The Enchanted View
— Thinking About Systems —

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www.incose.org/enchantment

Your Presence is Valued!

Ron Lyells, Chapter President, Honeywell

Sometimes showing up is the most important thing we can do as members of any community that we may be part of. In the last newsletter I mentioned three reasons why we as members of INCOSE decide to become part of this organization and what drives us to get involved. Basically appealing to all of our self- interests, I focused on networking, even through our Twitter account, as a way to provoke each of us to think about why we get involved.

In this message, I would like to turn our focus from looking inward to looking outward.

Have you ever been invited to a social function where your initial response was reluctance? But you have a friend or co-worker that just will not let you say no, and you eventually give in, albeit still reluctantly? Then you go to the event, and you end up having a great time, meeting new people, and sometimes meeting new friends. And maybe you found out that others at the event were flat out happy that you were actually there. You ended up making their life more fulfilling, more joyful in that moment in time.

Well, today, I am going to be that pesky friend, or co-worker, who just will not take no for an answer. We have two events planned for the fourth quarter of this year that I would like to ask you to attend. The first is the Socorro Summit at the end of October, the second is our annual social function in December. You can read about both items elsewhere in this newsletter.

The Socorro Summit represents a grand experiment in making culture for us in this chapter. We are creating a place in time where people can show up and edify each other. We have people outside of New Mexico who are coming to lead and participate in the workshops. These people are coming because they are enthusiastic about the topics selected for discussion and the collaborative aspect of the way the workshop is being planned.

Sometimes showing up is the most important thing we can do. Your presence is valued! ∞

Vote Now For Your 2017 Chapter Directors and Officers

A ballot with nominations and opportunity to write in your own candidate, or even yourself, should have arrived in your email.

It's the voting season, so if you have Hillary Clinton, Donald Trump, Gary Johnson, or Jill Stein on your mind, know that they are not eligible—write-ins must be INCOSE Enchantment Chapter members. Bios for nominees can be reviewed Here, at www.incose.org/ChaptersGroups/Chapters/ChapterSites/enchantment/about-this-chapter/2017-elections/ ∞

Socorro Systems Summit
Professional Development and Organizational Benefit

October 28-29, 2016
Socorro, New Mexico
New Mexico Tech
Joseph A. Fidel Center

8 Collaborative Workshops
Co-Sponsored by:
INCOSE Enchantment Chapter
NMTech EE Department

Self-Select for Interest:
1st Day: sample 4 topics
2nd Day: contribute to 2 topics

- Systems Engineering Cultural Transformation
- SE as Multidiscipline Enabler/Art/Science
- High Performance Teaming
- Systems of Systems Evolutionary Integrity
- Agile Security Adaptable to Attack Evolution
- Organizational Teaming for Joint Project Pursuit
- Agile HW-Development Infrastructure/ConOps
- Fail-Fast Rapid Innovation Concepts

Details and registration at www.incose.org/enchantment. See Newsletter pages 5-6-7 here for more info.

Holiday Social—Savoy Bar & Grill—December 2

Mary Compton, Sandia National Labs

Mark your calendar for the Enchantment Chapter Holiday Social on Friday, December 2, 2016 in the Napa Room at the Savoy Bar & Grill at 10601 Montgomery Blvd. NE in Albuquerque. Join your Systems Engineering Community of Practice for appetizers and drinks at 5:30 PM followed by a 3-course dinner at a cost of $20 per person. Watch for more details in upcoming emails.

This year's social will feature a presentation by Jennifer Owen-White, manager of the first official urban wildlife refuge in the Southwest, Valle de Oro. The refuge protects land along the Rio Grande River, including significant water rights to address restoration of the Middle Rio Grande. With all its 570 acres acquired, this urban jewel provides a place for people to get outside and truly enjoy nature within their own community.

This new refuge, established in 2012 as part of the National Wildlife Refuge System, is a partnership effort of many in the community that recognized the importance of having a wildlife refuge in this urban setting. Valle de Oro offers a unique environmental education and recreation opportunity in a highly populated area while promoting a wildlife conservation message. Ms. Owen-White, the refuge's first manager, does everything from planning outdoor experiences, to meeting the refuge community, to writing lots of reports. ∞

Jennifer Owen-White

Savoy attracts system engineers and their guests for the winter social.

Valle De Oro attracts ground-nesting birds, grassland species, geese, cranes, and various wading birds.

Meet Jennifer Owen-White—Holiday-Social Speaker

Why I gave up on becoming a doctor to play in the dirt—TEDxABQWomen

From TEDx in Albuquerque 2015, watch: www.youtube.com/watch?v=Il6f0MqE-u8.

Among STEM fields, conservation is Queen. Women in conservation command fulfilling careers and address the most pressing concern of humanity, our future. Despite this, the number of women in conservation is lower than many STEM fields and young girls are often dissuaded from pursuing a career in conservation.

As the Refuge Manager of the Valle de Oro National Wildlife Refuge, Jennifer mentors a team of young women finding their place in conservation work.

Jennifer is the first refuge manager of the new Valle de Oro National Wildlife Refuge in Albuquerque, New Mexico. Valle de Oro is the first urban refuge in the Southwest and part of a larger push by U.S. Fish and Wildlife to reach urban audiences. ∞

Summer Social—Systems Life Cycle of the Grape—What You Missed

Mary Compton, Sandia National Labs

The Enchantment Chapter's third annual Summer Social, entitled Systems Life Cycle of the Grape, was held on July 6th at the St. Clair Bistro in Albuquerque. Thirty people joined us for this opportunity to taste some wine and connect with their Systems Engineering Community of Practice. The crowd of thirty included twenty Enchantment Chapter members and their guests. Ten of our colleagues who have not yet joined INCOSE also joined us for this year's social.

This year's social began with an overview of winemaking by Enchantment Chapter Board member Heidi Hahn. Heidi presented a brief history of winemaking, including how winemaking came to New Mexico. St. Clair furnished us with two knowledgeable servers who provided us with the story of the St. Clair winery. We enjoyed tasting four of the St. Clair's excellent wines with some delicious appetizers. We tasted St. Clair Mimbres Pink, DH Lescombes Chenin Blanc, St. Clair Cabernet Sauvignon, and DH Lescombes Port. Our servers discussed each of the four wines in more detail, including the grapes and special processing used to produce the wine, as well as food pairings for each wine tasted. About a third of the attendees stayed to have dinner, enjoy more wine, and engage in great conversation following the event.

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Recent Meetings

Ann Hodges, Sandia National Labs

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

July 2016—Chapter Summer Social – At this free event at St. Claire Winery & Bistro, attendees learned about wine making from Heidi Hahn, Director of the Engineering Capability Development Office, Los Alamos National Laboratory**,** who presented *The Life Cycle of a Grape*.

After Heidi's presentation, attendees tasted four of St. Clair's wines. Appetizers and soft drinks were also included. After the event, many participants enjoyed a no-host dinner and continued socializing.

August 2016—Larry Pohlmann, Strategics, presented *How Ready Are We to Consider Natural System Concepts.* The biomimicry community would have us believe that the 'genius of Nature' is a ready source of inspiration for a wide range of our engineering, design, and sustainability problems. Should the SE community accept – and act on – this belief?

The presentation started with a brief overview of the objectives, activities, and findings-to-date of the INCOSE Natural Systems Working Group (NSWG). A major premise of the NSWG is that the SE community can, and should, more routinely consider natural systems data and solution concepts.

The presentation then proceeded to systematically address our readiness to do so from seven different, but interdependent, perspectives.

September 2016—Rick Dove, CEO/CTO, Paradigm Shift International, presented *Agile Systems and Processes 105: Operational Awareness – Alert to Threats and Opportunities.* Rick showed that agility is required in process and product operational environments that are Capricious, Uncertain, Risky, Variable, and Evolving (CURVE). He then showed the primary means for dealing with CURVE environments as proactive alertness to internal and external situations, with four examples.

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Next Meetings

Ann Hodges, Sandia National Labs

October 12: Testing of Autonomous Systems – Challenges and State of the Art.

Philipp Helle, Airbus Group Innovations, MBSE. (Speaking from Germany, so time is 9:00-10:15am MDT).

Abstract: Autonomous systems are on the rise. However, the challenge to test autonomous systems to ensure their safe and fault-free behaviour is not solved yet. This is especially critical when we consider the fact that autonomous systems are often safety-critical systems envisaged to interact with humans without explicit human supervision. This presentation points out why testing autonomous systems is such a challenge and provides an overview of the current state-of-the-art and state-of-practice. The gathered information is then condensed into guiding points for the way forward.

October 28-29: Socorro Systems Summit, New Mexico Tech, Socorro, NM.

Organizers: Mary Compton and Rick Dove, Enchantment Chapter, Aly El-Osery, New Mexico Tech EE Department.

Keynote Speaker: Garry Roedler, INCOSE President Elect

Bio: Garry Roedler is a Fellow and the Engineering Outreach Program Manager for Lockheed Martin and the President-elect for the International Council on Systems Engineering (INCOSE). His systems engineering (SE) experience spans the full life cycle and includes technical leadership roles in both programs and business functions. Some of his industry leadership roles include member of the INCOSE Board of Directors, US Lead for ISO/IEC JTC1/SC7 Systems and Software Engineering, steering group member for the National Defense Industrial Association SE Division; working group chair for the IEEE Joint Working Group for DoD SE Standardization; editor of ISO/IEC/IEEE 15288, Systems Life Cycle Processes and several other standards; and key editor roles for the Systems Engineering Body of Knowledge (SEBoK) and the INCOSE Systems Engineering Handbook. This unique set of roles has enabled Garry to influence the technical co-evolution and consistency of these key Systems Engineering and System of Systems resources.

Abstract: There are eight collaborative-exchange workshop topics to choose from. Participate in four of eight topic introductions on the 28th to establish objectives for in-depth collaborative exchange on the 29th. On the 29th, choose two of eight topics for in-depth participation. Go to the Chapter website for complete details at www.incose.org/enchantment, and see pages 5-6-7 of this newsletter for topic and schedule info.

November 9: How is Model-Based Systems Engineering Justified?

Ed Carroll, Sandia National Laboratories, Research Analyst.

Abstract: The change process, investment, training, and tools needed to implement a model-based systems engineering (MBSE) approach across the engineering enterprise are substantial. How is the change from a document-based systems engineering approach to an MBSE approach justified? The primary conclusion from a literature review is that there is a significant advantage to project performance by applying an MBSE approach. An MBSE approach made the engineering processes on a complex system development effort more efficient by improving requirements completeness, consistency, and communication. These were seen in engineering processes involved in requirements management, concept exploration, design reuse, test and qualification, verification and validation, and margins analyses. An MBSE approach was most effective at improving defect prevention strategies. The approach was found to enhance the capability to find defects early in the system development life cycle, when they could be fixed with less impact and prevented rework in later phases, thus mitigating risks to cost, schedule, and mission.

December 2: Holiday Social, Savoy Bar & Grill, 10601 Montgomery Blvd. NE, Albuquerque.

Speaker: Jennifer Owen-White, Valle de Oro National Wildlife Refuge, Fish and Wildlife Service Refuge Manager.

Producer: Mary Compton, Sandia National Laboratories.

Abstract: Join your Systems Engineering Community of Practice for appetizers and drinks at 5:30 PM followed by a 3-course dinner at a cost of $20 per person. This year's social will feature a presentation by Jennifer Owen-White, manager of the first official urban wildlife refuge in the Southwest, Valle de Oro. See newsletter page 2 for more information on this event.

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System Failures Lead to Better Designs

Anthony Matta, Chapter President Elect, Sandia Nat'l Labs

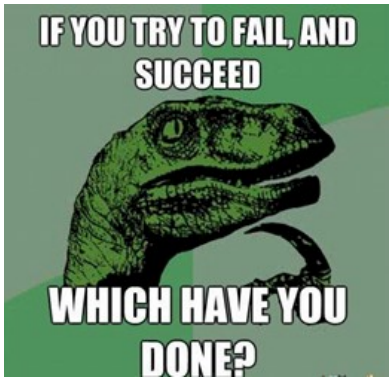
First, let me graciously thank you for allowing me to be your incoming President of the Enchantment chapter for the 2017 calendar year. This is an impressive and notably recognized chapter throughout INCOSE, and across the world. This is due to your commitment to excelling in the field of system engineering and enhancing the understanding and application of good systems engineering within your spheres of influence.

As I partner with our current president Ron Lyells to wrap up our end of year chapter Circle Award activities, and our past president, Rick Dove, for the Socorro Systems Summit, I have been contemplating how I can prepare myself for taking the reins of such a high quality organization the Enchantment Chapter has become. The only way that this can be accomplished is by a strong partnership among the Board of Directors and each of you in the membership. I would like to spend the incoming year focusing on two efforts:

1) Promoting and recognizing the daily efforts and successes in Systems Engineering that each of you face in your everyday jobs and lives.
2) Eliciting help to support the Board activities, such as chapter events and activities.

Through this effort, our network of friendships and professional connections can strengthen to develop new ideas, fresh opportunities, and more diverse people than our chapter has ever reached before.

I challenge each of you to start coming up with new ideas and desires that you would like to lead, document, or try out for our chapter. The best systems engineers in the world all have failure stories, and so I look forward to embracing our lessons learned just as much as our successes. Some new ideas might work and some might not; either way we will grow. Let's figure out what does and doesn't work so that we can move into the future. As Ron Lyells had mentioned in the previous newsletter, we now have our Twitter account, which is setup so that any of you may reach out and share some of your ideas. You will also have the opportunity to find us on LinkedIn and add yourself as an INCOSE Enchantment Chapter member. I welcome each of you to reach out to me directly on with any feedback, at my email armatta@sandia.gov or you may add me on LinkedIn.



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Not For Women Only

Heidi Hahn, Los Alamos National Labs

Just a few links to interesting things this time.

From TED, Watch: *How women wage conflict without violence***.** Filmmaker Julia Bacha shares stories of effective nonviolent resistance, including eye-opening research on the crucial leadership role that women play. Nonviolent campaigns are 100 percent more likely to succeed than violent ones. www.ted.com/talks/julia_bacha_how_women_wage_conflict_without_violence

From TED, Read: *TEDWomen 2016 – It's About Time.* This conference, in San Francisco, October 26–28, will explore how time and attention shape our lives, in a three-day program with speakers from the worlds of science, politics, psychology, the arts and more. I can't encourage you to attend, as it conflicts with the Socorro Systems Summit, as well as the EWLSE dinner gathering organized by Regina Griego; but I expect that some, if not all, of the 18 minute talks will be available for download shortly after. https://tedwomen2016.ted.com

From Engineering News Record, Read: *Engineering Educators Elect First Black Woman President-Elect.* Bevlee Watford, associate dean for academic affairs at Virginia Tech's College of Engineering, has become the first black woman to be president-elect of the American Society for Engineering Education. Congratulations, Bev! www.enr.com/articles/39806-engineering-educators-elect-first-black-woman-president-elect

From the National Science Foundation, Read: 'Belonging' can help keep talented female students in STEM classes. www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=189603&org=NSF&from=news

From Harvard Business Review, Read: *Why Do So Many Women Who Study Engineering Leave the Field.* https://hbr.org/2016/08/why-do-so-many-women-who-study-engineering-leave-the-field

From Intel, Read: *Decoding Diversity: The Financial and Economic Returns in Tech.* This June 2016 report provides the first of its kind analysis, quantifying the economic impact of improving diversity specifically for the tech sector.

The report has data from 167 U.S. companies and concludes that increased representation of African-American, Hispanic and female employees has significant economic implications, driving productivity, growth and revenue gains in the technology sector. www.intel.com/content/www/us/en/

EWLSE Dinner Gathering at the Summit

Regina Griego, Sandia National Labs

There will be a dinner gathering for Empowering Women as Leaders in Systems Engineering (EWLSE) at the Socorro System Summit, beginning at 6:30 PM, Friday, October 28th at Socorro Springs Brewery. We enthusiastically invite Summit attendees to join in a dialogue where we will ask participants to share their stories, exchanging tips and insights about navigating the systems engineering leadership journey, with particular emphasis on the Women Systems Engineer brand of leadership.

We ask participants to sign up in advance; there is a cost of $15 to cover dinner. People are asked to arrive at 6:30 PM with dinner being served at 6:45 PM and sharing starting thereafter.

Don't miss the conversation! ∞

Collaborative Exchange at the Socorro Systems Summit

Rick Dove, Paradigm Shift International

Workshop abstracts below are suggestions by the moderators, but **workshop participants will own the agenda**. Moderators will instigate discussion with a brief introduction on the first day, and then turn the floor over to participants for convergence on objectives for the second day. Moderators welcome pre-Summit communication – see Program Committee listing for email addresses.

Systems Engineering Cultural Transformation
Ed Carroll, Sandia National Labs.

- A systems engineering culture is an umbrella of shared values and behaviors that transcends the individual cultures of teams, departments, and disciplines—rooted in the appreciation of overarching system concepts and system relationships. Engineering is an ancient discipline, but systems engineering has a history of only a few decades. The primary benefits of systems engineering have been stated as the ability to control complexity, improve communication, and prevent defects. Systems engineering and particularly model-based systems engineering, is often touted as the approach to ensure high reliability from systems that are at the same time becoming more automated, adaptable, agile, and interoperable. These systems tend to also become more complex system-of-system solutions.

  If systems engineering is the approach to control this explosion of complexity and assurance of reliability, then why is the transformation to a systems engineering culture so difficult? It has been said that determining the return-on-investment for a transformation to a systems engineering approach is practically impossible to determine. What, then, is the paradigm shift that needs to happen to implement a successful systems engineering culture? What is required for an effective transformation? What impedes the recognition and realization of value here?

  This workshop will explore individual and organizational challenges that need to be overcome to effect a transformation toward a successful systems engineering culture.

Organizational Teaming for Joint Project Pursuit
Kevin Forsberg, OGR Systems, INCOSE Fellow, ESEP.

- Joint project teaming brings together different organizations with diverse capabilities to satisfy a customer need competitively. An "A" team covers all the project bases with specialty expertise, capability, and experience, presenting no weak spots. Appreciating and seeking the values of joint-team strength can be inhibited by organizational culture, tradition, and politics. Finding appropriate team members that can fill the technical gaps, improve proposal reception, and/or deliver superior results can be problematic under time pressures and the hurdles of new-relationship trust and respect development. There are awesome resources available for A team configurations.

  What are the values of joint-project teaming that can outweigh the obstacles? What are the obstacles? What requirements must be satisfied to encourage and realize beneficial teaming relationships? How might joint-teaming opportunities be enabled and facilitated to compelling benefit?

  This workshop will open the dialog, explore the opportunity, and identify means for advancing the pursuit of organizational joint-project teaming.

High Performance Teaming
Ann Hodges, Sandia National Labs, CSEP.

- A *high performance* team is a group of people committed to a common purpose, who consistently show *high* levels of collaboration and innovation. A high performance team produces superior results and a sense of personal joy in every participant - it takes the work out of work. There is plenty written on the characteristics of high performing teams and high performance teaming. So why isn't high performance teaming very prevalent? Why isn't it a compelling behavior that draws all of us in naturally? Is it a fault of leadership? Or is it a collection of personal issues and systemic organizational conflicts?

  What are the compelling personal values for working in a high performing team and what inhibits an irresistible pull in that direction for all of us? What motivates people to create a team culture of high performance? What personal issues stand in the way, no matter how much it is wanted? Claiming lack of enlightened leadership and corporate strategic imperative is an excuse to live with the status quo. High performance teaming is fueled most effectively by personal desire, personal motivation, and personal initiative, coupled with a trust-filled team environment. Many of us have had the occasion to be a member of a high performing team, but all too occasionally. If you've ever experienced it you know it's fun, rewarding, and memorable.

  This workshop will explore the personal and organizational inhibiting barriers, requirements for a personally-compelling solution, and personal initiatives to make a difference.

Fail-Fast Rapid Innovation Concepts
Bill Schindel, ICTT Systems Science, CSEP.

- Innovation delivers new stakeholder value, and includes discovery of new system configurations—including those which are insufficient or inadequate. The value of well-organized exploration efforts is that they will, on the average, produce higher-value results for a given investment of resources than other approaches. But "Fail-Fast Rapid Innovation" cannot simply mean quickly producing a series of rejected options. The discovery and experimental aspects of engineering are sometimes overshadowed by a belief that engineering proceeds only by syllogistic reasoning from a known place and first principles to a new place, but that is not the nature of innovation, which is itself not always so well understood.

  If we must organize and direct resources into completely unknown territory, what roadmap can we use for planning, budgeting, and scheduling? How can we optimize use of our resources so that these investments are well-justified and understood?

  This workshop will explore the nature and properties of the innovation process as related to effectiveness of experimentation and discovery as key parts of innovation.

Continued on next page

Systems of Systems Evolutionary Integrity
Dr. Scott Workinger, Workinger Consulting.

- Evolutionary integrity in System of Systems is concerned with upgrades to constituent systems during operation and mitigating disruptions that arise from asynchronous and unpredictable changes when independent constituent systems change without warning. Effective integrity management seeks seamless upgrades to constituent systems and the SoS as a whole. Yet, in practice, service-outage windows often don't accommodate major upgrades, and lengthening the outage can create an unacceptable disruption to SoS capabilities. Moreover, self-serving changes in constituent systems can interfere with total-SoS functionality. Even with well-meaning efforts to manage constituent systems, emergent behavior from constituent system interactions can arise unpredictably, creating serious disruptions.

  In general, what are the barriers to integrity management in an SoS composed of independently-owned systems? What inhibits sustained integrity in a complex collection of interacting systems and how can we define integrity for an SoS with no central authority to approve changes? What are the characteristics of a workable integrity management approach? Are these characteristics of effective integrity management represented in examples that we can share? Are there general principles that we can identify and apply to achieve robust integrity management?

  This workshop will explore these questions and others that participants have, with the objective of profiling the issues, converging on a set of general needs that an effective integrity management approach must satisfy, and sharing knowledge and experience on approaches that show some effectiveness.

SE as Multidiscipline Enabler/Art/Science
Dr. Regina Griego, Sandia Nat'l Labs, INCOSE Fellow.

- The branding of systems engineering in many companies and with too many systems engineers is that systems engineering is about developing good process and enabling that process in an organization to achieve systems that are delivered on time, within schedule, and meets requirements. While process is an enabler, it is like the score of music that a good conductor interprets with talented musicians and instruments to deliver a system that not only meets customer expectations, but indeed delights the customer and has an enduring quality. The conductor (systems engineer) knows how to adjust the score for the effect they are trying to achieve and integrates the musicians effectively based on their unique abilities.

  Think about the systems that you are most proud of, or the times that you have been a part of a system development effort that felt exciting, even exhilarating. Would you say they are works of art, or simply science, process, and project management? Systems architecture and design are the most obvious areas where the art of systems engineering is applied, but it is equally important to apply the art of understanding people and teaming. In systems engineering you are working with at least two systems, the system you *are* delivering and the system that *is* delivering. When have you experienced the flow as a systems engineer? How would you characterize systems engineering in your organization: process and project management or a blend of art and science?

  This workshop will explore the art and science of systems engineering and the notion of the systems engineering brand.

Agile Security Adaptable to Attack Evolution
Jack Ring, OntoPilot, INCOSE Fellow.

- Agile security must be reactively resilient and proactively composable at the pace of unpredictable and evolving adversarial attackers and their attack methods. The adversarial attack may originate from outside the system or, particularly in system of system scenarios, from inside the system. This idea encompasses information systems, cyberphysical systems, physical systems, infrastructure systems, and national defense systems. Success demands close collaboration and co-learning by system engineering and security engineering interests. System engineering seeks sustainable systems. Security engineering seeks sustainable system defense. It takes both to succeed against agile adversaries. The respective practitioners march to separate drum beats. Security engineering must educate systems engineers on the kinds and sources of threats and needs for detecting and defeating them. System engineering must satisfy new demands on system architecture, system design, systems engineering, and security engineering. All need to better understand their requisite interoperability.

  What stands in the way of synergistic engineering cooperation? What are the requirements for an effective engineering-team approach? What can systems engineering do to enable and facilitate the needs of agile-security engineers? What can security engineering do to enable and facilitate engagement with systems engineers?

  This workshop will explore values and needs for cooperative agile-security engineering, identify the inhibiting barriers, suggest concepts that any effective solution must address, and open a dialog on potential solutions.

Agile HW-Development Infrastructure/ConOps
Rick Dove, Paradigm Shift Int'l, INCOSE Fellow.

- An agile development infrastructure provides an architectural framework for component interconnect that enables asynchronous, incremental, and iterative component development. An agile hardware-development infrastructure would facilitate asynchronous component testing, alignment with agile software development, demonstrable and testable work-in-process of mixed component releases/prototypes/simulations, and operational system evolution. But hardware development is very different than software development. Agile software development relies on object-oriented infrastructure and webpage hyperlink couplings as architectural underpinnings. Software developers are simultaneously designers and fabricators, and incremental development lends itself to incremental test and demonstration. In contrast, hardware development has issues of tooling; communication between designers, fabricators, and assemblers; and costly re-work.

  An agile approach is beneficial when development occurs under uncertainty, unpredictability, and situational evolution – requiring the application of incremental learning during development. What are the barriers to incremental and iterative hardware development? Can concepts from product-line engineering, open system architecture, or live-virtual-constructive approaches offer guidance? Are proprietary approaches the only avenue, or is there opportunity for affordable common development-platform tools?

  This workshop will explore the values, the issues, and the requirements for possible solutions. ∞

Socorro Systems Summit—Program Schedule

Organizers

- Mary Compton, Sandia National Laboratories, mlcompt@sandia.gov
- Rick Dove, Event Chair, Paradigm Shift International, dove@parshift.com
- Dr. Aly El-Osery, New Mexico Tech Electrical Engineering Department, aly.elosery@nmt.edu

Program Committee

- Ed Carroll, Sandia National Laboratories, ercarro@sandia.gov
- Rick Dove, Paradigm Shift International. dove@parshift.com
- Dr. Kevin Forsberg, OGR Systems, kforsberg@ogrsystems.com
- Dr. Regina Griego, Sandia National Laboratories, griegor@sandia.gov
- Ann Hodges, Sandia National Laboratories, alhodge@sandia.gov
- Jack Ring, OntoPilot, jack@ontopilot.com
- Bill Schindel, ICTT System Sciences, schindel@ictt.com
- Dr. Scott Workinger, Workinger Consulting, scottworkinger@gmail.com

Day-1: Choose four from eight ¼-day topic introductions, collaboratively setting objectives for Day-2.
Day-2: Choose two from eight ½-day topic workshops, for developing collective knowledge.

Preliminary Agenda: Some items & times may move for final schedule. Coffee breaks not shown explicitly.

Friday October 28, 2016				
08:00	**General Session**: Welcome and What Will Happen			
08:30	**Keynote:** Garry Roedler, INCOSE President Elect			
09:00	**Systems Engineering Cultural Transformation** Topic Intro and Objective Setting for Saturday Workshop Moderator: Ed Carroll		**Agile Security Adaptable to Attack Evolution** Topic Intro and Objective Setting for Saturday Workshop Moderator: Jack Ring	
10:30	**SE as Multidiscipline Enabler/Art/Science** Topic Intro and Objective Setting for Saturday Workshop Moderator: Regina Griego		**Organizational Teaming for Joint Project Pursuit** Topic Intro and Objective Setting for Saturday Workshop Moderator: Kevin Forsberg	
12:00	**Lunch on Your Own**			
13:00	**High Performance Teaming** Topic Intro and Objective Setting for Saturday Workshop Moderator: Ann Hodges		**Agile HW-Development Infrastructure/ConOps** Topic Intro and Objective Setting for Saturday Workshop Moderator: Rick Dove	
14:30	**Systems of Systems Evolutionary Integrity** Topic Intro and Objective Setting for Saturday Workshop Moderator: Scott Workinger		**Fail-Fast Rapid Innovation Concepts** Topic Intro and Objective Setting for Saturday Workshop Moderator: Bill Schindel	
16:00	**General Session:** Brief Outs of Eight Workshop Objectives Established During Topic Intro Sessions			
17:00	**Reception with Refreshments**			
18:30	**Dinner on Your Own**		**Optional Dinner Gathering** (Separate Advanced Ticket): Empowering Women as Leaders in Systems Engineering	
Saturday October 29, 2016				
08:00	**Systems Engineering Cultural Transformation** Moderator: Ed Carroll	**Fail-Fast Rapid Innovation Concepts** Moderator: Bill Schindel	**Systems of Systems Evolutionary Integrity** Moderator: Scott Workinger	**Agile Security Adaptable to Attack Evolution** Moderator: Jack Ring
11:30	**Lunch on Your Own**			
12:30	**High Performance Teaming** Moderator: Ann Hodges	**Organizational Teaming for Joint Project Pursuit** Moderator: Kevin Forsberg	**SE as Multidiscipline Enabler/Art/Science** Moderator: Regina Griego	**Agile HW-Development Infrastructure & ConOps** Moderator: Rick Dove
16:00	**General Session:** Eight Brief Outs of Results @ 10 Minutes Each			
17:30	**General Session:** Wrap Up and Open Discussion			
18:30	**Adjourn**			

Systems Science Working Group (SSWG)

James Martin, The Aerospace Corporation, and Chair, Systems Science WG

The purpose of the Systems Science Working Group is to promote the advancement and understanding of Systems Science and its application of Systems Theories to SE. We have the following objectives:

- Encourage advancement of Systems Science principles and concepts as they apply to Systems Engineering.
- Promote awareness of Systems Science as a foundation for Systems Engineering.
- Highlight linkages between Systems Science theories and empirical practices of Systems Engineering.

The WG has about 200 members who have access to our Discussion List at syssciwg@googlegroups.com. Because of the interdisciplinary nature of systems science, many of our WG members are from other organizations such as the International Society for the Systems Sciences (ISSS). INCOSE is a member of the International Federation for Systems Research (IFSR), which enables us to know who else is working in this field and to interact with them in several forums and publications of IFSR member organizations.

We have been conducting two workshops per year since 2010 to advance our knowledge and understanding of systems science and of related disciplines such as systems thinking and system philosophy. The presentations from these workshops can be found at our Google wiki site (https://sites.google.com/site/syssciwg/home). You can also see on our wiki site the various projects we have been working on.

The Basic Structural Modeling Project (BSMP) led by Joe Simpson is developing software tools that support use of the Interactive Structural Modeling approach devised by John Warfield, one of the luminaries in the field of systems science and one of the former presidents of ISSS. BSMP is dealing with the issues, concepts, tools and procedures used when structural modeling techniques developed by John N. Warfield are engaged to develop solutions to complex problems.

The Systems Literacy project, led by Peter Tuddenham of the College of Exploration, is an ongoing international, coordinated effort to create a greater awareness and understanding about "Systems" in engineering, society, schools and universities and to develop a comprehensive set of big ideas, supporting concepts and learning progressions. They have held several workshops dealing with this topic and will conduct our next one at the INCOSE Workshop in January.

The Systems Philosophy project led by David Rousseau is exploring the philosophical foundations of Systems Engineering, and through that to support expansion of the theoretical foundations of SE. This will contribute to "Systemology," which is the organized body of knowledge dealing with systems. Systems Philosophy is "a discipline aimed at constructing a new philosophy (in the sense of worldview) by using systems concepts. The discipline was founded by Ervin Laszlo in 1972 with his book Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought. It has been described as the 'reorientation of thought and world view ensuing from the introduction of "systems" as a new scientific paradigm'. [wikipedia article]

As Laszlo explained, Systems Philosophy is a worldview grounded in General Systems Theory (GST). GST, as originally proposed by Ludwig von Bertalanffy, is a theory encapsulating the principles underlying the behaviors that recur across multiple kinds of systems ("systemic isomorphies"). GST is a formal theory about the nature of Nature, and together with Systems Philosophy provide a grounding for what von Bertalanffy called a "meta-discipline", because it involves fundamental insights about the nature of the concrete world that are applicable to multiple disciplines. In current usage this makes it a transdiscipline, which can be called the "General Systems Transdiscipline" (GSTD). The attributes of a transdiscipline are known independently from systems research, so this knowledge can enhance our understanding of the potential of the GSTD.

One our earlier projects was to define a common language for systems "praxis", which led to development of the Systems Praxis Framework illustrated below. (http://systemspraxis.org/) ∞

The SSWG is led by James Martin, with Duane Hybertson as co-leader.

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Duane Hybertson
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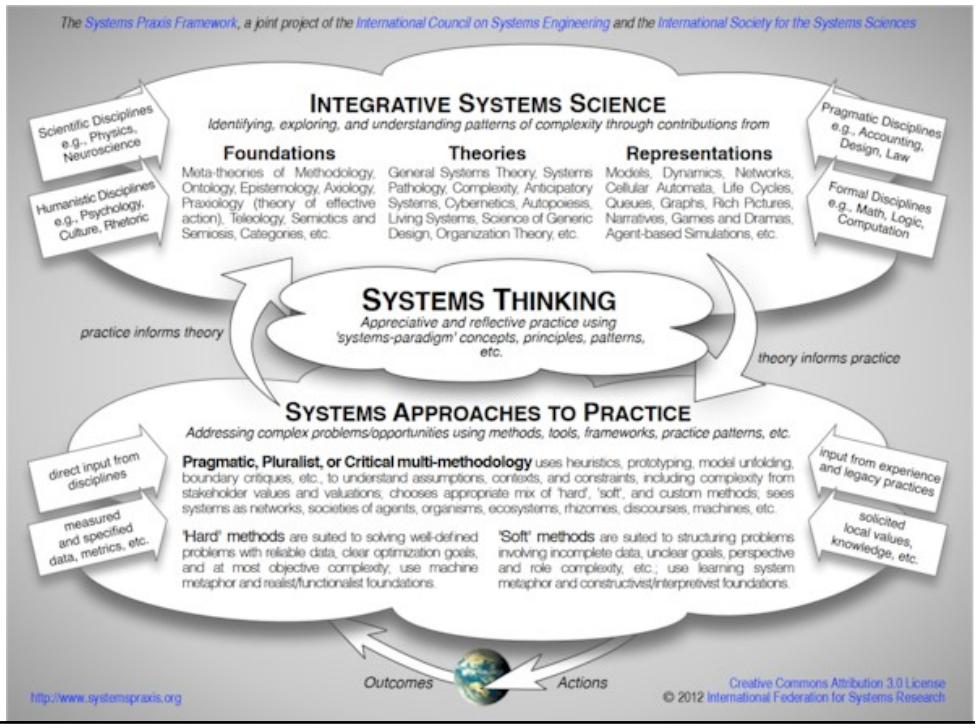


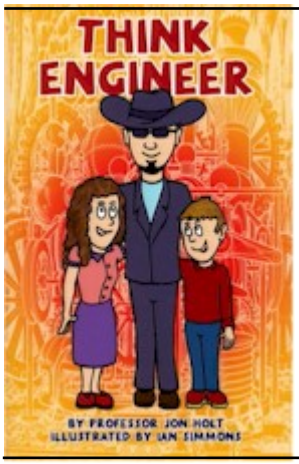
IS16 Banquet Night in Edinburgh


Mark Cavanaugh & Regina Griego


Banquet Bagpipe Serenade


Rick Dove, Heidi Hahn & Phil Goldstone

Not a big turnout from the Chapter this year, but overall attendance and number of papers presented was high. Days were filled with rewarding activities, and evenings were filled with Hopscotching, the local equivalent of pub crawling. For you single-malt Scotch fans, top shelf bar prices are about a third of USA prices. Edinburgh Castle was a short walk from the conference center.



'Think Engineer' is a new children's book that is designed to promote STEM (Science, Technology, Engineering and Mathematics), and in particular, engineering, to school children. The book was launched in November 2015 by John Holt, illustrated by Ian Simmons, and published by INCOSE UK.

Watch the 5-minute video
https://youtu.be/o3YyekiHX2M

Buy the book
http://incoseonline.org.uk/Normal_Files/Publications/ ∞

ENERGYTECH16

Cleveland, Ohio, Nov 28–30, 2016 http://energytech2016.com
An annual impactful event focused on applying advanced technologies and System Engineering to Energy and Critical Infrastructure, with support from NASA, INCOSE, IEEE, InfraGard/FBI, and corporate sponsors. Six Tracks:

- *Model Based Engineering of Complex Systems*
- *Power Systems: Smart Grid / Autonomous / Intelligent Control*
- *Critical Infrastructure Risk / Resiliency*
- *Advanced Technology in Power & Energy*
- *Energy, Environment & Policy*
- *Academic Papers & Posters* ∞

Student Division Kicks Off the Academic Year

Eric Smith, University of Texas El Paso

Officers Samuel Terrazas, president; Jose Martinez, vice-president; Bhriannon Tiscareño, treasurer; Cynthia Vargas, secretary; Leonardo Orea, program outreach coordinator; and Maria Perez, ASEP Coordinator, started the 2016-2017 academic year by holding a first general meeting on September 14th.

The meeting was attended by a wide variety of interested students, including graduate students from various departments, and a significant number of undergraduate students from the newest department in the College of Engineering, the Engineering Education and Leadership Department.

Discussed were an ASEP study group and attendance at the Socorro Systems Summit. Members were informed that attendance at the Summit must be preceded by preparation for participation with research examined and approved by the Division Advisor, Dr. Eric Smith. A number of discussion sessions are planned in anticipation of the Socorro Systems Summit. ∞

Student Chapter Officers

Resources

From Harvard Med School, watch: *The Evolution of Bacteria*, an eye-opening two-minute video that shows evolution happening over an 11-day period as random mutation and natural selection overcome environmental stress. In a creative stroke inspired by Hollywood wizardry, scientists have designed a simple way to observe how bacteria evolve as they become impervious to drugs. The experiments are thought to provide the first large-scale glimpse of the maneuvers of bacteria as they encounter increasingly higher doses of antibiotics and adapt to survive—and thrive—in them. www.youtube.com/watch?v=plVk4NVIUh8

From Flowcon, Watch: *The Logic of Flow: Some Indispensable Concepts*. Don Reinertsen, author of the acclaimed book: *The Principles of Product Development Flow: Second Generation Lean Product Development*, does a remarkable job of explaining clearly some of the fundamental science behind agile and lean systems engineering. "Often the value of development flow is so high, and so obvious, that you can disregard the cost of achieving it. However, this is not always the case; sometimes improvements are not free, and sometimes you must persuade non-believers. In such cases, a bit of scientific and economic logic can save the day." www.youtube.com/watch?v=rc1MqHsiiKo

From TED, watch: *How to build a business that lasts 100 years*. If you want to build a sustainable system of any kind, or specifically a "...business that lasts, there may be no better place to look for inspiration than your own immune system. Strategist Martin Reeves shares startling statistics about shrinking corporate life spans and explains how executives can apply six principles from living organisms to build resilient businesses that flourish in the face of change." www.ted.com/talks/martin_reeves_how_to_build_a_business_that_lasts_100_years

From Ted, Watch: *Interview With the Mind Behind Linux*, Linus Torvalds. "I am not a visionary, I'm an engineer ... I want to fix the pothole that's right in front of me." www.ted.com/talks/linus_torvalds_the_mind_behind_linux

∞

New Chapter Members

Jeni Turgeon, Sandia National Labs

Enchantment Chapter now has 128 active members and student members. We welcome the following new regular members:

Rebecca Hodkin	American Systems Corporation
Guillermo Pischansky	SAIC
Evan Richardson	Sandia National Laboratories
Robert Sayer	Sandia National Laboratories

We welcome the following new student members:

Miriam Bustamante	University of Texas, El Paso
Cesar Estrada	University of Texas, El Paso
Edgar Lozano	University of Texas, El Paso
Jorge Montes	University of Texas, El Paso
Ileana Rubio	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. ∞

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