The Enchanted View

✤ Thinking about Systems ✤

2020 Quarter #4

In This Edition

President's Message

Robin Reynolds

Autumn is in the air and I'm finding it to be a refreshing change. I'm hoping to make more time for reading over the next few months because that's the only chance I have of making a dent in my towering to-be-read pile. I've recently revisited *The Black Swan: The Impact of the Highly Improbable* and am making my way back through *Antifragile: Things that Gain from Disorder*, two of five books in the Incerto series and written by Nassim Nicholas Taleb. They are both excellent and complex enough to warrant a second trip around. With publication dates of 2007 and 2012, respectively, these aren't new releases, but they are still relevant and wise.

Taleb is educated as a mathematical statistician, has served at multiple universities, and has spent his career investigating uncertainty, risk, and probability in various disciplines, including the financial sector.

The Black Swan focuses on enormous, highly impactful events which humans often fail to predict. There are many reasons that we poorly understand and manage the risks in our lives - confirmation bias, preconceived notions, and taking a narrow view of a complex problem to mention only a few. This book explores this topic deeply and in a way which transformed the way I thought about the world.

Antifragile examines the concept of systems which become stronger or more cohesive when shock or randomness is introduced. He asserts that this principle has been critical to the advancement of humans and to technological advancement.

Considering the unusual volatility of the public health crisis, economic impacts, and political and social unrest, a primer in how to appreciate and leverage uncertainty might be in order. From a system engineering perspective, understanding and building antifragility into our systems is a partner to risk management. I'm fascinated by the concept. If you haven't read these books, give them a spin and let me know what you think.

Welcome to Arno Granados

Robin Reynolds

I would like to warmly welcome Arno Granados as the 2020 VP/President Elect. When Bill Cooper recently moved to Colorado, this role opened up outside the election cycle. As President, I nominated Arno and the nomination was approved during the August board meeting. I really appreciate his willingness to step into this important function on the Board of Directors. Arno is

educated in Physics (BS) and Astrophysics (MS) and is currently employed at Sandia National Laboratories (SNL) as an R&D Systems Engineering Manager. He has built an impressive career in the aerospace and defense realm, working in both staff and leadership positions. Before coming to Sandia, Arno served as the Director of Engineering for Cloud Cap Technology.

I know I speak for the entire Board of Directors when I say we are thrilled to have him and look forward to 2021 with him at the helm!

First Ever Virtual Summer Social Event

Mary Compton

Who says you can't socialize, meet social distancing guidelines and still have fun? The Enchantment Chapter did just that on September 9, 2020. Eleven of your colleagues and friends participated in the Enchantment Chapters first virtual social event via Zoom. At around 5:30 pm we all settled in with our cocktails and played three rounds of virtual Systems Engineering (SE) Bingo.

Many thanks to the Enchantment Chapter board members who helped prepare for this event. Cheryl Bolstad, Director-at-Large, collected favorite cocktail recipes from the Board. The list was sent out with the event announcement. (Check your email – you have them!) Jim Larkin, also Director-at-Large, compiled a list of definitions for Systems Engineering terms and provided them to Chapter Past-President Heidi Hahn. Heidi turned these definitions into the SE Bingo game that we played during the social. Don't worry – we are keeping all the information compiled! It was so much fun we are thinking of doing this again!

In addition to the fun we had playing SE Bingo, each of the game winners was awarded a prize. The first game was won by Sue Collins. Ed Carroll won both of the subsequent games played. Each victory netted the winner a $50 Amazon eGift Card.

2021 Election

Ann Hodges

Another election is right around the corner – no, not the US Presidential election! It's time for the Enchantment Chapter's yearly election. The ballot will be sent to the Enchantment Chapter members at the beginning of October to be returned by October 31, 2020. The slate is shown below and there's an opportunity for you if you want to become more involved in the Chapter

operations – either as a voting member (President Elect, Director-at-Large) or a non-voting member. Contact anyone on the Board for more information on how to get involved (see contact information at the end of this newsletter). The chapter runs exclusively on the efforts of its volunteers.

I have been on the Board since 2011, and I have received far more benefit than I have given: expanded my professional network, collaborated with SE colleagues (co-authored papers, tutorials, panels both regionally and at the INCOSE international symposia), and achieved greater visibility within my company as well as within the nationally and international SE community. Another benefit is that when I help plan events, I get to guide things in the direction that I'm interested in and enjoy (such as talks, venue / food / drink for social events).

2021 Officer and Director Slate

Here is the slate for next year's officers. There is one opening, VP/President Elect – which may be filled by appointment after the elections. This officer is expected to but not required to run for President the following term; this is to provide leadership continuity for the chapter. The President would nominate the candidate, then with the approval of the board, the role would be filled. If interested in this role, please contact any member of the board. Not only is this an opportunity to serve and give back to the SE community, but this is a tremendous networking opportunity within the local, national, and international Systems Engineering and professional community. First come-first served!

President: Arno Granados, SNL
Past President: Robin Reynolds, SNL
VP/President Elect: TBD *(could this be you?)*
Treasurer: Mary Compton, SNL
Secretary: Ann Hodges, SNL
Directors-at-Large:

- Dr. Cheryl Bolstad, SNL
- Dr. Heidi Hahn, ret. LANL
- Jim Larkin, Northrop Grumman
- Dr. Eric Smith, UTEP
- Kyle Spisak, SNL
- Raymond Wolfgang, SNL

Photo by visuals on Unsplash

Enchantment / PMIRGC Partnership

Ann Hodges

Earlier this year, Shannon Boynton, a PMIRGC member, approached me about exploring the potential for closer ties between the regional INCOSE and PMI chapters. Three PMIRGC members attended our Chapter's May Board of Directors meeting to discuss opportunities for collaboration. Some exciting steps for collaboration are already underway:

- Each organization advertises the other organization's events on their website
- PMIRGC has offered a speaker to present on the topic focused on WBS integration with an effective schedule – be looking for this in our event lineup
- PMIRGC has offered member prices for their events to our Enchantment Chapter members (another reason to become an INCOSE Enchantment Chapter member!)
- PMIRGC may participate in the next Socorro Systems Summit (date TBD) – such as a track on the integration of project management and systems engineering

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Not for Women Only

Facilitation Tips – Improving in the Professional Competency of Facilitation
Heidi Hahn

In 2017 and 2018, Ann Hodges and I facilitated two workshops on the topic "Integrating Program/Project Management and Systems Engineering in Practice." The objective of a facilitated workshop is to help participants gain knowledge and experience, in this case on how to integrate program or project management and systems engineering in their own organizations. This objective was achieved, and the workshops were a success. This article focuses not on the results of the workshops per se, but rather what we learned about facilitation from the experience in keeping with Presland's (2018) exhortation that "expert" facilitators should advise others on best practices regarding facilitation methods and logistics.

Facilitation is "the act of helping others to deal with a process, solve a problem, or reach a goal without getting directly involved" (Presland, 2018, pg. 50). It is important to systems engineers because we often must perform in environments where we have a great deal of responsibility but little authority from which to drive results. (The same can be said of project managers.) In these situations, we need to use "facilitative leadership" or the ability to lead without controlling (Presland, 2018, pg. 50).

The job of a facilitator is setting up activities that enable people to learn from one another and build on their own knowledge. Because people tend to remember things better if they learn actively, it is important to find ways for participants to play an active role, such as talking about the topic under consideration, and for them to relate the information to their own experiences. To make the most of experiences, people need to reflect upon them and make generalizations about them, formulating the knowledge in a way that can be applied in other situations (Seeds of Change, n. d.). These principles should guide the formulation of facilitated exercises.

Though Ann and I do not claim to be experts, facilitating the workshops did provide some insights that are of benefit to the systems engineering community:

- Icebreakers and small group exercises are good ways to help people get to know each other, which helps them feel safe and confident, more willing to take risks and explore new ideas. Small breakout groups worked well at the first workshop, with participants being assigned different groups for each exercise. At the second workshop, the plan had been to again mix up the small groups after each exercise, but the room set-up was not conducive to that, so participants stayed in the same small group all day and used breaks for networking. Facilitators need to be flexible to deal with logistical issues on the fly.
- If possible, participants should be assigned to their small groups such that a diversity of perspectives is represented. Having coworkers in the same small group often leads to two-way conversations that are organization specific, not generalizable.
- The use of individual brainstorming followed by group cluster analysis was effective both in terms of bringing out individual experiences and generalizing them, and for time management. The go-round debriefing technique, in which one group (a different one each time) shares their results then other groups add any new ideas, going around the room until all groups have provided input, was also effective for time management.
- Timing needs to be realistic. At the first workshop, the presenters spent too much time on cases studies from their respective organizations and did not have adequate time for the exercises, which were largely where the value of the workshop was derived. The timing for the second workshop, which had been carefully planned during proposal preparation and benefitted from lessons learned from the first workshop, worked well. Timing needs to account for breaks, and be realistic – accommodating how far away are the break

area, restrooms, etc. and will participants be able to get there and back in the allotted time?

- It is tempting to leave the flip charts and Post-It™ notes used to capture brainstorming, cluster analysis, and synthesis behind but there is a danger there that the we experienced firsthand: If there is a desire to do post-processing of the data after the workshop, the summary information may not suffice. In the present situation, one person who reviewed the IS paper that came out of the workshops suggested that the outcomes be summarized by ranking the issues or using tables or plots. Without retaining the Post-Its™ and flip charts, it was impossible to do this since there was no way to assess the frequency with which issues were raised. Taking photos of the materials (if allowed in the venue and the notes are sufficiently legible) might be an alternative to carrying paper.

There is little data in the literature about gender differences in facilitation styles *per se*, but there are gender differences in communication styles that can affect facilitation. Men are more likely to use language that is direct and to the point, while women are more likely to use language that draws others out (Goman, 2016).

More than half of the information conveyed in conversation is in non-verbal form (Point Park University Business Department, 2017). Men use fewer facial expressions than women, keeping "a poker face" (Goman, 2016). Women use paralanguage, which is the non-lexical components of spoken communication, more than men (Point Park University Public Relations and Advertising Department, 2017). Both styles have their place – and the best facilitators are comfortable adapting to the style that is appropriate for the situation.

These differences emphasize that co-facilitation using facilitators of different genders, races, and/or cultures is a recommended best practice (Porteus, Howe, and Woon, n. d.).

References:

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- Presland, I. (Ed.), 2018, '*INCOSE Systems Engineering Competency Framework*', INCOSE, San Diego, CA (US)

> Any idea is only as valuable as its ability to solve a problem.
> *Sally Hogshead*

INCOSE International Symposium

Raymond Wolfgang

Our own Ann Hodges presented a paper at this year's International Symposium! This year's symposium was held virtually at a greatly reduced price – and no travel expenses! Ann relates her experience:

> *I expected a lot of technical trouble, but the access to the virtual platform was nearly flawless. The only issue I experienced was getting familiar with accessing the first talk. The symposium was supposed to be in South Africa, so it was run on South Africa time. Because of the time zone difference, presenters were offered the alternative to record their presentation; most of the presentations I attended were live. The live presentations were recorded for later viewing for those attendees that wanted to sleep in.* [The platform was open for two weeks after the conference close.] *Because I didn't want to miss the opportunity for real-time interaction with the presenters and other attendees, I was at my keyboard with headphones on at 1am each day which allowed me to start my regular work day at ~10am. Believe it or not, I got used to this schedule – with enough coffee!*

Photo by Nathan Dumlao on Unsplash

Ann, as the chapter Program Development Committee lead, was on the prowl for talks for our Chapter! Four of the next 5 talks lined up for our Chapter events were outstanding presentations given at the Symposium:

- 10/14/2020: Jakob Axelsson – "Achieving System-of-Systems Interoperability Levels" – best paper award
- 12/9/2020: David Hartley and Paul Clements - "Patterns for Success in the Adoption and Execution of Feature-Based Product Line Engineering"
- 1/13/2021: David Long – "Schema and Metamodels and Ontologies – Oh My!"
- 2/10/2021: Gan Wang – ""Implementing a Model-Based Digital Engineering Enterprise for a Defense System Integrator" – best paper award

Ann's presentation and paper, *Implementing Systems Engineering in Early stage Research and Development (ESR&D) Engineering Projects*, was well received and expands on several years' worth of momentum in applying SE principles to an area that traditionally has been much more free-form: early stage R&D. The problem they are solving, is having funded research drift far off the path of the original sponsors' idea. Sponsor needs and requirements analysis – here-to-fore lacking – are emphasized, in particular for R&D teams accepting money from a sponsor. Ann and her team have proposed a tailorable method to keep the spirit of exploration essential to R&D while guiding the work in partnership with the sponsor – in a SE framework.

Several other chapter members attended the IS – including Rick Dove, who moderated a panel on "Issues, Impediments, and Inspiration for Continuous Integration in Mixed Discipline Development Projects." Rick, a former chapter president and frequent INCOSE presenter,

continues to be sought out at the international level for these types of service roles. The panel covered a very pertinent topic related to Rick's specialty in agile engineering. This shows the Enchantment chapter's continued connection with state-of-the-art SE processes and exploration.

I also attended the IS. For an all-virtual event, they did an extraordinary job with the mechanics of the program. It was easy to ask questions real-time to the presenters. I especially enjoyed the life 'cafés' after the sessions ended for the day, where I could network and discuss the topics covered earlier in the day with colleagues, I've seen at the last several events. Finally the keynotes were again (as in previous IS events) top-notch. The fact the platform was open for two weeks after the conference ended, was extremely helpful – as I was able to watch as many presentations after the event, as during the event itself. That let me keep up with my work responsibilities, while still learning new material at the symposium.

Later in the year, I presented at the Western States Regional Conference, originally planned for the Seattle, WA area but held virtually from Sept. 17 – 19. The first one, *INCOSE's Guide to Verification and Validation: Context, Progress and Content*, described the new guides coming out of INCOSE's Requirements Working Group, where I am a member and the guide-lead for the V&V guide. These guides are intended to help the wider SE community. The three new guides being created are:

1. *Needs and Requirements Lifecycle Manual*
2. *Guide to Managing Requirements*
3. *Guide to Verification and Validation*

The effort also includes revising the existing *Guide to Writing Requirements*, currently in its 3rd edition. I presented a history of each document's evolution – and how they connect with both the INCOSE SE Handbook ver. 4.0, and the SE Body of Knowledge (SEBoK). In my second talk, A Proposed Model-Based Approach for Product Verification, I continued the V&V theme with a "coffee-pot" example of how an MBSE tool can be used to create required V&V artifacts needed in the development of systems – in this case, a Requirements Verification Traceability Matrix. The talk started from a MBSE model, to an Excel spreadsheet export that everyone would recognize as an RVTM. Linking the "new way" of MBSE, back to "old-school" artifacts was the value-add. Often the way new tools are introduced and

accepted, is by showing how they can help engineers do their current day-job. The talk gave a way for systems and qualification engineers to do this.

From Ann, Rick's and my work, the Enchantment chapter continues to have a national and international presence at INCOSE's marquee events. With their leadership on their respective working groups, the chapter also maintains its long tradition of international service to INCOSE and the profession. We can be proud, as a chapter, of their efforts. I encourage participation at the next INCOSE event, the International Workshop, which will also be 1000% virtual! See me or a member of the board for more information – or visit www.incose.org, under *Events*.

SEP Certification Training

Ann Hodges

The INCOSE Enchantment Chapter has offered webinar-based Systems Engineering Professional. (SEP) certification training for the past 2 years. SE Scholar, the firm we worked with in the past for this training, offered the Chapter a discounted rate. We are considering offering this training again in early 2021. This webinar serves as an overview of systems engineering even for those not interested in getting certified. Here's some details from our past training opportunity:

- The class is self-paced consisting of 7 modules and over 16 hours of instructional videos covering the entire INCOSE SE Handbook v4.0.
- The price includes study guides, a comprehensive process flow diagram, practice quizzes and exams.
- The material is provided as a PDF with the students making hard copies as desired.
- There is a discussion board so that students can collaborate and ask the instructor questions.

If you have any questions, please contact the Chapter's SEP mentors Heidi Hahn or Ann Hodges. Their contact information is on page 9 of this newsletter.

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Recent Chapter Meetings

Ann Hodges

July 2020

Dr. Jon Wade, a professor of practice at the Jacobs School of Engineering at the University of California at San Diego and previous chief technology officer of the Systems Engineering Research Center (SERC), presented "Systems Engineering 2.0". Dr. Wade's point was that we have entered an era of great system complexity, rapid technological change, growing resource stress, and evolving societal systems that are both enabled and impacted by advancing engineered systems. Artificial intelligence is now at a tipping point where the technical capabilities it enables are outstripping the ability of systems engineers to employ it in viable systems. To solve this problem, consideration for the system as an evolving enterprise must be a core part of systems engineering. There is an increasing call from all systems stakeholders for foundational tools that reflect the human, organizational, and societal aspects of engineered systems. In particular, the growing complexity of systems and their evolving, emerging behaviors require that systems engineers often need to take the role of systems scientists as well as engineers to ensure that both the system they are creating and the systems that are responsible for their creation are interconnected and aligned. This talk presented a model to address evolving, AI-Intensive systems of the future, and the challenges and future directions for Systems Engineering that will be necessary to conceive, design and support them.

August 2020

Sarah Hale, a mechanical engineer at Sandia National Laboratories, presented "A Next-Generation Model-Based Enterprise Maturity Index". For any transition journey, one needs a vision for your organization to get started; one needs plans, for your organization to finish; and one needs an index for your organization to define a path for success and determine when "victory" is achieved. This talk introduced a next-generation Model-Based Enterprise (MBE) Maturity Index that helps define and normalize the transition from a document-centric, drawing-based business to a part-centric, digital, model-based enterprise. The aim of this presentation and paper is to share NNSA's efforts related to MBE and thus help increase the pace of progress adapting MBSE in the Department of Energy enterprise – and hopefully, in industry as well.

September 2020

The Chapter hosted a virtual social event. See page 2 to read about the grand time you missed!

Upcoming Events

Ann Hodges

October 14, 2020: Dr. Jakob Axelsson, a senior research leader in system-of-systems at RISE - the Research Institutes of Sweden, will speak on "Achieving System-of-Systems Interoperability Levels".

November 11, 2020: Dr. Heidi Hahn, recently retired from Los Alamos National Laboratory (LANL) where she served as Senior Executive Advisor to the Associate Laboratory Director for Weapons Engineering, will speak on "Empowering Women Leaders in Systems Engineering".

December 9, 2020: David Hartley, product owner for Product Line Engineering at Mission Systems, and Dr. Paul Clements, VP of Customer Success at BigLever Software Inc. will discuss Patterns for Success in the Adoption and Execution of Feature-Based Product Line Engineering.

Several fascinating speakers are already on the 2021 docket!

Board of Directors Service Awards

Robin Reynolds

Your Enchantment Board of Directors works very hard behind the scenes to make this Chapter a valuable resource and to support and contribute to the discipline of Systems Engineering. These activities aren't always obvious, but they make the Enchantment Chapter exemplary. It's been my honor to work with each and every member of the board. They all deserve an award! That said, I could only choose four. For each quarter of 2020, a board member received a service award to recognize their contributions. Congratulations to each of you and many thanks for your service!

2020 Board of Director Service Awards
Quarter 1: Mary Compton, Treasurer
Quarter 2: Ann Hodges, Secretary
Quarter 3: Heidi Hahn, Past President
Quarter 4: Cheryl Bolstad, Director at Large

End of Year Survey

Cheryl Bolstad

Near the end of each calendar year, we email members a survey to help us understand how we can better serve and support you. It's coming soon so keep a lookout! Please promptly complete the survey, as it is critical to plan our future activities and craft our strategic direction. We welcome input and feedback.

Membership

A very enthusiastic welcome to our new Enchantment Chapter members, **Jason Morgan (LANL), Ouray Kinsel (not listed), and Ryan Coogan (NNSA / PNNL)!**

The Enchantment Chapter currently has 99 members. That number includes 90 regular members and 9 student members. INCOSE now has over 18,000 members in 70 countries worldwide.

Enchantment Chapter Board of Directors

President	Robin Reynolds, SNL	rmreyno@sandia.gov
VP/President Elect	Arno Granados, SNL	agranad@sandia.gov
Secretary	Ann Hodges, SNL	alhodge@sandia.gov
Treasurer	Mary Compton, SNL	mlcompt@sandia.gov
Past President	Heidi Hahn, LANL	drsquirt@outlook.com
Director at Large	Cheryl Bolstad, SNL	cbolsta@sandia.gov
Director at Large	Jim Larkin, Northrup Grumman	jelarkin3@gmail.com
Director at Large	Eric Smith, UTEP	esmith2@UTEP.edu
Director at Large	Kyle Spisak, SNL	kspisak22@sandia.gov

Committee Leads

Collaborative Engagement Committee	Phil Bennett, SNL	pcbenne@sandia.gov
Operations Committee	Robin Reynolds, SNL	rmreyno@sandia.gov
Professional Development Committee	Ann Hodges, SNL	alhodge@sandia.gov
Technical Committee	Heidi Hahn, LANL	drsquirt@outlook.com

Please contact any board member or committee lead if you are interested in getting involved or have questions.