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Experiments in Leading through Influence: Reflections from a Group of Emerging Technical Leaders

Chris A. Browne
The Australian National University
Baume Bldg #42 Daley Road
Canberra, ACT 2601 Australia
Chris.Browne@anu.edu.au

CDR Jeffrey Brown, ASEP
United States Navy, VA, USA

John Cadigan, ASEP
Prime Solutions Group, Inc, AZ, USA

Heidi Davidz
Aerojet Rocketdyne, FL, USA

David Fadeley, ESEP
Integrity Technology Consultants, MD, USA

Heather Feli, CSEP
Ensign-Bickford Aerospace & Defense, CT, USA

Karl C. Geist, ESEP
Precise Systems Inc, MD, USA

Myra Parsons Gross, ESEP
JONY Software Solutions, MD, USA

Maz Kusunoki
Nissan Motor Co., Ltd, Japan

Clement Lee, CSEP
Thales Solutions Asia Pte Ltd, Singapore

Al Meyer, CSEP
Lockheed Martin Corporation, GA, USA

Louis-Emmanuel Romana
Airbus Operations SAS, France

Brad Spencer, CSEP
Nova Professional Services Pty Ltd, Australia

Lauren Stolzar
Grubhub, NY, USA

Luca Stringhetti
SKA Organisation, United Kingdom

Ming Wah Tham, CSEP
Thales Solutions Asia Pte Ltd, Singapore

Abstract. Technical leadership is a skill defined in the INCOSE professional competencies. This paper presents reflections on a shared learning journey about technical leadership from the prospective of a group of emerging technical leaders. These reflections provide insights around building awareness, navigating power and influence, benchmarking personal performance, developing capacity for change and establishing critical friends. The final section provides lessons for working as a global team in technical leadership. This paper is of relevance to any technical leader looking to develop this capacity across technical sectors.

Introduction

The scope, scale and complexity of systems engineering projects today are unprecedented (Friedenthal et al, 2014). As the value of systems approaches to engineering becomes clearer in more application domains, there is an increased need to develop leadership skills grounded in technical expertise: this is the domain of the professional competency of technical leadership (Presland et al, 2018; Fierro et al, 2018). Presland et al (2018) describe many themes in providing an indication of activities related to effective technical leadership, such as collaboration, identifying best practice, accepting critique, communicating clearly, understanding the situational context, and delivering successful activities built on trust. Being able to diagnose and adapt to the situation at hand is an important skill for a technical leader to develop (Fierro et al, 2018).

In the domain of complex problems, an effective technical leader cannot simply follow the simple command-and-control approach, and requires a more holistic repertoire of experimentation, reflection, self-review and—most importantly—learning. In this sense, we have based our learning about technical leadership in active experimentation in the complex domain: a probe-sense-respond mindset (see the Cynefin framework in Kurtz and Snowden, 2003). In this paper, we describe elements of a shared learning journey over an 18 month period as participants in the INCOSE Institute for Technical Leadership (TLI). In this program, group members developed a repertoire of techniques for framing leadership and were challenged to learn through active experiments in leading through influence within their own organizations. These activities were supported by other colleagues and a number of technical leadership coaches.

Professional practice has long been a challenging domain to navigate, well situated by Schon's (1983) swampy lowlands. Understanding the role of systems approaches in complex adaptive systems of the near future is a grand challenge in engineering education (Hoffenson, 2019), at a time where there is a keen and growing understanding of the need for developing the capacity of technical leaders. Activities in Cohort 1 of the TLI, summarised by Godfrey (2016), describe the technical leader as someone who: holds the vision; thinks strategically; fosters collaboration; communicates effectively; enables others to be successful, and; demonstrates emotional intelligence.

Building on TLI Cohort 1's work, this paper is a collection of insights about technical leadership as experienced by the group. Members of the TLI Cohort 4 were presented with a range of topics and asked to respond to the prompt: how has this experience shaped your own Technical Leadership Journey? These reflections were then clumped into thematic groups:

- Building technical leadership awareness
- Navigating the tension between power and influence
- Benchmarking performance for shared development
- Developing capacity around transitions and changing futures
- Creating a group of critical friends

These five thematic groups provide a structure for sharing our individual and collective learning journeys in the following sections.

Reflections on Experiments in Leading Through Influence

These thematic five groups shown above have been used to share the vignettes of the individual contributions, which are attributed within the text. In the vignettes, respective companies and other business units are referred to generically as 'organizations'. The vignettes are interwoven with contextual notes arising from our learning journey. Each participant's reflection is shown through the pseudonym 'a cohort member (domain, nation)' to illustrate the diverse nature of this cohort; however, these individual responses are provided from a collective perspective, and reflect a view representative of many members of the group.

Building Technical Leadership Awareness

The need for technical leadership awareness is, perhaps, an obvious starting point for this journey: to be an effective technical leader, one must be aware of the context in which they are trying to lead or influence. A cohort member (aerospace sector, France) describes this need:

In complex organizations, it is impossible to simply break down product and organization, due to the high number of interactions. Technical leaders simply can not have organizational power on all the edges they need to master. Being an effective technical leader requires the ability to have impact in the technical and non-technical domains, and within the entire scope of the organizational effort. Hence, the ability to influence outside of the technical arena is a core competency of the technical leader: the ability to "lead from the inside".

Developing leadership skills requires the tools to analyze, a mindset of self-reflection and a network of leaders, mentors and mentees to exchange ideas and perspectives. These provide the structure to understand, the engine to progress, and the fuel to feed the leadership journey.

Building awareness of technical leadership skills is not limited to the early career stages or future leaders: honing technical leadership skills is an opportunity to re-evaluate and identify edges to grow. A cohort member (defense sector, USA) reflects on the value of refreshing her awareness of leadership in a technical field, and the effect of doing this in a global team:

Having the opportunity to reassess your current leadership style and how others see you in that role is important in a professional team environment. This applies to all levels of technical leadership, not just emerging leaders. As a seasoned member of an executive leadership team, what I found challenging was being able to influence a group of highly technical engineers with a technical solution. I lacked technical confidence in my own experience to successfully influence others. Specifically, more often than not, I relied on the technical knowledge of others and my actual authority as a member of the executive team to move forward on technical solutions. By refocusing my awareness on technical leadership, I began to value my own technical knowledge, and build the confidence to offer my own technical opinions, hence establishing my expert power.

In the US, our technical field remains dominated by Caucasian males, and the TLI provided an opportunity to work with a much more diverse group of engineers, including nationalities, cultures, different technical backgrounds and skills. This diversity of thinking and ideas highlights how important it is to recognize alternative leadership approaches. Each member of the group shared their ideas and contributed to our tasks using their own approach, strengths and individual experiences.

The awareness of nuance between positional and expert power as a technical leader was an important point of differentiation for many in the group. The concept of leading from the inside highlights an important concept that shaped our journey: the tension between power and influence.

Navigating the Tension Between Power and Influence

The five types of power identified by Handy (1985)—physical, resource, positional, expert and personal power—was a cornerstone for many experiments in leading through influence. Reflections on these experiments focused on the realization that having power of any sort does not translate clearly into a ready capacity to influence others: someone with high levels of expert power may not be effective without the resource or positional power to exercise that expertise. A cohort member (defense sector, USA) reflects on the benefits of recognizing the different power types:

In my role as a senior consulting SE, I need to create a positive influence, make an impact, and influence appropriate change. This includes engaging willing and unwilling players. Acknowledging the power structures is important to influence this change. I found that without the positional power in an organization, expert power is to be earned through time by job performance and demonstrated knowledge, not merely through credentials. Further, personal power is to be earned through building relationships incrementally over time by building rapport with all concerned. However, structural challenges make influencing change difficult, such as access to key personnel and facilities. An amount of expert power can open a door to an opportunity but focusing on growing personal power is required to be effective and sustain the influence with key stakeholders.

Coupled with the five types of power are the personality types of those involved: the personality of the technical leader, and those who the technical leader is attempting to influence. On this topic, we considered the four personality types described in the DiSC profile: Dominance, Influence, Steadiness and Conscientiousness. A cohort member (defence & transport sectors, Singapore) describes his experience in navigating personality types:

When attempting to influence co-workers, typically in the Conscientiousness profile, placing emphasis on technical experience, employing my know-how and experience to influence co-workers has been quite effective. Superiors, who tend to be in the Dominance profile, usually control the resource. However, when I apply expert power to obtain the resources to start initiatives, I have found that the Dominance profile is not open to other options. Customers are often in the Dominance or Influence profile. My work is based around technical matters, and my customers tend only to engage me in technical matters. Projecting technical excellence and confidence has been very effective in this situation.

However, even when a leader holds positional power, influencing members of a team who hold expert power in their technical domain can be challenging. A cohort member (building services sector, India) describes the response he achieved when trying to influence domain experts to learn systems engineering processes, so that the effectiveness of the organization could be improved:

Systems engineers in my organization are domain experts and have vast experience in their field but often lack a sound understanding of systems engineering process, which results in their respective projects being ineffective. I applied expert power to conduct in-house systems engineering process training, followed by personal power to encourage members of the team to

attend INCOSE SEP exam. I connected emotionally with the members of the team by explaining the value of knowledge, certification and adherence to standards. Now, 5 out of 7 engineers are INCOSE SEP certified, allowing the organization to develop a high level of confidence in its engineers. This experiment showed me how influencing with multiple power types can add real value to the project.

These reflections in power, personality and influence, highlight the importance of the technical leader operating in a probe-sense-respond paradigm. In this process of experimentation, it is often hard to benchmark performance against clear and consistent goals. In the following section, we explore the importance for the technical leader to benchmark their own performance as an opportunity for personal development.

Benchmarking Performance for Shared Development

We each engaged in a process of anonymous 360-degree feedback with managers, co-workers, direct reports and a self-evaluation within our organizations to benchmark our own performance. This exposed us to the sectors in the Johari window: elements known and unknown to ourselves, and elements known and unknown to others. A cohort member (defense sector, USA) describes the value of receiving this feedback:

This feedback is a powerful tool that allows each group member to examine his or her leadership style and to determine where they need to grow as a leader. I was forced to evaluate preconceived opinions on my leadership ability and identify areas in which to grow. My biggest take-away from this experience is that leaders at all levels can benefit by using this 360° tool. My organization utilizes the LPI, but only for executive leadership positions. Membership in TLI has granted me the opportunity to take the LPI earlier in my career than I would normally experience. I recommend that technical organizations use tools like the LPI to foster a leadership training continuum throughout an individual's career.

The Leadership Practices Inventory (LPI) focusses on Five Practices of Exemplary Leadership: Modeling the Way, Inspiring a Shared Vision, Challenging the Process, Enabling Others to Act, Encouraging the Heart. Within our group, we each identified areas within our feedback that required development and formed small sub-groups on this basis. Each grouping discussed and supported each other to develop technical leadership capacity in that area. A cohort member (aerospace & defense sectors, USA) reflects on the process of learning together:

My personal development was assisted by the group opportunities to learn together. The leadership survey given to members of my work organization helped me to see how I am perceived by others and to identify blind spots. I worked with a sub-group with similar blind spots around 'Encouraging the Heart' to exchange ideas, readings and discussion on how to effectively recognize others, meeting on a fortnightly basis over three months. One suggested reading on the topic, 'The Carrot Principle' (Gostick and Elton, 2009) described that a good share of an employee's attitude toward work is internally driven by the desire for autonomy and achievement, and recognition provides reinforcement of self-image and proof of accomplishment. As the ideas in the book were discussed by the sub-group, I enhanced my understanding on how to effectively use recognition to lead.

The concept of shared development extended beyond the group for many members. A cohort member (automotive sector, Japan) describes how he has embedded shared learning within his team as an approach to technical leadership:

While being in the TLI is full of opportunity for personal reflection and identification of areas to improve on, what has been most important has been the way in which the team around me in my own organization has enabled my journey of learning. The feedback survey tool that we used catalyzed communication on feedback. I feel that I am able to proactively seek out things that I can improve on, and my colleagues do not hesitate to tell me things performance roadblocks that I may not have noticed. Furthermore, this has opened the door to discussion on good technical leadership. These discussions have provided me with opportunities to think about good technical leadership together with colleagues in the team around me.

This highlights how a culture of open technical leadership within an organization can help foster a change of culture within an organization. However, for many members of the group, these skills have been invaluable as an individual in an organization which is itself going through change or has become the catalyst for personal change.

Developing Capacity Around Transitions and Changing Futures

In a technical organization, change is the normal state of activity - be it with technology, management approach, or projects through the life-cycle. Adapting to this change is a key opportunity to apply technical leadership skills. A cohort member (aerospace & defense sector, USA) reflects on his experience as his own organization transitioned management and product line approaches:

Technical Leadership is not restricted to the acquisition of “hard” technical skills and the practice of accepted engineering processes and needs to be coupled with techniques in “soft” power and informal authority as applied to the technical organization. Recently, my organization transitioned from a Waterfall approach to Agile Systems Engineering, consolidation of different aircraft programs into a single, cross-platform, Line of Business and implementation of a Culture of Accountability (Connors et al, 2004) providing much more informal power to employees.

During these periods of substantial transformation into a faster, more responsive environment, there was ample opportunity to identify and analyze several forms of both formal and informal influence. During this time, I engaged different types of influence by tailoring communication to personality profiles of employees. As engineering organizations move away from a highly structured, heavily documented organizational structure to a more flexible, team oriented and model-based approach, the application of informal influence will become even more prevalent.

Technical leadership skills are useful in a transitional period within an organization, but also are transferable across organizations. A cohort member (tech sector, USA) describes how she moved to a new organization encouraged her new team members to run experiments in how to help the organization adopt systems engineering:

Shortly after taking the opportunity to change companies, I was given a team of strong systems engineers and the task to grow the systems engineering discipline within our organization. By utilizing the “probe, sense, respond” technique, we ran small experiments across the organization

to see how the organization reacted. This enabled us to coalesce around techniques that work, such as role definition within each project, and avoid techniques that did not work, such as formal diagramming or strict sequencing of activities. In many cases, this effort represents a middle ground between a full-process systems engineering implementation and no implementation at all. This has been far more effective than if I had fallen into the trap of rolling out big changes without taking time to understand the organization and the strengths and challenges specific to it. I would have also missed the opportunity to develop my team's own capacity for technical leadership.

Recognizing that the context of broader societal factors is constantly changing is also important to the technical leader. Alongside cultural factors, generational change—and the modes of communication that go alongside it—is a large consideration of how a technical leader can be effective, as a cohort member (transportation domain, Singapore) describes:

Working in a multi-national company located in a multicultural country, where East meets West and also a good blend of Gen X, Y and Z, the diversity of culture and generation has never been more distinct at my workplace. Practicing Leadership in this environment is even more challenging when trying to influence someone of a different culture and generation. Beyond understanding personality profiling, I need to be quite aware of cultural behaviors as well as the generation gaps in order to succeed.

For example, in an Asian environment, showing respectful behavior towards people, like listening attentively, speaking non-aggressively, agreeing politely to avoid embarrassing my stakeholders would all go towards increasing my chances of success. When conveying instructions to a Gen Z, it is far more effective to send a text message with mobile slang, whereas a Gen X would prefer a face-to-face briefing and an explanation of the rationale behind it.

Change can also be hard when the context and need for capability is moving faster than the organization is willing to accept, even when this capability need is apparently clear. In a constantly changing environment, cause-and-effect logic and rigorous analysis become nonsensical, as the context has shifted in the intervening time. A cohort member (aerospace, defense, & transport sectors, Australia) has applied the probe-sense-respond approach to build a business case in a rapidly shifting environment:

I was given the task in my organization to advance our capabilities in Requirements Management and Capability Design – a clear opportunity to introduce an MBSE initiative. This approach was quickly rejected, and I was left pondering the challenge of how to take the company forward.

Over the next 12 months I took a new approach based on experimentation. We executed small initiatives to develop expertise and adopt small advances in technology. We piloted these new approaches on small projects, gaining momentum every month. This quickly snowballed into a team of eight over 12 months, backed by a technology platform capable of delivering a number of digital engineering solutions for the business. By taking an approach that relied on probe-sense-respond we were able to clearly identify strategic directions to drive the capability in order to best serve the business. By showing that we can deliver increasing value month on month, as we amplify the wins and dampen our losses, and by creating services that can be applied to new markets, we have received significant investment to drive forward our digital engineering capability.

Fostering technical leadership can create great opportunities within our organizations. In the next section, we discuss how these opportunities are amplified because of the network that has been created in the group.

Creating a Group of Critical Friends

Networking is often seen as a positive activity for professionals in all sectors; however, without a purpose it can become transactional and disingenuous. In the TLI group, we have been a part of each other's learning journeys, and have in turn been able to gain a better understanding of our own situation because of the experience and guidance from others in the group. This is, in large part, due to the culture and environment created by the TLI coaches, who clearly demonstrate the 'Expect'-level practices of Technical Leadership, such as leading "practitioners in technical and and leadership issues within Systems Engineering" (Presland *et al*, 2018, pp. 47).

The supporting environment that was created so that participants could gain outside perspectives from 'critical friends' (Costa and Kallick, 1993) have been invaluable in navigating our own technical leadership journeys. The INCOSE core competencies describe emotional intelligence as a key facet of the professional competencies of a systems engineer, as A cohort member (aerospace & defense sectors, USA) demonstrates:

I came to TLI to work on changing and improving my leadership skills to be more successful in a role where I was burnt out and isolated in my organization. I found that the activities alone were not enough to support growth and change: I gained the perspective I needed through discussions and feedback from my group, experiments leading our various projects, observing my fellow group leaders, classmates listening intently without judgement and acting as sounding boards in an environment of trust.

I began to recognize that, regardless of the effort I was putting into improving in my organization, some hurdles are not worth the effort of attempting to overcome. My TLI peers gave me the high level, outside perspective and support I needed. I shifted sideways in my organization from Program Management to Engineering, and I am thrilled to be working in a role that aligns with my interests and enables me to embrace my leadership growth. My TLI group members are now my trusted advisors, with such cultural, personality and experiential diversity. Together we are vested in this journey of challenge and growth, helping each other.

This highlights the power and value of having networks of technical leaders in a variety of fields and career stages. A cohort member (defense sector, USA) reflects on the group as a safe environment to explore the concepts in technical leadership:

This experience has also introduced the mindset of purpose driven experimentation in complex environments. The blend of tools and techniques used in these experiments as ways to interpret the world around us help overcome inherent human biases that are present in our decision-making processes.

As a group, we have been able to share stories and provide insights to each other about our technical leadership journeys in an amicable and un-threatening way, as well as provide idea generation for improvement on a regular basis. The group has become a guiding tribe to review

and reflect upon our experiments: a safe space to share our true feelings about each situation rather than exposing ourselves to the biases and networks of our home organizations.

Although being a part of the group has been valuable for its members, the commitment of personal time, energy and resources has also been challenging. Running experiments within our organizations pushed us to move out of the plane of action and into the plane of reflection. A cohort member (scientific research, Italy) describes the challenges of finding time for this personal development:

I worked on developing my innovation practice in my organization. Because of the stress involved in trying to balance life and work, we often have very little time devoted to being reflective, and instead spend most of our time in a performing state. The group work forced me to stop, get off the train, and take some time to reflect and think. This process helped me to navigate obstacles in my own work.

I believe that the building of relationships with people from different cultures, backgrounds and stories helped me to recognize the need for considering technical leadership as a point of personal development. The perspectives we have shared during monthly catch-ups have been eye-opening. Seeing the real implementations of innovation from several colleagues in the group gave me the support to run experiments in my organization.

The effort required to invest in this personal development work—across a large group made up of multiple time zones, cultures and sectors—outside of regular requirements of work is not to be underestimated. A cohort member (aerospace & defense sectors, USA) describes how engaging in this process is similar to the experience working as a technical leader in a global company:

Since my company is a global entity, we are used to working with people across cultures and languages, which can present problems in understanding ideas or solutions because of cultural differences. These are many of the same situations we faced with group teammates. As we researched our various approaches, we are directed to “think outside the box”. Where someone in the group may have a weakness, another may have a strength, so our internal assignments permit each of us to lead with our strengths and follow with our weaknesses. By creating a safe zone environment to experiment, we have been able to react and deal with change from a technical leadership position.

As a coda to these reflections, it is worth reflecting on the process of the creation of this paper as an output relevant to technical leaders. Producing an output that captured our disparate interests and that we could all be proud of has been a topic of conversation in the group since early on in our shared learning journey. A cohort member (academia sector, Australia) reflects on the effort to distill our experience:

It has indeed been an exercise in influence in the complex domain to create a framework for multiple authors to contribute equally across such diverse interests and activities. This framework for developing this paper was itself an exercise in probe-sense-respond (repeat). The original call for contribution yielded over 6000-words of reflection and identified group members who had gone astray with the assignment.

This initial call yielded some very personal and extraordinary powerful stories (the probing) but was unstructured and as a whole incoherent. Categorizing these raw stories into broad themes (the

sensing) and asking each member to revise their contribution with new eyes (the response) gave some small amount of shape to these disparate ideas. I'm grateful to those members of the cohort who reached out to build the connections with our cohort members who had succumb to misadventure, with some of these later cohort members providing the most profound contributions, while others found it overwhelming to come into the process late. The greatest challenge has been working with group members to descope and sculpt each incredible contribution so that the whole could be greater than the sum of its parts: on that, you'll have to take my word(!)

These far-ranging reflections based on an 18-month period alongside the above vignettes on our experience, indicates we have learned a number of lessons of relevance for other emerging leaders, and for any organization seeking to build the technical leadership across a sector.

Lessons for Global Technical Leaders

Our group has worked through a number of projects as a full group, and as subgroups within the group. We have met face-to-face as a group during INCOSE symposia and workshops, and regularly through teleconferences. We have experimented in our own organizations, and spent countless hours supporting and dissecting each others' experiences. Although the learning has been profound, as evidenced by the reflections in this paper, it has not been without its challenges. These include:

- **Making time to participate**: group members are juggling competing priorities, such day jobs, families, life, study and other commitments. What you get out of an experience like this depends on what you are able to put in
- **Staying engaged outside of defined contact points:** as a large, global group connected largely in a virtual setting, the continuity of effort due to other commitments can be difficult to maintain
- **Determining end goals and realistic plans to accomplish them**: as there are no clear leadership responsibilities or required outcomes, determining what these might look like is very important
- **Controlling our collective ambition**: as a group of motivated leaders, our ambition has at times got the better of us, and it is often difficult to de-scope our activities

Our shared learning has had a profound effect on each of us as individuals. When we started this journey, the concept of leadership was an individual activity: the probe-sense-respond mindset was an individual activity. As we conclude our journey, we reflect on attributes necessary for a model of a collaborative probe-sense-respond mindset. These include:

Probe: *Motivation and curiosity*. Each group member is busy, often juggling multiple activities across multiple life domains. We have to encourage and reward those members who engage, and respect those who cannot in the knowledge that they will engage and lead when they can. We left our biases at the door and showed a great amount of curiosity about everybody else without preconceptions. This curious mindset has been key to create a safe space for our experiments.

Sense: *Sharing and reflecting*. Sharing our past and current experiences in an open way through a regular monthly teleconference catch-up, as well as targeted sub-projects, has been a valuable way

to understand our shared journey. We have been regularly prompted to reflect: to take a step back for a moment and seek to understand why something is not working as expected.

Respond: *Acting and delivering*. Actually doing something. It is really easy to 'want' to do something or to 'think' about doing something, but actually doing something as or for the group requires significant effort. This in itself is a fantastic achievement. Delivering on our ambition, or at least a good portion of it, is not to be underestimated.

As a final note, we recognise that we are just one cohort within the TLI initiative, and that our experience has been shaped by those before us, and will, hopefully, shape those who come after us. We are beginning to see the ripples of the impact that this initiative has had outside of the TLI, such as within our own organisations, in our local chapters and in other spheres, as demonstrated through the vignettes in this paper. We could reasonably expect to see the INCOSE TLI as a vehicle for influencing our sector into the future.

Conclusion

This paper described the experiences of a shared technical leadership learning journey. This journey was framed in the probe-sense-respond mindset required to negotiate the complex domain, as defined by the Cynefin framework. The lessons that have arisen out of this process, including creating availability, staying engaged, developing a plan and curtailing ambition are applicable to any learning community. Further, we present our observations around conducting a collaborative probe-sense-respond experiment, where the 'probe' requires motivation and curiosity; 'sense', sharing and reflection, and; 'respond', acting and delivering.

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Author Biographies

Dr. Chris A. Browne's research and teaching focus is on building literacy in systems in the Colleges of Science, Health & Medicine at The Australian National University. This includes investigating conceptual models of complex systems, methodology of problem-solving processes, strategies for developing intuition of dynamic systems, and processes for constructing shared conceptual models of systems. Chris is Tomorrow's Systems Engineer lead in the Systems Engineering Society of Australia.

CDR Jeffrey Brown is an Aerospace Engineering Duty Officer (Maintenance) in the United States Navy and serves as the Production Officer for Fleet Readiness Center Southwest in San Diego, CA. He has led Naval Aviation Maintenance Departments in sustainment at the organizational, intermediate, and depot levels. He holds a B.A. from Chowan College and a Master of Project Management from Western Carolina University. CDR Brown is an ASEP.

John Cadigan is an ASEP and is currently serving as the Systems Engineering Lead at Prime Solutions Group, Incorporated (PSG) located in Goodyear, AZ. At PSG John conducts research on Big Data elements in energy and defense programs. He leads the PSG Senior Capstone projects and serves as PSG's engineering representative to professional and technical organizations. John is a graduate of the Ira A. Fulton Schools of Engineering at Arizona State University with a major is Engineering Management with a concentration in Business Analytics.

Dr. Heidi Davidz is a Systems Engineering Principal Engineer at Aerojet Rocketdyne (AR) where she leads Digital Engineering and MBSE. Previous AR roles included: Discipline Lead of SE; Chief Process SE; Stennis Space Center Achieving Competitive Excellence Manager; Systems Development, Verification and Test; Test Operations. She supported NASA Headquarters and National Security Space while at The Aerospace Corporation. Currently OCSMP-certified, her degrees include: Massachusetts Institute of Technology, Ph.D. in Engineering Systems; University of Cincinnati and GE Advanced Courses in Engineering, M.S. in Aerospace Engineering; The Ohio State University, B.S. in Mechanical Engineering.

David Fadeley has over 35 years of engineering and Project Management experience in the U.S Department of Defense community. He has worked on Electronic Warfare systems, Cooperative Engagement Capability systems for Air and Missile Defense, and IT systems including data collection, processing, and producing knowledge for SIGINT and Cyber Defense. Dave has led projects and teams in public, private, and not-for-profit firms including Westinghouse, The Johns Hopkins University APL, and small professional consulting firms. Dave is a registered Professional Engineer in Maryland, a certified Project Management Professional (PMP) and an ESEP.

Heather Feli is a Missile & Aircraft Systems Program Manager at Ensign-Bickford Aerospace & Defense. During business hours you can find her bossing everyone around and helping customers plan, optimize, and succeed with specialized explosive systems. The rest of the time she's typically busy roping my husband and dog into a Pinterest DIY. Heather is also a CSEP.

Karl Geist is a Senior Systems Engineer/Program Manager with 40+ years of acquisition experience throughout the lifecycle. He is DAU Level 3 certified in Systems Engineering and Program Management. He works for Precise Systems, where he provides Sustainment Support for NAVAIR PMAs. As a Charter Member of the SoMD Chapter, Karl was Maryland's first CSEP and first ESEP and is a recognized SME in Systems Engineering.

Myra Parsons Gross has more than 30 years of systems engineering experience. She has a B.S. in Electrical Engineering from California State University - Long Beach and currently resides in Annapolis, MD. Myra began her career in radar development for Raytheon (former Hughes Aircraft). She joined Westinghouse (Northrop Grumman) to further her career working a number of multi-million-dollar development programs before accepting a contractor position for a small company within the Intelligence Community. Myra is a certified Project Management Professional and an ESEP.

Maz Kusunoki is an interior module development engineer at Nissan Motor Corporation where he optimizes designs for collision safety, ergonomy, aesthetics and global assembly. Maz is a graduate of the School of System Design and Management at Keio University, where he led the Hyperloop team to a top 4 finish in the 2017 competition finals at SpaceX. On a weekend you will most likely find him driving in the countryside or maintaining and customizing his car.

Clement Lee is Singaporean Chinese and has been an active and contributing member for eight years since the inception of the Singapore INCOSE Chapter. He has served in the Executive Committee for a period of 4 years under the leadership of two Presidents. Clement is a CSEP and is currently holding the position of Membership Chair. Clement is employed by THALES where he has broad exposure to all levels of System Engineering.

Al Meyer is a Lead Systems Engineer with Lockheed Martin Aeronautics in Marietta, GA where he has worked on the F-22, C-130J and C-5M programs. Al has a B.S. in Engineering Management from The University of Missouri – Rolla, an MBA from St. Louis University, and an M.S. in Software Engineering from Southern Polytechnic State University. Al is a CSEP, and he is an AIAA Associate Fellow.

Louis-Emmanuel Romana is expert in aircraft ground stability and control at AIRBUS. During his career, he used his natural curiosity, maker mind-set and system thinking in the fields of control theory, complex system architecture design and systems engineering. He has achieved successful implementation of innovative functions on AIRBUS products. Louis-Emmanuel holds a master's degree in Mechanical Engineering. In his spare time, he enjoys developing personal projects with his 4 kids, using 3D printer and ARDUINOs.

Brad Spencer has worked in the Systems Engineering industry for over 15 years, predominantly in the Defence sector. He has worked across all phases of the systems life-cycle on behalf of the Australian Department of Defence and for the majority of Australian prime system integrators. He holds a Bachelor's degree in Engineering (Aerospace Avionics); Masters in Systems Engineering; Advanced Diploma in Leadership & Management; is a Fellow of the Institute of Engineers Australia and Chartered Professional Engineer (CPEng) and is a CSEP. He is currently the Capability Development & MBSE Lead for Nova Systems.

Lauren Stolzar has over 10 years' experience in systems engineering, software engineering, program management, and proposal management on research programs for a wide variety of department of defense customers. She specializes in leading geographically distributed, multi-organization teams in bringing research capabilities to operators. Lauren has led teams from early research experimentation through field and flight test and demonstration, in addition to working directly with the user community to understand existing needs. She holds a BS and M.S. in Computer Science from Worcester Polytechnic Institute.

Luca Stringhetti has been an SKA Project engineer since 2016. He is currently charge of the SKA Telescope Engineering office (SKA-TE) for the Square Kilometres Array project in the SKAO Headquarters in UK. He has more than 20 years of experience in systems engineer in industry and research for space programs and ground base astrophysical experiments and observatories. This includes the commissioning of SRT Telescope and the AIV of the LFI Instrument for the Planck/ESA satellite.

Ming-Wah is a Systems Engineering practitioner and a CSEP with over 20 years of systems engineering experience working on large-scale projects in the urban rail industry. Throughout his career, he has held various roles in SE, which enabled him to practice and gain experience in the entire spectrum of SE process areas. Along the way, Ming-Wah embarked on a journey of leadership, studying various leadership theories and philosophies and putting them into practice. Ming-Wah is currently serving in the INCOSE Singapore chapter as President-Elect.