An obituary for Jerry Lake ran in the last issue of this newsletter. "While many of the original INCOSE voices are silenced by time, in Jerry Lake's case, we have his own words from an interview conducted in 2015 in honor of INCOSE's 25th Anniversary. We believe this continuation of the INCOSE story bears appearing in this issue. These are edited excerpts from the 2015 interview (full disclosure, this was an interview with David Long, then president, and Jerry Lake. It has been lightly edited for this article.):

Why a Council?

JERRY LAKE: The decision was that a council was more important to have than a professional society. The group believed that professional societies were top heavy with academics and that the industry voice would be lost; the focus would be more on academic publications than on helping industry and government agencies field systems that met customer needs. A council structure would be comprised of the experts who would be able to answer the questions and requests for help that were generated by industry leaders, customers, and program and project managers. The integrated discipline groups/committees would still have a major role in defining recommended solutions to issues that came to the council.

The original constitution dictated that half of the leadership of the Board of Directors would be from industry while the other half would be divided between government and academia. That way, industry was the driver and neither government nor academia would take dominance.

What about the definition of Systems Engineering? We currently use one devised by the Fellows but there is always an undercurrent of thought about what it should really be.

JL: It took nearly two years to come up with the initial definition and then nearly two more years to get consensus. We delayed writing a definition of Systems Engineering until organizational issues were resolved. Once a small committee was selected to work on a definition all the problems of turf entered in. I believe that the definition that came out, as I review it now, is exactly what it is supposed to be: general enough to have the different groups participate in what happens and to ensure that a usable, cost-effective system is fielded that provides products of value to customers and users. The first consensus definition was *"Systems Engineering is an interdisciplinary approach and means to enable the realization of successful systems."* This definition enabled all disciplines to feel a part without mentioning any specific discipline.

What do you think most people think of when they use the term Systems Engineering today?

JL: I have the benefit of age. I grew up in the profession in the early seventies when commanding Generals had to hire someone who spoke software because software was just coming into its own. Software has been a real problem: it evolved into people who talked functions, and then ones who talked objects. When objects became the focus for some software engineers, they didn't worry about functions; that created a gap in the software world and in the system world! Systems engineers work using functions while looking for reuse products that satisfy the functions. A driving goal is to satisfy requirements with functions that make the objects useful. It is very difficult to bridge that gap, largely because of terminologies and methods. Software engineers have to be involved from the pre-concept phase, to talk about how requirements can be met with a software product instead of a hardware product;

without the system hardware development working together early on with software development creates, or early on created an environment in which software design moved ahead of hardware design

because software object engineering did not rely on functions. I've seen software engineers come in and software engineers move out of INCOSE; academics come in and academics move out. The biggest impact on membership and, consequently, funding the work of the organization, was the exodus of mid to upper-level industry managers when the emphasis moved from Council to a professional organization. *Personally, once I got over the goal of larger membership numbers, I came to the conclusion that membership will grow if there is something of value for all disciplines.*

What are the key concepts of Systems Engineering that stood up 25 years ago and still hold up today; concepts that are "need to know" and "need to do" for the success of the project?

JL: The whole reason for starting integrated multidisciplinary work early in the life cycle is to identify the real problem being solved and get the requirements right before bending metal, so to speak. It is also essential to complete verification and validation of the system as it evolves from phase to phase during R&D before going to manufacturing. It is when you do it incrementally, getting everyone involved at the checkpoints, including the customer, that you can get what you want—a successful and affordable system. It is essential to validate and verify against the phase requirements at each level of the system architecture before you move on to the next phase of the life cycle activity It is essential to work to the appropriate level of the system architecture from the beginning and each successive phase (increment). It must be kept in mind that at lower levels of the architecture of a system, different projects and or organization may have the primary responsibility for delivering a product to the project or company that passed requirements down. It is essential to ensure that the requirements are in fact included in the subsystem or part provided to their customer.

Pendulum swings are partly because of the younger generation always joining the profession. They are not trained in a holistic way. It has been one of the shortfalls of engineering education.

What do you think is the most valuable benefit of being an INCOSE member? Do you agree that INCOSE provides an environment where you can learn and practice skills that you might not be able to do in your work environment?

JL: You get to come to meetings and play at a higher level with people of various backgrounds and levels of expertise. The senior engineers have to be patient with the new practitioners and act like mentors. Too often the more mature practitioners only talk with others at their level and the new practitioners do not feel welcome. This was an early NCOSE/INCOSE management problem to solve. I understand that, since I faded out of being directly involved in INCOSE, progress has been made through a mentoring effort.

The value of interdisciplinary communication becomes diluted when you only have inward looking groups. Such inward groups don't talk to other inward focusing groups. I've been an academic, trainer, and system and project manager for many years. I gained experience in how to integrate all of engineering into a worldwide Systems Engineering environment by working within INCOSE and with clients. There is always something new to learn in managing the creation, testing, manufacturing, support, and disposal of a system. I'm not sure if I learned more in those outside environments or at INCOSE but in all my years in the Systems Engineering business and in NCOSE/ INCOSE, there has always been forward thinking and holistic thinking people involved.

It is so clear, in Jerry's own words, how much his early leadership shaped who and what INCOSE is today. That he did it with such grace and foresight sets a standard of its own that will last well into the future….hopefully, forever.

By Holly Witte

Remembering Barry Boehm

As INCOSE matures, the inevitable consequence is that the early cohort of members and the founders of the pillars of Systems Engineering begin to leave us; their presence to be felt by their absence.

Barry Boehm is one of those. Barry joined INCOSE in 1995 and held his membership until his passing in August of 2022. He won the INCOSE Pioneer Award in 2019 *"for his work as a systems pioneer uniquely contributing to the advancement of systems engineering through extensive research, education, and the application thereof in industry."*

Pioneer is truly one of the right words to describe Barry. In his early career Barry created a model for software cost estimation that made everyone notice the brilliant elegance of his thinking. To this day, Barry stands as one of the two most cited software engineers in the world (Google Scholar and Springer).

Barry's many achievements have been documented in tributes paid to him both during his life and as his passing is being acknowledged. But only INCOSE members can speak to the power of his presence here. Several INCOSE Fellows, quoted throughout, speak to his power.

He was highly influential and deeply involved in the SERC (Systems Engineering Research Center), strong supporter of BKCASE (Body of Knowledge and Curriculum to Advance Systems Engineering) and the SEBoK (Systems Engineering Body of Knowledge). His influence is substantial, as Azad Mahdni pointed out: *"Barry and I shared a common interest to exploit the synergy between systems and software engineering particularly to address complex DoD and aerospace challenges. With encouragement from our former INCOSE President, George Friedman, the support of my Systems Architecting and Engineering Program team, and under Barry's leadership, the USC Center of Systems and Software Engineering (CSSE) was established as the first center of its kind in 2006. That, along with his leadership at INCOSE, SERC, NAE and other organizations has left an indelible mark. Besides that, I lost a dear friend and irreplaceable collaborator."*

Garry Roedler also recalls him as a friend, a mentor, a colleague, a role model, and a pioneer. *"I knew Barry for approximately 25 years. I first met him through the CSSE. I was always impressed by the way he was able to build a collaboration between academia, industry and government to meet the common needs of Systems and Software Engineering and focus the research toward the true advancement of these disciplines. He was a natural motivator for the students and the sponsors of the research and an inspiration to all who met him."*

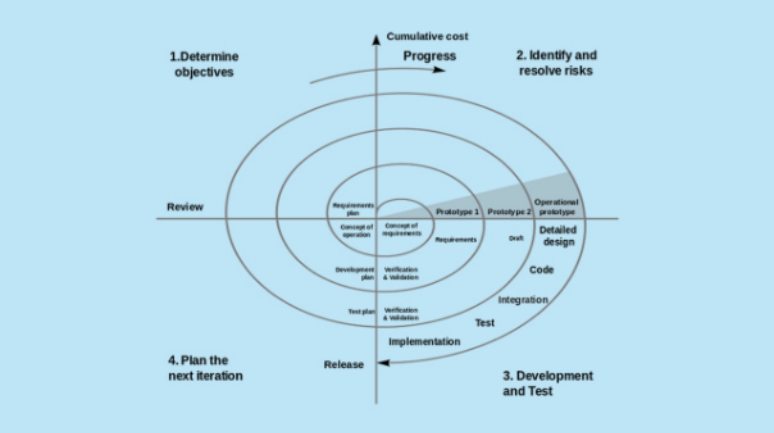
Garry pinpointed what many have experienced and that is Barry's purpose and principal passion to help others become exceptional. His real superpower was dedication to the voices of people he encountered that allowed him to help them thrive without needing to swell his own ego.

"As so many of us know," said Roedler, "Barry was a visionary who believed in the people around him. He was the motivator and enabler to help his students and teams to meet tough challenges that would move the Systems and Software Engineering research to new levels."

Barry's active talent to advance others is a common thread among the voices from INCOSE. Sarah Sheard met Barry in the early 1990s. *"I had been on a couple of advisory committees with him, both of us being asked to help clarify the interface between systems and software. I knew him as an extremely knowledgeable and very kind person. I*

found out how important he was when he sent me a Christmas card in the late 1990s and my boss at the Software Productivity Consortium had a strong reaction, both surprise and dare I say jealousy?

When I asked Barry for advice when I was thinking of returning for a PhD, he instantly got on the phone to try to find a way for USC to accommodate me as a long-distance student in his lab. Although this did not work out, I was highly flattered that he would have me and would work so hard to make that possible. He was always the quiet guy in the room who never tried to drive the conversation but encouraged others to express their ideas and helped them develop and prove new and better insights and methods."



Barry had a sly humor about him, too. Sarah told the story of how Barry inserted MANY words beginning with the letter q in an introduction he wrote when he asked her to update a paper she had written on The Frameworks Quagmire. She asked rhetorically, *"Is it even possible to throw that many "Q" words into an English paragraph that makes sense? But he did it, and from that moment on I was enchanted."*

Barry's playful side included his avid devotion to tennis. Ricardo Valerdi, a youth competitive tennis player, was a graduate student in Barry's lab at USC in the early 2000s. *"Barry Boehm was known to many as a humble intellectual. A gentle giant in our field. But if you ever faced him on the tennis court you would witness an entirely different side of him. With a racquet in his hand, the man was a beast."*

Barry's invitation to Ricardo was to play at Barry's LA home. Home -court advantage; the court where Barry knew every crack. *"When I showed up at his house, Barry was dressed in old and beat up tennis attire from the 1980s. His wardrobe featured a partially ripped shirt, shoes with holes in them, and glasses that fit crookedly on his face. I soon learned that this was simply a façade."* In five years, Ricardo never beat Barry who knew every crack, had a killer serve and approached the net on every single point. *"Every point,"* laments Ricardo to this day. *"Who does that?"* Once his doctoral dissertation was done, Ricardo – who by then also knew where every crack was – decided to end Barry's streak. The win did not diminish his respect. *"When I am his age, I hope to be half as talented, half as humble, and half as competitive. I will dearly miss my Professor and tennis partner, but I recognize that the ball is in my court to carry on his legacy."*

It is so clear, in everything written about Barry, that his impact on people goes far beyond what he taught them: it is how he conducted himself, how he lived in this world. As Regina Griego said, *"It is incredible the vacuum created when a gentle giant exits our lives. We must celebrate Dr. Boehm's life, his contributions, and the way he touched each of us. He was an INCOSE Pioneer and Fellow. He was a distinguished professor and academic advisor with a progeny of many excellent engineers and professors. While Dr. Boehm's extensive professional contributions in computer-based systems and software are too extensive to mention, we remember most his gentle and humble presence, the naturally humorous stories he told when he taught or explained concepts, the care and nurturing of his students, the depth of his listening, and his passion to make us all better at what we do in INCOSE.*
Over the course of Dr. Boehm's career starting with a summer job programming at General Dynamic while attending Harvard, through various positions with RAND, TRW, DARPA, and USC as well as the history he lived, he witnessed systems that became increasingly complex, expensive, and the increasing role of software. Dr. Boehm instinctively wanted to pass his knowledge and experience on and he did it

in a very collaborative way with the younger generations. Ultimately, he supervised over 2000 masters students and over 40 PhDs while at USC. Always he listened for and asked hard questions about our profession. His biggest interest was in how we do our work and how we could be better as a profession. While you can anticipate the loss of such a man, you can not anticipate the sting of losing him."

One tribute to Barry noted how his talent for presenting big ideas through simple charts. It is perhaps No. 4 that memorializes best Barry's forward looking devotion to populating the future with generations of students he taught and guided: Plan The Next Iteration. Quite unmistakably, he did just that.

For tributes that document Barry Boehm's six-decades of achievements and tenure at USC, concluding as Viterbi Professor Emeritus, as well as remarks from other INCOSE members, see these two links:

- https://bit.ly/3UOxoJC
- https://bit.ly/3iLLzl8/

By Holly Witte

A Dedication to Barry Boehm by Dr. Azad Madni

Everything that could be said about Barry's legendary career has already been said by his legions of students, colleagues, and fans. I will provide a slightly different perspective. For many years, Barry and I shared a common interest – exploiting the synergy between systems and software engineering to address complex DoD and aerospace challenges. Barry and I worked diligently to make this vision a reality with encouragement from our former INCOSE President, George Friedman. In 2006, this vision became a reality with the formation of the USC Center of Systems and Software Engineering (CSSE), the first center of its kind.

Under Barry's leadership and with the support of my Systems Architecting and Engineering Program team, the center thrived and had a vibrant affiliates program that specifically addressed the most pressing need of aerospace and defense - affordable software-intensive systems. The photo below is from the convocation of CSSE with Bill Wulf, the NAE President at the time. In 2010, I reached out to Barry to join me in organizing and running the Conference on Systems Engineering Research, co-founded by USC and Stevens Institute. This conference today is the "go-to" conference for researchers from academia, industry, and

government. In 2009, Barry became the Chief Scientist of the Systems Engineering Research Center (SERC), a DOD University Affiliated Research Center, comprising more than twenty universities (led by Stevens Institute and USC) devoted to advancing the state-of-the-art in systems engineering in specific areas of DoD interest. I had the distinct honor of collaborating with Barry on various SERC projects for well over a decade. Barry left an indelible mark on this center through his inspired leadership and impressive results. With Barry's passing, the systems and software engineering community has lost a giant in the field. And I lost a dear friend and irreplaceable collaborator.

Remembering Amy (Kowalski) Wang

The extended INCOSE family has lost a cherished member. Christine Kowalski's daughter Amy passed on Saturday, October 22nd.

Amy worked with INCOSE for seven years (as Alex does, now). Who can ever forget her willowy presence going from meeting to meeting at IW or IS on impossibly high heels looking elegant and capable! As lovely as she always looked, Amy's real essence was in how she responded to members, always putting them first and giving their issue highest priority – no matter how many high priorities there were in any given day! That is a special art and that is truly how Amy lived her life – caring so deeply about the needs of others.

All of her family was with her – Christine and Rob, Amy's sister and brother – Alexandra and Caleb – Amy's children – Breanna, Chase and Natasha; her granddaughter, June; Amy's own grandmother and her aunts.

And, now, all of INCOSE is with Christine and her family as they move through this time in their lives.

Purdue University

Industrial engineering professor C. Robert Kenley was recently elected INCOSE Chair by the INCOSE Fellows. The INCOSE Board of Directors has ratified the election, and Kenley will serve as the Chair of the INCOSE Fellows for a 2-year term beginning December 1, 2022.

Professor Kenley was honored as an INCOSE Fellow in 2016 for advancing the application of analytic methods and statistical modeling techniques in systems design and analysis. He has over 30 years' experience in industry, academia, and government as a practitioner, consultant, and researcher in systems engineering. He also has served on the INCOSE Board of Directors in multiple roles. He also is an expert system engineering professional (ESEP). He is a Professor of Engineering Practice in Purdue's School of Industrial Engineering, where he has been developing courses and curricula to support the educational objectives of the Purdue Systems Collaboratory. In this role, he has sponsored multiple undergraduate and graduate student projects at Purdue in collaboration with INCOSE. He has published papers on systems requirements, technology readiness assessment and forecasting, Bayes nets, applied meteorology, the impacts of nuclear power plants on employment, and model-based systems engineering, and agent-based modeling for systems of systems.

Professor Kenley notes that, *"Unlike many other fellows in professional societies, the INCOSE Fellows have a track record for continuing to contribute as individuals and as a group to advance the aims of INCOSE and the state of the art and practice in systems engineering. Comprised of a unique combination of researchers and practitioners in the field, there is a critical mass of expertise among the INCOSE Fellows that can contribute to the INCOSE goal of making a better world though a systems approach. I plan to continue engaging Purdue students with INCOSE broadly and specifically with the Fellows to contribute to the education of our students and to inspire them to make a lifelong commitment to the goal of the Purdue Systems Collaboratory of tackling complex challenges to move the world forward."*

The mission of the Fellows Committee is to advance the state of the science, art, and practice of Systems Engineering. The Fellows Committee serves as an action forum to achieve its mission and to expand the service of the Fellows to INCOSE and society. Examples of such activities include the establishment of expertise groups to advise INCOSE and society and developing of publications, presentations, and position papers pertaining to systems engineering. A notable recent contribution of the INCOSE Fellows was to update INCOSE definitions of "system" and "systems engineering" to align them to the current state of the practice and to the aspirations of INCOSE's vision to apply system engineering to a broad range of application domains such as biomedical, defense, healthcare, power and energy, telecommunications, and transportation.

The INCOSE Fellows are individuals who have made significant contributions to the art and practice of systems engineering in industry, government, or academia. This award recognizes practitioners from government and industry applying knowledge and contributing to the practice of systems engineering in designing and acquiring systems, researchers developing new knowledge, pushing the theory forward, and teachers disseminating knowledge and developing the next generation of successful systems engineers.

By C. Robert Kenley, Professor of Engineering Practice, Purdue University

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INSIGHT Upcoming Submission Deadlines and Themes

March 2023 Issue

Deadline: 2 January 2023

Theme: Model-Based Test & Evaluation - Laura Freeman and Mark Blackburn

June 2023 Issue

Deadline: 1 April 2023

Theme: Future of Systems Engineering Agility - Rick Dove

September 2023 Issue

Deadline: 1 July 2023

Theme: Systems Engineering in Early R&D - Ann Hodges

For further information on submissions and themes email insight@incose.net

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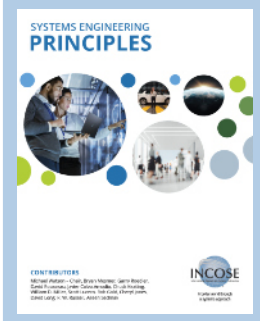

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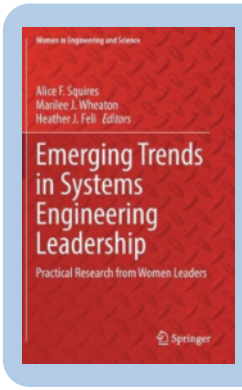

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incose.org/maplecafe

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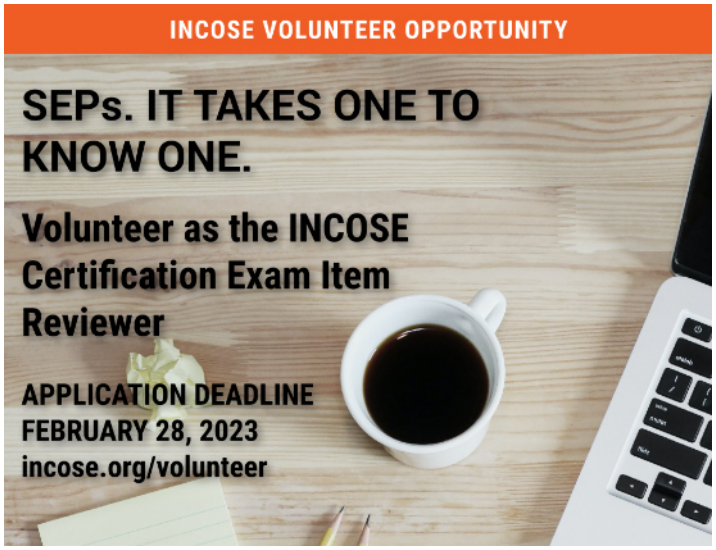
Volunteer Opportunities Administrator, voadmin@incose.net



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- Q1 2023 Newsletter: 15 Feb 2023
- Q2 2023 Newsletter: 15 May 2023
- Q3 2023 Newsletter: 15 August 2023
- Q4 2023 Newsletter: 15 November 2023

For further information on submissions and issue themes, visit the INCOSE website: www.incose.org/marcom

Who are we? INCOSE is a 21,000 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.

All views expressed in this Newsletter are the writers' own and do not reflect the views of INCOSE.

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