The Enchanted View
— Thinking About Systems —

Published quarterly and sent to INCOSE Enchantment Chapter members, et al. 2017 Q3
www.incose.org/enchantment

Shaping the Future

Anthony Matta, President— Hello Enchantment members!

Quarter 3 is upon us and we are picking up pace for some fun annual activities that I encourage you all to participate in and to get others to join as well. The Summer Social – "Going Green Saves the Planet" is an exciting event that is gaining interest from many. The Socorro Systems Summit has elicited feedback for topics that many have responded to, and the upcoming chapter meetings are all great avenues to connect, learn, and contribute to the education of others in the realm of systems.

The last two great chapter meetings (Defining a System - a Comprehensive Approach and The Art & Science of Systems Engineering) have had me pondering the future of Systems Engineering (SE) and how we can shape that future. As chapter members, it is our responsibility to both continuously learn the practices of SE and to teach others the value of SE. As we conduct these activities, we should determine how we can cohesively merge and adapt SE practices with other disciplines. This merging will cause engineering to mature so that complexities of today are easier to manage, and thus progress our systems capabilities forward with new challenges and opportunities. This thought encouraged me as I realized we are all making a difference for the future, by being part of this organization and performing these functions. I hope that you all feel the same way. It is easy to get caught up in our day to day activities, but remind yourself to review our chapter resources, join an INCOSE working group, or partner with other chapter members to learn and make a difference in the future of engineering! ∞

The INCOSE Enchantment Chapter presents:

Our summer social on *July 6, 2017*:

Going Green Saves the Planet!

Location: Chama River Brewing Co., 4939 Pan American Freeway, Albuquerque, NM
Check-in: between 5:00 and 5:30 PM
Virtual Tour: of Friedman Recycling, starts promptly at *5:30 PM* in Brewer's Lounge
This event is free, but you must register by noon July 3.
Participants must be 21 or over, you can bring one guest.
-- includes appetizers, and 1 drink ticket
Limited to first 40 registrations
Friedman Recycling

Mary Compton, Sandia National Labs

Come mingle with fellow chapter members and friends with a beer, some food, and a virtual tour of Friedman Recycling led by Robert Taylor. This year's social will be help at the Chama River Brewing Co, 4939 Pan American Freeway in Albuquerque. Check-in begins at 5:00. The Virtual Tour starts promptly at 5:30 PM in the Brewer's Lounge. Networking continues immediately following the virtual tour. Register on Chapter website or direct via **EventBrite** by July 3, 2017 at 12 noon.

About Friedman recycling: Friedman Recycling is the largest private paper recycler in the southwest. Their versatile containers, modern truck fleet, flexible equipment sales and rental program, and their streamlined, computerized waste hauling and disposal systems have helped make your world a cleaner, happier place. ∞

Fall Tutorial: September 22
Integrating Systems Engineering, Project Management and Quality Management

Mary Compton, Sandia National Labs

Recently there has been growing interest in applying systems engineering (SE) and project management (PM) to complex engineering projects in an integrated way – INCOSE has formed an alliance with the Project Management Institute (PMI) and chartered a SE-PM Working Group for this purpose, for example.

Both Sandia National Laboratories and Los Alamos National Laboratory have taken up this quest, and have each developed what they call their Mission Assurance Framework, which describes the integrated application of SE, PM, and engineering quality and rigor (which is one area of overlap in the specializations claimed by both disciplines, along with topics such as stakeholder analysis and configuration management) to achieve mission success.

The presenters will describe their organizations' Mission Assurance Framework, including similarities and differences, and discuss what factors drove the decisions that were made. Participants will work through a series of questions to consider in making integration decisions for their own organizations.

The goal of the tutorial is to instill an appreciation for the benefits of a graded approach to applying a mission assurance framework, and how to apply the ideas discussed in the participants' organization.

Location: UNM Continuing Education Conference Center, 1634 University Blvd. NE, Albuquerque NM.
Time: 8:00am to 5:00pm, with sign-in from 7:30-8:00am.
Cost: INCOSE members $125; non-members $175; students $0.
Registration and additional details: Visit the Chapter website and look at the September 22 Tutorial Event on the home page.

Ann Hodges is the National Security Programs (NSP) Program Management Unit's (PMU) Mission Assurance systems engineering lead at Sandia National Laboratories as well as lead for the systems engineering-related part of the NSP PMU Mission Assurance framework, and is currently a deputy program manager and systems engineer for a complex exploratory-phase project.

She is a primary author of the Mission Assurance framework, which is a risk-informed graded approach to the application of project management, systems engineering and quality management.

She has worked over 40 years at Sandia National Laboratories and is a Distinguished Member of Technical Staff.

Ann holds an M.S. in Computer Science and a B.B.A., both from UNM. Her certifications include Certified Systems Engineering Professional, CMII, and SAFe SPC4.

Heidi Ann Hahn is Senior Executive Advisor to the Associate Director for Engineering Sciences at Los Alamos National Laboratory. She is responsible for development of processes and tools to promote engineering capability; professional development of R&D engineers and technicians; and engineering capability assessment.

She is the author of LANL's Mission Assurance Framework for the integrated application of systems engineering, project management, and engineering quality and rigor and has experience in tailoring those processes for projects of various scales.

She holds a Ph. D. in Industrial Engineering and Operations Research (Human Factors Option) from Virginia Tech and is an Expert Systems Engineering Professional with the Acquisition extension (ESEP-Acq) as well as a certified Project Management Professional (PMP).

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Agile Risk Management Tutorial—What You Missed

Mary Compton, Sandia National Labs

On May 19, 2017 INCOSE Fellow Rick Dove, a leading researcher, practitioner, and educator of fundamental principles for agile enterprise, agile systems, and agile development processes, presented a full-day tutorial entitled "Agile Risk Management – Problem Space Analysis" at the Central New Mexico Workforce Training Center in Albuquerque. This tutorial focused on characterization of the problem space, or operational environment, in which a potential solution will reside. To be effective, projects/processes/products (all viewed as systems) have to mate well with their operational environments. But operational environments are not static, and they react to disturbances and evolve with opportunity and whimsy. Inserting a system into an environment is a disturbance. Sustaining a system in an environment entails compatible evolution. Understanding the requirements for a compatible-to-the-space solution is best done before system functional requirements get too far ahead and shape an incompatible path.

This tutorial presented ways to characterize the environment as a dynamic problem space and develop solution-response requirements, sufficient to guide the design of risk-mitigating agility. Characterizing the problem space is an ill-structured problem. It cannot be expressed in numbers and equations, nor solved with algorithms. The tutorial provided heuristic frameworks for developing useful characterizations of the problem space, and for developing risk-mitigating requirements for the solution space.

Examples were presented of how others have characterized their problem state. Also applying the series of heuristic tools introduced to a project throughout the tutorial allowed participants to gain a better understanding of their chosen problem and readily derive effective solution requirements and features.

The tools practiced included frameworks for system goal-development, environment characterization, reality factors, and solution response-requirements. Using these tools presented during the tutorial participants learned to formulate context-driven top-level goals, illuminate the problem space, establish risk-response needs, and make traceable solution design decisions. The benefits of using these tools are: system environment compatibility, projects that mitigate evolving risk, processes that deliver on purpose, and products that are sustainable. ∞

Recent Meetings

Ann Hodges, Sandia National Labs

Presentations and recordings are in the Library at www.incose.org/enchantment.

April 2017—Mr. William Schindel, chair of the MBSE Patterns Working Group of the INCOSE/OMG MBSE Initiative, presented *What the Systems Community can Learn from ASME Work in Computational Model V&V Standardization.* This talk reflected the perspective of INCOSE Model-Based Systems Engineering community leadership, concerning the need for V&V of systems models in general, and the opportunity to learn from and contribute to the related ASME standards committee efforts.

May 2017—Ms. Schaible, NASA Deputy Chief Engineer, presented *The Art and Science of Systems Engineering – Developing the Next Generation of Systems Engineering Leaders.* Developing systems engineering leaders who are highly competent in both technical leadership and systems management can be a challenge for all organizations. This talk discussed how NASA is addressing the challenge through its Systems Engineering Leadership Development Program.

June, 2017—Dr. Regina Griego, Distinguished R&D Systems Engineer at Sandia National Laboratories and INCOSE Fellow, presented *Defining "System" – a Comprehensive Approach.* Over the past decades, a common definition of the term system has eluded researchers and practitioners alike. A team of INCOSE Fellows has been working on developing a more common/comprehensive definition of "system." She discussed the approach used for developing the definition, and the team's proposal of a family of definitions which is in line with both the realist and constructivist world views and covers real and conceptual systems. It is the definition team's belief that this more comprehensive definition can impact the scope of systems engineering and support the aspirations expressed in the INCOSE SE Vision 2025 document.

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Next Meetings *Ann Hodges, Sandia National Labs*

Jul 6, 5:00pm-8:00pm: Summer Social, Chama River Brewing Company: Going Green Saves the Planet.

Mary Compton, Enchantment Chapter Event Director; and Robert Taylor, Friedman Recycling, Virtual Tour Guide.

Abstract: Mingle with fellow chapter members and friends with a beer, some food, and a virtual tour of Friedman Recycling led by Robert Taylor. Friedman Recycling is the largest private paper recycler in the southwest. Their versatile containers, modern truck fleet, flexible equipment sales and rental program, and their streamlined, computerized waste hauling and disposal systems have helped make your world a cleaner, happier place. This event is free, including appetizers and one drink ticket, but you must register. You may bring one guest. Participants must be 21 or over. Event is limited to 40 participants. Register by visiting the Enchantment Chapter website event notice.

Aug 9: Agile Systems and Processes 106 – Risk Management and Mitigation.

Rick Dove, Paradigm Shift International, CEO/CTO.

Abstract: To be effective, projects/processes/products (all viewed as systems) have to mate well with their operational environments. Operational environments are not static, they react to disturbances and evolve with opportunity and whimsy. Inserting a system into an environment is a disturbance. Sustaining a system in an environment entails compatible evolution. The environment is the problem space the system will occupy. Understanding the requirements for a compatible-to-the-space solution is best done before system functional requirements get too far ahead and shape an incompatible path. Given enough understanding about the problem, effective solution requirements and features becomes (almost) obvious. The problem shapes and constrains effective solution. But how do we characterize the environment as a dynamic problem space and develop solution-response requirements; and then, how do we structure a solution for risk-mitigating agility? This presentations introduces methods for dynamic problem-space characterization, and reviews methods for risk-mitigating solution-space agility.

Sep 13: The New Field of Systems Mimicry: Would Evidence from the Natural Sciences Help Design Better Systems?

Len Troncale, California State Polytechnic University, Professor Emeritus and Lecturer.

Abstract: The sciences study natural phenomena using experimental methods. Their evidence and discoveries are widely used in engineering design and implementation. This talk proposes to use their vast data to establish a new specialty called "systems mimicry." This new knowledge base would provide tested, evidence-based solutions to the challenges that all systems face whatever their scale or particular function. The talk will describe the features of systems mimicry and suggest a new tool to explore its data for designing on the systems-level. It will list similarities and differences between the established *biomimicry* and the proposed *systems mimicry*. It will outline how general theories of systems like SPT (Systems Processes Theory) can provide a stimulus for adding the general systems focus to conscious SE praxis and provide a framework for integrating the unintegrated results of several systems science and natural science knowledge bases. Five possible examples of use of systems mimicry in systems design will be presented as case studies (use of hierarchies in materials design; chaos & robotics; using principles of exaptation in design; use of systems evolutionary algorithms; and use of awareness of systems pathology. The talk will end by suggesting a wider, future vision of systems design and SE.

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Other Albuquerque Events

Aug 21-25: International Conference on System Safety, Hotel Albuquerque at Old Town**.** The conference will push the boundaries of the *System* of Safety as well as how we think about the safety of systems; bringing interdisciplinary practitioners and the foremost thinkers in the system safety and related disciplines together to exchange ideas, knowledge, experiences and best practices. http://issc2017.system-safety.org

Jun 22: Greater Albuquerque area (ISC)^2 chapter kickoff/ social. The International Information System Security Certification Consortium [(ISC)^2] members and prospective Certified Information Systems Security Professionals met local cybersecurity professionals to ask questions, get involved, and have fun at Seasons Rooftop, Seasons Rotisserie & Grill, 2031 Mountain Rd. NW. Contact Curtis Keliiaa at 505-845-0185 for information about this new ISC^2 local chapter.

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Not For Women Only

Heidi Hahn, Los Alamos National Lab

As my Future Female Leaders in Engineering students are arriving in Los Alamos and the summer professional development program is beginning, the topic of inspiring young women to pursue careers in engineering is on my mind and in my heart. Here are a couple of presentations on that topic that I'm finding useful. I hope you do, too.

Inspiring the next generation of female engineers | Debbie Sterling | TEDxPSU www.youtube.com/watch?v=FEeTLopLkEo

Close your eyes and picture an engineer. You probably weren't envisioning Debbie Sterling. Debbie Sterling is an engineer and founder of GoldieBlox, a toy company out to inspire the next generation of female engineers. She has made it her mission in life to tackle the gender gap in science, technology, engineering and math.

Pushing Boundaries - Women in Engineering | Dawn Bonfield www.youtube.com/watch?v=LKVEtnjGvxw

Follow Dawn Bonfield on her journey looking at some incredible and inspiring stories of female engineers - could the next one be you?

Books recommended by TED speakers.

Inferior: How Science Got Women Wrong — and the New Research That's Rewriting The Story **by Angela Saini**

I very much appreciated Saini's challenge of popular stereotypes around women in science. From Darwin onwards, male scientists have often brought their own gendered expectations into understanding women. This book challenges many myths, like the idea of the female brain and man as hunter, and pays tribute to the work of female scientists who fight sexism in their fields. — *Deeyah Khan*

Good Night Stories for Rebel Girls **by Elena Favilli and Francesca Cavallo**

This is an illustrated children's book by the co-founders of Timbuktu Labs and creators of the first iPad magazine for children. It's packed with 100 bedtime stories about the lives of 100 extraordinary women from the past and the present, illustrated by 60 female artists from all over the world. It is a must-read for all children. For adults, it shows a diverse look at the world, illustrating women as distinguished, accomplished and, most of all, tenacious. — *Giorgia Lupi*

Lab Girl **by Hope Jahren**

I read this assuming it was fiction and was utterly amazed to find it was an autobiography. I'd like to recommend this account by a female scientist struggling to start and maintain a scientific career, against odds which seem overwhelming at times. It's very funny, and Jahren's quirky personality shines through her telling of almost unbelievable events, her deep struggles with depression and imposter syndrome and the friends, students and family who support her during her wild journey. Her life is an inspiration to scientists everywhere, and this book is a beautiful and hilarious love letter to science and the natural world. — *Natasha Hurley-Walker*

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Lessons From Women Scientists

Amanda Phingbodhipakkiya, TED Resident

Excerpts from IDEAS.TED.COM

Research has found that having a backup plan might actually sabotage your efforts toward Plan A. Before you set up your safety net, read these lessons from women scientists.

Having a backup can alleviate some of the psychological discomfort associated with uncertainty and help us feel better about the future. But by and large, having a backup plan comes with a cost—as shown in these stories from the history of science, matched with the latest research on how our minds work.

- A backup plan can make you less excited about your main plan.
- It could also water down your motivation.
- Another lesson in Plan A thinking: Stay focused on your goal, so you know how best to reach it.
- Before you set out to pursue your goal, remember this: being risky doesn't mean being reckless.
- Anticipate adjustments to your plan.

These lives of women scientists can provide inspiration for sticking to your Plan A: Nobel prize winner YouYou Tu, nuclear physicist Chien-Shiung Wu, and neurobiologist Rita Levi-Montalcini.

So, the next time you find yourself worried about *not* having a backup plan, ask yourself this: is making a Plan B worth the risk to your Plan A?

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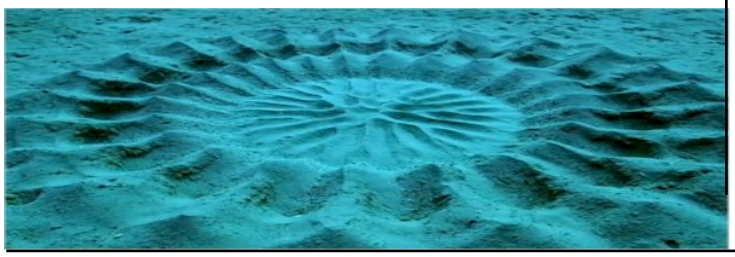
A System Designed by a Fish?

Watch Here



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2017 Oct 30-Nov 3	Las Vegas, NV
2018 Feb 26-Mar 2	Las Vegas, NV
2018 Apr 2-5	Denver, CO

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Astronaut Jean-Jacques Favier visits UTEP INCOSE Division

fosters link with International Space University, and completes CO2–O2 prototype for NASA Mars HI-SEAS testing

Eric Smith, University of Texas El Paso

Dr. Jean-Jacques Favier flew on the 1996 Space Transportation System mission #78 (STS-78), where he logged over 405 hours in space, studying life in microgravity. In April, Dr. Favier visited UTEP to deliver a lecture to INCOSE Student Members and to the class of Systems Engineering (SE) 5344 Integration, Verification & Validation (IV&V).

While at UTEP, Dr. Favier signed a cooperation agreement between the International Space University (ISU) of Strasbourg, France, and the University of Texas at El Paso (UTEP). The agreement regarded the mutual cooperation to deploy a new CO2 removal, O2 production process and system, which is being developed by Dr. Angelo Karavolos, who completed his dissertation with the joint mentoring of Dr. Favier and Dr. Eric Smith. Dr. Karavolos has a patent for the CO2- O2 REMOVAL SYSTEM (CooRS).

The prototype of the CooRS process and system has been deployed to the NASA Hawai'i Space Exploration Analog and Simulation (HI-SEAS) experimental camp. The HI-SEAS NASA 2017 program is a long duration Mars human mission simulation (8 months), occurring on the slope of Hawaii's Mauna Loa volcano. Dr. Favier has noted how the process and prototype system, developed by Dr. Angelo Karavolos, for CO2 removal and O2 production, can be tested in the confined atmosphere of the HI-SEAS Mars-simulation habitat. The HI-SEAS setting and testing will allow for proof of concept, and will highlight the very unique research performed together by ISU and UTEP. ∞

Dr. Favier (center of screen) with Dr. Smith (right side of screen, in back) and Dr. Karavolos (in front of Dr. Smith), with INCOSE UTEP Student Division members and Systems Engineering students.

Dr. Angelo Karavolos with Dr. Favier (right), preparing the CO2 scrubbing, O2 generating apparatus for HI-SEAS testing

CooRS benchtop prototype for CO2 removal and O2 generation. Future uses are foreseen in space, aviation, undersea, and mining operations

Silicon Valley Tech Tour of INCOSE UTEP Student Division

Gustave Marquez, ASEP Coordinator, UTEP Student Division

The academic and professional purpose of this April 28 – May 1, 2017 tour was to promote professional experiences through exposure to companies and academia, with visits to Tesla Motors, Google Inc. and Stanford University.

INCOSE UTEP seeks to bring opportunities to the University of Texas at El Paso, and to network with professionals and recruiters of companies for job and internships. INCOSE UTEP wants to provide professional experiences for all students, so that the Student Division Members become more confident and self-assured.

The group toured the Tesla Motors production line for the Model S vehicle, and was privy to witnessing the pioneering of a completely new eco-friendly automotive company. On returning to UTEP, students will speak about their experiences and encourage the next generations to become more involved in their field. ∞

Pepe Martinez
President

Natalia Acosta
Vice President

Dayren Rodriguez
Secretary

Karla Huerta
Treasurer

Gustavo Marquez
ASEP Coordinator

The UTEP Student Division Tour Group at Tesla

Agile Systems and Systems Engineering Working Group

Rick Dove, Chair, AS&SE WG

The capitalized word Agile is used as a noun by many people. "We do Agile." In this respect it refers to software project management values, backed up by some good software development process principles, shared by a family of software development practices. Some people trained or certified in coaching agile software development would like to solve the needs of agile systems engineering with the same core values and principles. When all you know is a hammer, every problem looks like a nail.

The INCOSE WG on Agile Systems and Systems Engineering does not subscribe to this insufficient understanding and misguided belief.

Instead, we are focused on agility as an adjective – an operational property of systems and the systems engineering processes that create them. A property that enables and facilitates effective and sustainable systems and development processes faced with uncertainty and unpredictable changes in their operational environments.

Charter (briefly)

Purpose – Develop a body of knowledge that will inform systems engineering on how to deal with unpredictable, uncertain, and evolving environments.

Goals –

- Agile systems-engineering and agile-systems engineering fundamentals.
- Agile acquisition processes.
- Supplier Quick Reaction Capability (QRC).
- System and process design that can respond effectively to the pace of technology and changing user expectations.
- International engagement.

Scope – Fundamentally necessary and sufficient INCOSE-relevant architectural concepts and concept-employment principles that enable any system or process to be agile.

Architecture and design principles that enable system and process agility are known [1]. They weren't invented. They were discovered in the 90's by analyzing the causal DNA of this agility property in hundreds of systems and processes. But architecture and design principles are static enabling concepts. Agility manifests in execution – in the facilitated behavior of system and process dynamic operations.

A major current project of the WG is the discovery of an Agile Systems Engineering Life Cycle Model (ASELCM). It is a discovery, not invention, project – analyzing what works and why in effective process operational dynamics across a wide variety of agile process models.

The general focus of this WG is on education and socialization of the enabling concepts, employment examples of these concepts in application, and discovery of fundamental facilitating behaviors – in broadly-applicable systems engineering.

We are a working group, with the accent on working. Working manifests as self-motivated collaborative projects that result in published or performance artifacts. We also welcome curious visitors at our twice-annual IW and IS workshops, as well as observers and lurkers among all on the email distribution list.

What Work Have We Done?

- Five annual INCOSE Webinars on agile System and Process fundamentals.
- Wrote INCOSE Handbook V4 section on agile systems engineering.
- Conducted fundamental-based tutorials at IS and IW.
- Provided papers and panels at INCOSE International Symposiums.
- Organized and edited two INSIGHT Theme issues on Agile SE and on Agile Security.
- Completed four ASELCM Phase 1 Case Studies [2, 3, 4, 5].
- Confirmed an Agile SE Life Cycle Model Framework and the necessary addition of a Research stage, working paper: *Agility in Systems Engineering—Findings From Recent Studies* [6].
- Discovered nine fundamental operational principles that appear necessary for sustaining agile SE processes [6].
- Developed the CURVE operating environment framework: Caprice, Uncertainty, Risk, Variation, Evolution [6].

What Work Are We Doing?

- ASELCM Phase 2, vetting Phase 1 discoveries as fundamentally necessary.
- Five WG collaborations in process.
- OSA, Agility, and Complexity project.
- Sixth annual INCOSE webinar in development.
- Systems Summit ConOps for Chapter employment [7].
- Systems Summit planning for IS17 and IW18.
- INSIGHT Theme issue 2018 Q2 draft essays for review at IW18: *Enabling and Practicing Systems Engineering Agility*.
- Presentations to various Chapters.

What Work is Planned?

- ASELCM project report as INCOSE Product.
- Agility-enabling hardware development infrastructures and concepts.
- Mixed discipline agile systems engineering processes.
- Quick reaction capability, with accent on enabling capability.
- SEBoK contributions.
- Supplier-compatible agile-acquisition concept guidance.
- Whatever YOU want to do, consistent with our Charter.

How Do We Do It?

- Enable and facilitate distributed remote project team collaboration.
- Facilitate project team formation and operation.
- Conduct two annual workshops at IW and IS that review projects in process, discuss new project interests, and start new projects.
- Select project starts that fulfill a need felt by you, by your organization, and by others.

Why You Want to Work With Us

We are mission oriented – focused on employable deliverables that satisfy application needs. The WG provides the opportunity to broaden your understandings through collaborative diversity, and develop actionable knowledge of value to you and your organization. On a personal level, engagement in WG activity is professional development, network enlargement, and new knowledge assimilation. On an organizational level, you bring home actionable and sharable knowledge, broader understandings, and more capability.

How Do You Get Started?

Email the WG chair to be on the WG distribution list. Attend our IW and IS workshops. Come with a passion to learn and make something happen.

Chair: Rick Dove, Paradigm Shift International, dove@parshift.com.
Co-Chair: Kevin Gunn, MITRE, kgunn@mitre.org
Co-Chair: Ron Lyells, Retired, rlyells@aol.com
Co-Chair: Larri Rosser, Raytheon, Larri_Rosser@raytheon.com

References:

Links to seven publications referenced:
www.parshift.com/s/170701References.pdf

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2017 Socorro Systems Summit—Oct 6-7

Co-sponsors: INCOSE Enchantment Chapter and New Mexico Tech Electrical Engineering Department

Chapter Board

Event: Practitioners teaming for knowledge exchange and development on issues of interest and professional development.

Location: New Mexico Tech (NMT), Socorro, New Mexico – a charming small-community location 60 minutes south of the Albuquerque airport.

Attendance fee: $100, with UTEP and NMT students admitted free with faculty-advisor registration and workshop topic research completed before attendance, per faculty advisor guidance.

Registration: is open now.

Full Event Detail: in Chapter website Library tab.

Workshop Topics:

Eight topics of current interest have been selected by survey and interviews from an initial candidate list of 14 topics.

Objectives: Engaged professional development. Expanded work-relevant network. New knowledge to take home. A stimulating time-out from deadline driven work that leaves little time for thinking.

Intent: Understand problem and solution spaces of the topic area better—barriers to solution, cultural incompatibility and push back, systemic inertia, misaligned forces, and solution objectives and requirements.

Topics:

- How can SE accept the need to enable and facilitate agile security, adaptable to adversary attack?
- How can fail-fast rapid innovation concepts be appreciated and employed?
- What blocks and enables integrating project management and systems engineering?
- How can SE operate as a multidiscipline enabler, art, and science?
- What are the organizational challenges and opportunities for transforming to a systems engineering culture?
- What impedes and promotes attention to upfront and in process Problem-Space risk characterization?
- What prevents and enables high performance teaming?
- What are infrastructure needs to enable Quick Reaction Capability (satisfying urgent needs effectively)?

Keynote Speaker: Ann O'Neil, CSEP, has served on the INCOSE Board of Directors as Director of Industry Outreach, and is the recipient of the INCOSE Founders Award. Previously Ann was Chief Engineer of Capital Programs for MTA New York City Transit, currently she is the Principle of Ann O'Neil Consultants.

Day 1: Speed dating. First day will have two parallel tracks of four workshop topics each. These will each be 1.5 hours in duration. Participants can attend four intros in the time allowed. The session will conclude with setting objectives for the 2nd day workshop.

Day 2: Two dance dates. Participants will choose the two 3-hour workshops they will participate in, one in the morning and one in the afternoon, which don't have to be among the four intros attended on day-1. The objective of day-2 is to develop a team-work environment, expose each participant to the thinking, practices, and knowledge of the others, and provide new contacts that can become longer term collaborative relationships. An equal objective is to have the workshop identify a clearer understanding of the problem, concepts, and knowledge that surfaces in the workshop.

Meet-and-Greet reception at end of day-1 provides an opportunity to socialize with new contacts and old friends.

Optional dinner gathering, Empowering Women as Leaders in Systems Engineering (EWLSE), will be held after the meet-and-greet reception, at the Socorro Springs Brewery. Tickets are $15.00 for all who wish to attend

Value Proposition for Personal and Organizational Participation

The knowledge base is exploding. The duration of value for any given piece of knowledge is shrinking as new knowledge makes old knowledge obsolete faster. This puts pressure on the speed of knowledge diffusion and a focus on the anticipation of new knowledge needs. When an organization needs to learn quicker it must shorten the time of knowledge acquisition.

Effective learning is amplified when conducted as a team sport, among people driven by curiosity and a deep-felt need to know something more – a specific something. Collaborative-learning workshops chose topics screened for real appeal to real practitioners – who have a real application for the results. Participants self-select, bring passionate questions and diverse perspectives, and never fall asleep. Collaborative learning is aided when topics do not have a clear established knowledge base, and when participants cannot claim dominant expertise.

Collaborative learning is an effective mechanism for knowledge agenda fulfillment, knowledge diffusion, collaborative culture initiation, and community of practice formation. Communities of practice are an effective mechanism for nurturing a collaborative culture and increasing the velocity and richness of knowledge diffusion. ∞

On Defining Agile Systems Engineering

Rick Dove, Paradigm Shift International

A definition of Agile Systems Engineering is necessarily context dependent on Systems Engineering, which should in turn be context dependent on Engineering. I will approach this perhaps differently than others.

I choose to view engineering fundamentally as an intelligence directed activity that designs artifacts (broadly meant) which exhibit design coherence (key word).

Webster defines coherence as:

1: The quality or state of cohering, such as:
- systematic or logical connection or consistency.
- integration of diverse elements, relationships, or values.

2: The property of being coherent: united as or forming a whole.

Engineering is generally defined relative to a domain. But in all cases it is fundamentally an intelligence directed activity that can include both biological and artificial – it is the activity (designing) and the outcome (coherence) that are defining. Designing a coherent algorithm is an engineering activity. Designing a coherent strategy is an engineering activity. The work of a building architect is engineering. An artificial intelligence that designs new molecules that exhibit coherence is engineering.

Engineering, arting, and crafting are activities on a continuum carried out by artifact creators with purpose. The essential semantic difference between the three is in the nature of the activity, not in the quality of the result, or even the completion of the activity. Frank Lloyd Wright engineered the total coherence of Falling Water, including the structural coherence, which ironically resonated with its name, as the structural coherence was inadequate to sustain the stresses and had to be subsequently re-engineered years after it was built. Nevertheless, his initial total-design activity was engineering, with quite a bit of coherence.

Engineering, arting, and crafting are all subject to laws of coherence (whatever they might be fundamentally). In the end, the elements employed in artifact creation must work together in concert, synergistically. We can ignore elements that may be present but do not participate in coherence: software code that is isolated, forgotten, and cannot be activated; structural members with unnecessary purpose and of no value if removed; electronic circuitry that has useless vestigial tails.

Defining Engineering: designing something constructible that can function sufficiently to satisfy a purpose when constructed according to the design. Note I did not say an *intended* purpose – what is designed may actually fulfill a different purpose than intended, it is nevertheless an engineering activity. Engineering does not carry a requirement of beauty. Its quality requirement is functional coherence. Engineers have engineered things that don't get used, for lots of reasons: something better was engineered by someone else, or the functional purpose ceased to exist. Nevertheless, an engineering activity occurred. The elements are peculiar to the domain of the engineering activity: physical materials, natural laws in various domains, computer instructions, and other such.

Defining Arting: engineering and crafting something that has a quality requirement defined as a mental interaction and reaction by an observer or participant. Art doesn't have to be beautiful in a critic's esthetic sense (though the ability to cause a reaction might be called beauty). Art doesn't have to have lasting value or lasting existence – performance art, for instance, is art in the moment.

Defining Crafting: The exercise of procedures to construct a functional artifact. It may function as art, and/or as a usable engineered artifact; but there is little engineering in the activity, except that which is felt necessary by the craftsman to interpret a design intent.

We speak of system science as a missing element in codified systems engineering. The systems science of relevance are the laws of system coherence. What are the universal laws of coherence, and what are the domain dependent laws of coherence? The concept of system coherence is basic to all engineering, arting, and crafting activities.

Systems engineering is engineering by the definition above. Systems engineering is fundamentally about total-system coherence. But as it is currently codified, it has a large focus on craft, and some arm waving about art.

Systems engineering distinguishes its domain of engineering in the *systems* context.

Agile systems engineering distinguishes the type of systems engineering with the adjective *agile*. It is called *agile* systems engineering because it exhibits agility – not because it has a practice dogma (like agile software development practices). It is an organic complex system (process) motivated by self preservation to evolve suitably in a potentially uncooperative environment. An understanding of what the phrase *agile systems engineering* means is captured at the encompassing conceptual level, not at the procedural or best practice level. This understanding starts with succinct statements of need and intent.

Need: Effective system engineering in the face of uncontrolled change.

Intent: Effective response in a systems engineering operational environment that is Capricious, Uncertain, Risky, Variable, and Evolving (CURVE).

The word *effective* means that a valued result from resource employment is obtained. At one extreme, a project canceled before completion should provide valuable and employable learning and artifacts. At the other extreme, a deployed system should provide sustainable relevance beyond a break even ROI. In the middle, responding to changes in the engineering operational environment should sustain forward progress. The word *should* is used to indicate a necessary objective for an agile systems engineering process: value delivery.

Uncontrolled change encompasses uncontrollable change, but is not limited to that which can't be controlled, just what isn't controlled regardless of reason.

The definition of agile systems engineering is rooted in what it does, not how it does it. The how can be satisfied many ways. Agile systems engineering responds effectively in CURVE environments, operates asynchronously and potentially simultaneously in at least seven life cycle stages, appears to behave according to nine operating principles, and melds target system, development system, and learning system into one interdependent system.

For details, see Agility in Systems Engineering – Findings from Recent Studies. Unpublished working paper, 15-April. www.parshift.com/s/ASELCM170515-AgilityInSE-Findings.pdf

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Resources

From TED, watch: *Why you think you're right -- even if you're wrong*. Perspective is everything, especially when it comes to examining your beliefs. Are you a soldier, prone to defending your viewpoint at all costs—or a scout, spurred by curiosity? Julia Galef examines the motivations behind these two mindsets and how they shape the way we interpret information. Do you defend your own beliefs or do you see the world as clearly as you can?

From PopTech, watch: *Mindfulness over matter*. Harvard psychology professor Ellen Langer discusses the surprising power of being present during everyday activities. "We have many, many studies that suggest that the limits we assume are real are artificial, and that we don't have to accept them at all."

From TEDx, watch: *Mathematics and sex*. Mathematics and sex are deeply intertwined. From using mathematics to reveal patterns in our sex lives, to using sex to prime our brain for certain types of problems, to understanding them both in terms of the evolutionary roots of our brain, Dr Clio Cresswell shares her insight into it all.

From TED, watch: *Meet the inventor of the electronic spreadsheet*. Dan Bricklin changed the world forever when he co-developed VisiCalc, the first electronic spreadsheet and grandfather of programs you probably use every day like Microsoft Excel and Google Sheets. Join the software engineer and computing legend as he explores the tangled web of first jobs, daydreams and homework problems that led to his transformational invention. ∞

Chapter Membership *Jeni Turgeon, Sandia National Labs*

Enchantment Chapter now has 121 active members and student members.
We welcome the following new regular members (Q1 & Q2):

Jason Adams	SAIC
Bartley Byrnes	SAIC
Marissa Conroy	Sandia National Laboratories
Sharlee Hughes	SAIC
Patrick Munoz	Sandia National Laboratories
Robin Reynolds	Sandia National Laboratories
Eric Rodriguez	???
Per Frost Vedsted	Grundfos Holding A/S

We welcome the following new student members (Q1 & Q2):

Eduardo Castillo Fatule	University of Texas El Paso
Martha Chan	Los Alamos National Lab
Miguel Corral	University of Texas El Paso
Jorge Delgado	University of Texas El Paso
Vincent Fonseca	University of Texas El Paso
Rodrigo Hernandez	University of Texas El Paso
Franciscio Martinez	University of Texas El Paso
Jesus Sanchez Primo	University of Texas El Paso ∞

Connect to Your Community of Practice

Chapter meetings with a focus on systems engineering are held monthly on the second Wednesday, except when social events occur, with mingling, dinner, and often a speaker chosen for enjoyment by systems engineers and guests alike.

Monthly meetings feature speakers from out-of-town as well as local subject matter experts on topics of relevance.

On occasion special facility tours are arranged, sometimes as the monthly meeting, and other times on a separate schedule.

Chapter meetings begin at 4:45 pm. After chapter news, announcements and introductions, the presentation and discussion lasts until 6:00 pm; and are carried and recorded as a web meeting for anybody to access who can't attend in person.

Tutorials with coverage on topics of interest are arranged approximately twice a year. Delivered by experts in the field, tutorials range from 1/2 day to day+ durations, and generally involve a tuition.

Mix with people who have the same professional interests as you do, but with a diversity of perspective beyond daily workmates. It comes in handy when you need help or answers to questions outside your accumulated experience, need a connection at another organization, or simply want some mind stretching thought.

Meeting announcements, event notices, and web-meeting links routinely go to all INCOSE members within the Chapter's geographic territory; as well as to names on a special *information* list open to one and all. Sign up for the *information* list with a request to the Chapter secretary listed below. ∞

Chapter Board

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Published quarterly by

INCOSE Enchantment Chapter,
New Mexico.
www.incose.org/enchantment

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