

The Enchanted View

— Thinking About Systems —

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A Bit of Reflection



Anthony Matta, President— Hello Enchantment members!

It has been a wonderful year and it isn't over yet. I would like to thank all of the members including the Board of Directors for all of your participation and commitment to making our Enchantment Chapter such a successful and well recognized community. Our focus this year was on change and attempting new ideas and new approaches to better serve the systems engineering community. We definitely succeeded in that, by integrating lunchtime chapter presentations, offering new tutorial topics, offering the systems engineering certification examination for FREE at the Socorro Systems Summit, continuing the Socorro Systems Summit, and doing all this while continuing to maintain our chapter's existing successful commitments. How exciting!

My service to this organization has been extremely fulfilling and I thank all of those who were part of this journey. The opportunity to lead this great chapter has been invaluable as I have made friendships and professional relationships that I will maintain for years to come. If you or someone you know is interested in growing as a systems engineer by serving on our board of directors or in another form of leadership role I highly recommend it. Our chapter could use everyone's help in growing and communicating the value of systems engineering to our community. If you have questions or would like to submit your name or someone else for a leadership position please contact Ann Hodges (Secretary) alhodge@sandia.gov.

This year has been and continues to be outstanding, I look forward to chatting with you all at the upcoming Socorro Systems Summit, chapter meetings, and the winter holiday social.

Thank you all for the opportunity to serve as your 2017 Chapter President. It has been my pleasure and please feel free to stay in touch. armatta@sandia.gov

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Why and How Being a Board Member Has Rewarded Me



Ron Lyells, Retired

I sometimes get asked what a Board of Director member does, why would one want to be part of our local chapter in this way for a period of time? I don't have any standard formula answer, but I can share what motivates and has motivated me.

For me it is completely personal.

When originally asked a number of years ago, a few questions, and only a few came to mind:

1) Do I want to be part of this organization in this way? Do I want to spend time and energy on this journey?

2) Acting as a Honeywell representative, can I add value to the chapter and the company in some way?

3) Do I enjoy being with the people on the board?

What have I experienced? I have gotten to spend time with some really fine and smart individuals as we work through chapter business and work to improve the future chapter culture. I have had much fun meeting and sharing with chapter members. Also, I have met many people outside the chapter that I would have never met unless I was in a position as a BOD member. This occurs within the INCOSE organization at large, but also with people outside of INCOSE.

2017 Q4

Many seeds got planted as a Honeywell representative. Many things happen based on circumstances that exist at the time and require more of a seed planting and nurturing mind set as opposed to a fire, forget and hope mind set. In fact, a nurturing mind set is required for most of what happens on the Board.

As a BOD member I have learned to work within a more open community environment. This is different than working in a corporate environment, and I have used what I have learned in different life engagements. Even acquiring better knowledge and skills in parliamentary procedures has transferred to other parts of life.

There is another thing that may pique all of your interests. That is the idea of emergent opportunities. These opportunities arise from chapter plans, ideas, and synergistic activities that come about. It will be in these things where you will find spaces for you to engage in a way that you find most rewarding, most fun. You will find yourself making time for them. ∞

2018 Board Member Elections—Act Now, You Can Be on the Ballot

Ann Hodges, Sandia National Labs

Interested in becoming more involved with the INCOSE Enchantment Chapter? The slate for the upcoming 2018 Enchantment Chapter's Board of Directors election is being finalized. If you are an INCOSE member and are interested in a Director-at-Large position or becoming an Officer (President-Elect, Secretary, Treasurer), glance through the Chapter's <u>Operating Plan</u> (roles and responsibilities can be found on pages 2-3). For more information or to "throw your name in the hat", contact Ann Hodges (<u>alhodge@sandia.gov</u>, current Secretary and election coordinator).

The ballot will be distributed to the Enchantment Chapter membership by the first week of October 2017, and all ballots need to be received by October 31. New officers are welcomed at the December Chapter social, with the official installation occurring during the January 2018 Enchantment Chapter meeting.





2017 Socorro Systems Summit-Register NOW or at the Door



High Performance Teaming

October 6-7, 2017 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



- Agile Security Adaptable to Attack EvolutionProblem Space Risk Characterization
- Quick Reaction Capability for Urgent Needs
- Fail-Fast Rapid Innovation Concepts

Registration and full Information at: www.incose.org/enchantment under Library tab.

FREE—INCOSE ASEP/CSEP Knowledge Exam On 5-October take the INCOSE knowledge exam and get one step closer to INCOSE Certification at the ASEP or CSEP level. There is no cost or membership required to participate in this activity, though there are additional requirements to apply for certification. Exam results will be emailed a month later. Learn more at www.incose.org/certification.

 Systems Engineering Cultural Transformation • SÉ as Multidiscipline Enabler/Art/Science

• Integrating Proj Mgmnt and Sys Engineering

Pre-registration is required, no on-site registrations. Registration is limited to first 40 participants. Register HERE until noon 4-October. The two-hour exam starts precisely at 4:30pm. Room opens at 4:00pm; arrive at least 10 minutes early. Important: exam form requires #2 pencils (you bring). Exam is in Workman Center room 113, New Mexico Tech, Socorro, N.M. Questions? Contact Heidi Hahn, hahn@lanl.gov or 505-665-4606.



Keynote Speaker: Anne O'Neil, CSEP, advises industries and organizations seeking to adopt systems practices and apply systems engineering (SE) capability to achieve and improve business outcomes. She counsels the increasingly diverse range of industries facing complexity and integration challenges as a result of deploying technology, software-intensive, and communications-intensive systems. She supports businesses across a spectrum of needs – from assessing where applying a systems expertise offers the strongest business benefit, to assisting internal systems capability acquisition or enhancement.

From 2005-2013 as the founding Chief Systems Engineer for New York City Transit (NYCT), Anne established and integrated SE capability to improve the agency's capital project delivery. This required developing systems engineering discipline expertise and modifying the agency's business process and program development approach. It also necessitated effecting change and building systems engineering awareness at an industry level – among peer transit properties, consultants, contractors and systems suppliers.

A former Board member for INCOSE, Anne served as Director of Industry Outreach; reaching out to industries not traditionally associated with systems engineering to support their adoption of SE practices, expansion of SE capability and greater involvement within the INCOSE SE community. She has served as a systems champion within the transportation industry, raising SE awareness. She spearheaded the evolution of the INCOSE Transportation Working Group into an international forum for industry exchange, serving 6 years as co-chair. In 2008 she founded and chaired until 2012 the Systems Engineering Committee for the American Public Transportation Association. In 2009, Anne was profiled as a systems engineer by Money magazine, boosting the recognition of the value of systems engineers across many sectors. In recognition of Anne's extensive outreach efforts within the SE community and within the transportation industry, she was awarded the 2011 INCOSE Founders Award.

Anne has accumulated over 20 years of experience guiding large-scale organizations and program teams to successfully deploy technology-based solutions that address operational performance expectations and overall business priorities. Her career began as an electrical/control systems engineer in the power industry. She soon transitioned into the transportation industry, with the emergence of the intelligent transportation systems (ITS) field. She designed and deployed advanced traffic management systems for vehicular tunnels and highways. Her professional responsibilities have spanned the planning, design and construction phases of projects. She has served in corporate strategy, program leadership, engineering design, technical management, and construction management capacities. ∞





<u>Recent Meetings</u>

Ann Hodges, Sandia National Labs Presentations and recordings are in the Library at www.incose.org/enchantment.

July 2017 – Robert Taylor, Friedman Recycling, was our Summer Social speaker at Chama River Brewing Company and presented *Going Green Saves the Planet*. Robert gave a virtual tour of Friedman Recycling, 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. A great time was had by all!

August 2017 – Rick Dove, CEO of Paradigm Shift International and adjunct professor at Stevens Institute of Technology, presented *Agile Systems & Processes 106: Risk Management and Mitigation.* 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.

This presentation introduced methods for dynamic problem-space characterization, and reviewed methods for riskmitigating solution-space agility.

September 2017 – Dr. Len Troncale, Professor Emeritus of Cell and Molecular Biology and past Chairman of the Biology Department at California State Polytechnic University, presented *The New Field of Systems Mimicry: Would Evidence from the Natural Sciences Help Design Better Systems?* The sciences study natural phenomena using experimental methods. Their evidence and discoveries are widely used in engineering design and implementation.

This talk proposed 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 described the features of systems mimicry and suggested a new tool to explore its data for designing on the systems-level. It outlined 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 were 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 ended by suggesting a wider, future vision of systems design and SE.

September 2017 Tutorial – Heidi Hahn and Ann Hodges, Integrating Systems Engineering, Project Management and Quality Management. See newsletter page 7 for details. ∞

Next Meetings Ann Hodges, Sandia National Labs

Oct 5: ASEP/CSEP Free Knowledge Exam. See Chapter home page event listing for details and required pre-registration.

Oct 6-7: Socorro Systems Summit. See Chapter home page event listing for details and registration.

Oct 11: Why is Human-Model Interactivity Important to the Future of Model-Centric Systems Engineering?

Dr. Donna Rhodes. MIT, Principal Research Scientist and Director, Systems Engineering Advancement Research Initiative. **Abstract:** In our envisioned future, we see engineers, analysts, and decision makers immersed in highly interactive model-centric environments using digital system models as a primary basis for system decisions. While significant progress on modeling languages, modeling practices, and modeling methods has been achieved, insufficient attention has been given to the necessary interactivity between humans and models. Given emerging modeling toolsets, availability of powerful computational resources, and autonomous decision-aiding, the human role in relationship to models must be re-examined. In this talk, Dr. Rhodes will share findings and insights from ongoing research on human-model interactivity. The research is motivated by the need to better understand and enable effective "human-model teaming," while drawing from advancements in data science, visual analytics, and growing knowledge of complex systems. Ongoing areas of inquiry include: how and why individuals interact within model-centric environments, facets of human interaction with visualization tools and large data sets, and underlying fundamentals such as the role of trust in model-centric decision making. Emerging implications for practice extending from the interim findings are discussed.

Nov 9: Architecting Cyber Physical Systems. Note-this talk is on a Thursday rather than the usual Wednesday.

Dr. Cihan Dagli, Missouri University of Science & Technology, Professor of Engineering Management and Systems Engineering. **Abstract**: Multi-faceted systems of the future will entail complex logic and reasoning with many levels of reasoning in intricate arrangement. The organization of these systems involves a web of connections and demonstrates self-driven adaptability. They are designed for autonomy and may exhibit emergent behavior that can be visualized. Our quest continues to handle complexities, to design and operate these systems. The challenge in Complex Adaptive Systems design is to create an organized complexity that will allow a system to achieve its goals. These complex adaptive systems have dynamically changing meta-architectures. Finding an optimal architecture for these systems is a multi-criteria decision making problem often involving many objectives in the order of 20 or more. This creates "Pareto Breakdown" which prevents ordinary multi-objective optimization approaches from effectively searching for an optimal solution; saturating the decision maker with a large set of solutions that may not be representative for a compromise architecture selection from the solution space. Possible approaches that can be adapted in overcoming this difficulty in architecting cyber physical systems will be discussed.

Dec 8, 5:00 PM to 7:30 PM: Holiday Social, St. Clair Winery and Bistro.

Mary Compton, Enchantment Chapter Event Director; and speaker TBD.

Abstract: St. Clair Winery and Bistro is located at 901 Rio Grande Blvd NW, Albuquerque, NM. Check Chapter home page event listing for upcoming details and registration. ∞





Summer Social—Going Green Saves the Planet—What You Missed

Mary Compton, Sandia National Laboratories

The Enchantment Chapter's fourth annual Summer Social, entitled Going Green Saves the Planet, was held on July 7th at the Chama River Brewing Company in Albuquerque. Thirty people joined us for this opportunity to connect with their Systems Engineering Community of Practice over appetizers and drinks. The crowd included twenty-three Enchantment Chapter members and their guests, and seven of our colleagues who have not yet joined INCOSE.

This year's social featured a Virtual Tour of Friedman recycling led by Robert Taylor, Friedman Recycling's Regional Manager. Robert manages the daily operations, maintenance and safe-

ty for the Friedman locations in Albuquerque, El Paso and Las Cruces. Robert educated us about recycling by sprinkling humor throughout his presentation. Using a series of photos, he led us through how recycling is processed and regaled us with stories of the "odd" items (e.g., mattresses) that have shown up to be recycled at the plant.

He also gave us several tips about what and what not to recycle and some "dos and don'ts" about recycling. For instance, did you know that crushing items such as soda cans and plastic bottles make it harder for recycling to be sorted? The machines use the item's thickness in part as criteria to sort the items.





Wine, good food, surprise entertainment, and new/old friends. To: djtrump@WhiteHouse.gov; hrc@HillaryClinton.com Subject: Decisive Grudge Match Opportunity Donald/Hillary – Please join us 8-December for best-of-three (silent please) arm wrestling matches. A quick response is requested. We have to announce the entertainment soon.







Not For Women Only

Heidi Hahn, Los Alamos National Lab

One of the invited panels at IS17 in Adelaide was titled "The Role of Design in Systems Engineering – Systems Thinking Meets Design Thinking." NASA's Dawn McGowan talked about how design and systems engineering are related. This question had come up previously for me when my students in a Systems Engineering MS program had trouble reconciling what they had learned about SE processes with the Design Thinking (DT) way of working.

I had also just been teaching Design Thinking (aka Human Centered Design) to a group of female engineering students who were participants in a pipeline program called Future Female Leaders in Engineering, which involves summer internships and a professional development enrichment program among other benefits. They had been taught SE the previous summer and they, too, had questions about how the skills being taught in Design Thinking would help them as engineers.

My initial response was along the following lines: The focus of the enrichment activities is to help build skills in problem definition, problem solving, communication and other "soft skills" that will enable you to excel as a technical leader. At LANL, progression to the higher levels of the R&D Engineer job family places a great deal of emphasis on these types of skills – technical competence in your engineering discipline is necessary but not sufficient.

I suggested that the summer DT project didn't necessarily have content related to the kind of engineering work they'd be doing in the future, but the skills related to gathering and organizing data, thoroughly understanding the problem from different points of view, considering the full product life cycle, and research ethics related to the

use of humans as subjects in the design process are all directly relevant.

Dawn's presentation was really helpful to me and I hope you'll find this brief summary helpful, too. She started by saying that sometimes the different terminology, and particularly the tendency to think in either/or terms, often trips us up. Rather than being OR, it's really AND as shown in the lower left table.

Dawn debunked the myth that qualitative data is not real data, and noted that qualitative methods like interviews and focus groups are useful ways to gather stakeholder perspectives on a problem in need of solution. She also saw value in Design Thinking's inclusion of nontraditional disciplines like sociology and psychology to bear on engineering problems – again, as valuable inputs to seeing the problem to be solved from a different point of view.

As shown in the graphic below, when it comes down to it, Design Thinking and Systems Engineering care about the same things, they just come at problems from different starting points! ∞

<u>Design</u>	AND	Systems Engineering	different starting points!	8
Creativity (Feminine)	\longleftrightarrow	Rigor (Masculine)		
Design Thinking	\longleftrightarrow	Systems Thinking	(Desirability) (Viability))
Qualitative Data	\longleftrightarrow	Quantitative Data	Design Thinking (Fooribility) Enginee	onal
Integrating Non-Engineering Disciplines	\longleftrightarrow	Integrating Engineering Disciplines	starts here (redsibility) starts h Courtesy of I	DEO

Three Days of TEDWomen

November 1-3, New Orleans. "We build them, we cross them, and sometimes we even burn them... at TEDWomen 2017, we will explore the many aspects of this year's theme: *Bridges*, through curated TED Talks, community dinners and activities throughout one of America's most beloved cities, New Orleans. We are excited to be convening TEDWomen 2017 in the historic Orpheum Theatre in New Orleans, with plans to capture the unique attractions that make this city one of the most visited in the US. We will hear TED Talks from entrepreneurs, innovators, artists and activists, thought leaders from business and civil soci-

ety—bridge builders from around the world."

The first speakers in the lineup can be seen <u>HERE</u>. One is Valarie Kaur, pictured to the right, with a **jaw-dropping** talk (<u>watch</u>) that went viral, about the antidote to the rise in nationalism, polarization and hate in the U.S. and around the globe.



Another must <u>watch</u>—Sheryl Sandberg's iconic talk, *Why We Have Too Few Women Leaders*, from TED Women 2010, which inspired her book *Lean In*. She is Facebook COO with two kids.

Her follow-up TED talk, So We Leaned In ... Now What, is HERE ∞



CSEP Training Nearby

CSEP Courses by Certification Training International:

Course details Course brochure					
Courses Nearby (but many more other places & dates):					
2017 Oct 30-Nov 3	Las Vegas, NV				
2018 Feb 26-Mar 2	Las Vegas, NV				
2018 Apr 2-5	Denver, CO				

Reminder: Free ASEP/CSEP exam at 2017 Socorro Summit \propto





A Personal Note from INCOSE President-Elect Candidates

Kerry Lunney, Thales Australia



Hello Enchanted! You will have the opportunity to vote soon for INCOSE President-Elect, for which I have the honour of being nominated. It is both humbling and exhilarating to be considered.

INCOSE has identified the values and principles which our vision of "A better world through a systems approach" builds upon. Over 27 years we have invested in meaningful products and programs, such as Vision 2025, SeBOK, Integrating Program . Look into different avenues for partici-Management with Systems Engineering, GRCSE, and SE Certification, to name a few. With professional focus these initiatives must continue to support, with energy and passion, global growth in membership, Chapters, and Corporate Advisory Board (CAB) organisations; and expansion into new industries, domains, technical areas, and outreach to others who may or may not be aware of their need for a systems

approach. None of these are mutually exclusive and all are of equal importance.

Building on these foundations, I have listed below a snapshot of my ideas to advance INCOSE. These will be augmented in my full detailed vision paper to be circu- Nurture - through education, training, lated by INCOSE. I will:

- Strive to advance INCOSE in "all things systems," taking Vision 2025 to 2025++;
- · Endeavour to prioritise and provide more support to activities in the technical operations arena in order to produce meaningful artifacts;
- Strengthen the link between Chapters, Working Groups and Outreach;
- Continue to "open up" our terminology to communicate across industries and domains:
- pation, targeting younger demographics;
- Seek additional paid professional support where appropriate, for timely outcomes:
- Continue to review and refine budgets, particularly to seed opportunities;
- Open new communication channels for members to access key Board members.

If we are to achieve any of these it is important to recognise and foster qualities of the individual and members collectively. These qualities, which I believe I demonstrate, are:

- Inform spread the knowledge and applications of "all things systems."
- mentoring, coaching, from entry to expert levels.
- Collaborate work as a team to increase our success and break down barriers.
- **O**rient pursue our goals and objectives with fairness, respect and honesty.
- Sell and sell, sell, sell; whether it's an idea, or INCOSE itself, or even for raising revenue.
- Excel in all our undertakings, striving to do our best to achieve our goals.

Together, think of what INCOSE can be with such qualities supporting the vision! I would love for you to give me the opportunity as President-Elect. Please do vote in November, as every vote counts!

All the best, Kerry Lunney, FEngAus, CPEng, Eng Exec, MIEEE, MINCOSE, ESEP.

INCOSE Director Asia-Oceania

Watch IS17 nomination speech HERE.

Paul Schreinemakers, How2SE, Netherlands



Hello Enchanted! I'm passionate about INCOSE and about being a Systems Engineer. My vision for IN-COSE has three strategic themes: our members, our impact and our

flexibility and adaptability.

Our Members-INCOSE is a successful and growing organization with an enormous range of Working Groups, CAB organizations like Sandia and Los Alamos National Laboratories and Honeywell, and the Enchantment Chapter. All distinctive communities bringing energy and enthusiasm that forms the bedrock of our organization.

I am committed to listening to you, using your needs as the basis for Board of Directors planning and implementation. I want to make sure that INCOSE is transparent and it's focus and direction connect with local Chapter needs-facilitating the gaining of insight, moving INCOSE forward as a stronger organization, creating

an environment where you can excel and achieve successes. I have experience with transforming INCOSE stakeholder needs into actions. For example, based on member input, I led the effort to re-structure Technical Operations.

Our Impact—Over the years, the Working Groups of Technical Operations and members of the Enchantment Chapter have generated many excellent products. We are recognized as the authority for Systems Engineering; but we are still confronted with policy makers that have never heard about us or the value we can bring.

I'm committed to reach out to the policy makers, to grow awareness about the benefits of our discipline, and to attract these policy makers into our community. I plan to achieve this by setting up policymaker events under the umbrella of IN-COSE and/or by attending events at which these policy makers discuss their views.

I believe that INCOSE must speed up the implementation of Vision 2025 and widen its horizon. As an example, I led a 2016 effort by the Netherlands Chapter to project Vision 2025 on the country's specific Systems Engineering needs and to widen it's horizon to 2035 where possible.

 ∞ Our Flexibility and Adaptability-

The world around us is changing; confronted with ever more challenging and complex system problems, like the digital evolution. I believe we need to continuously evaluate and adjust our course of action to remain the world authority in Systems Engineering, while expanding our collaboration with others like IEEE, PMI and IET. Leveraging our diversity and global footprint will enable a more effective organization

My 14 years of service for INCOSE as Chapter President, Associate Director for Events, Technical Director, member of the Board of Directors; and work experience in multiple domains for both industry and government; has provided me insight from multiple perspectives on the drivers of our organization and the changes needed to keep INCOSE and our discipline relevant. If elected, this insight will equip me to serve in this demanding role.

Thank you. Please vote in November. Paul Schreinemakers, ESEP. e-mail: schreinemakers@how2se.nl LinkedIn profile HERE.

Watch IS17 nomination speech HERE.

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Developments at the University of Texas El Paso Student Division

Eric Smith, University of Texas El Paso

INCOSE

INCOSE Student Division Officers pictured to the right display the new cooperation between the INCOSE Student Division at UTEP and the Student Chapter of IIE (Institute of Industrial Engineers).

Historically, the INCOSE UTEP Student Division has been populated with graduate students in the Master of Science in Systems Engineering program, while the Student Chapter of IIE has been populated by Bachelor of Science students in the Industrial Engineering program.

With UTEP's authorization to convert the B.S. program into an Industrial & Systems Engineering program, the undergraduate population has embraced the field of Systems Engineering, and undergraduates now almost fully populate the officer positions in the Student Division. This change brings an increase of student membership, as well as new millennial energy.

Pictured to the right, officers of the INCOSE Student Division participate in UTEP's Gold Rush, an early Fall (Sept. 7) event for recruitment of members by engineering organizations.

INCOSE Student Division officers are planning new initiatives in the areas of Certifications, Mentorship, and Industry Exposure. ∞



Student Division officers left to right: Jorge Montes (Director Technical Advancement, SEP Exam Coordinator, and graduate student in the Systems Engineering program), Briana Moreno (Vice President Public Relations, undergraduate participant in the SE Lockheed Martin Boot Camp), Dayren Rodriguez (Secretary, undergraduate), and Natalia Acosta (Vice President, undergraduate).

September Tutorial—What You Just Missed

Mary Compton, Sandia National Labs

On September 23, 2017 the Enchantment Chapter sponsored a full-day tutorial entitled *Integrating Systems Engineering, Project Management and Quality Management: Lessons Learned and Recommendation,* at the University of New Mexico Continuing Education Conference Center in Albuquerque.

The tutorial was co-presented by ESEP Heidi Hahn, Senior Executive Advisor to the Associate Director for Engineering Sciences at Los Alamos National Laboratory (LANL), and CSEP Ann Hodges, Systems Engineering Lead for Mission Assurance for the National Security Programs Program Management Units at Sandia National Laboratories (SNL). Recently there has been growing interest in applying systems engineering (SE) and project management (PM) to complex engineering projects in an integrated way. For example INCOSE has formed an alliance with the Project Management Institute (PMI) and chartered a SE-PM Working Group for this purpose.

Both SNL and LANL have taken up this quest, each having developed what they call their Mission Assurance Framework, which describes the integrated application of SE, PM, and engineering quality and rigor to achieve mission success which is one area of overlap in the specializations claimed by both disciplines, along with topics such as stakeholder analysis and configuration management. The presenters described their organizations' Mission Assurance Framework, comparing and contrasting their similarities and differences. They also discussed what factors drove the decisions that were made. Participants worked through a series of questions to consider in making integration decisions for their own organizations.



Heidi Hahn

Ann Hodges







Systems Security Engineering Working Group

Rick Dove, Chair, SSE WG

This working group believes that security engineering cannot succeed without system engineering attention - partly in system requirements, partly in system trade space recognition, but mainly in system thinking applied to concepts of operations and systems architecture. Sustaining system functionality in the face of intelligent determined attack requires self preservation capabilities that adapt and evolve. Security engineering alone cannot accomplish this without the enabling-capability at the frontier of system engineering. Mission - Provide Systems Engineers and Systems Engineering with effective means and methods for sustainable system functionality under advanced adversarial attack.

Goals –

- \cdot SE responsibility for system security.
- \cdot SE influence on security and standards.
- \cdot SE concepts for next gen security.

• Engaged international participation. **Scope** – Address and foster system engineering design concepts, processes, enabling-support, and community understanding and acceptance of the roles that systems engineering must play in enabling effective systems security in the face of evolving systems complexity and systems security threat.

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.

A Declaration of Responsibility

For effective security, the buck stops at systems engineering. This demanding situation defines our mission, articulated and published as a *Declaration of Responsibility* in the INSIGHT April 2008 issue. The beginning excerpt from this declaration:

We hold these truths to be self evident, that engineered systems are designed for purpose; that they are engineered by their designers to meet certain fundamental requirements; that among these are security, safety, service, and the pursuit of economic effectiveness; that to secure these requirements design principles are instituted among the community of engineers, deriving their just nature from first principles, natural laws, and best practice; that whenever such principles become inadequate to these ends, it is the responsibility of the community to abolish them, and to institute new principles that shall seem most likely to deliver security, safety, service, and effectiveness.

Usefully modeled after the United States' Declaration of Independence, the document goes on to justify the need for a new order that breaks with tradition, before concluding:

We, therefore, solemnly publish and declare, that the community of system engineers are, and of right ought to be, responsible for system security as a fundamental systems engineering practice, that they are absolved from all encroachment on responsibility assumed or claimed by others, and that all political and inertial connection with maintenance of the status quo be totally dissolved; and that as custodians of optimal system effectiveness they have full power and responsibility to develop principles and best practices that employ holistic systems thinking; assume adversary penetration of our systems always and constantly; define and embody resilient reactive concepts; define and embody innovative proactive concepts; integrate all security disciplines; embed security within system architecture; represent meaningful measures and heuristics of risk and security effectiveness; identify and address the realities of the environment, including human behavior, organizational behavior, technology pace, systems complexity, globalization, agile enterprise practices, and agile adversaries; and remain both vigilant and innovative as expressions and possibilities of reality continue to change; and to discover, define, and address all other such things which responsible systems engineers have an obligation to do.

What Work Have We Done?

- Declaration of Responsibility.
- Wrote two sections in the INCOSE Handbook V4.
- Provided papers/panels/tutorials at IN-COSE International Symposiums.
- Organized and edited four INSIGHT Theme issues.
- Provided 3 INCOSE responses to NIST 800-160 standards drafts.
- Participated in NDIA Systems Engineering Division and Cyber Division.
- Developed/presented four webinars.
- Contributed to the SEBoK Systems Security Engineering primary references.
- Won the 2013 INCOSE Award for WG

- Sustained performance.
- Won the 2016 INCOSE Award for WG Collaboration.
- What Work Are We Doing?
- Collaborating on ABET accreditation for security courses.
- Representing INCOSE on ISO security standards.
- INCOSE Product: SE Responsibility Framework for Security.
- Conducting Socorro Systems Summit Collaboration on agile security.
- Planning IW/IS Systems Summit security topics.
- Planning IS18 papers and panel.
- Collaboration with various other INCOSE WGs.
- 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, discuss new project interests, and start new projects.
- Select project starts that fulfill a need felt by you, your organization, and 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 knowledge through collaborative diversity, and influence the work of others. 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, <u>dove@parshift.com</u>. Co-Chair: Beth Wilson, Adjunct WPI &

JHU, <u>wilsondrbeth@aol.com</u>.

Co-Chair: Ken Kepchar, Eagleview Associates, <u>eagleview2@cox.net</u>.

Reference Material: See the WG <u>Public</u> <u>Page</u> and <u>Connect Site</u> for published materials and synopses of all workshops.

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Resources

From TED, watch: What moral decisions should a driverless car make? Should your driverless car kill you if it means saving five pedestrians? In this primer on the social dilemmas of driverless cars, Iyad Rahwan, from MIT Media Lab, explores how the technology will challenge our morality and explains his work collecting data from real people on the ethical trade-offs we're willing (and not willing) to make.

From NASA's NESC Academy, <u>watch</u> seventeen videos, or download slides, on various aspects of systems engineering. Examples: Model Centric Engineering Parts 1, 2, and 3; Defining the Path to Elegance in Systems; The Representations and Practices of the Discipline of Systems

^r urgeon, Sandia National Labs				
Enchantment Chapter now has 124 active regular and student members.				
We welcome the following new regular members:				
Sandia National Laboratories				
Alpha Omega Change Engineering (AOCE)				
Sandia National Laboratories				
We welcome the following new student members:				
University of Texas El Paso				
University of Texas El Paso				
University of Texas El Paso				
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University of Texas El Paso				
University of Texas El Paso				
University of Texas El Paso				
University of Texas El Paso				
University of Texas El Paso ∞				

Engineering; Thinking Systemically About Complex Systems and Decision Making.

From TED, watch: *There's more to life than being happy*. Our culture is obsessed with happiness, but what if there's a more fulfilling path? Happiness comes and goes, says writer Emily Esfahani Smith, but having meaning in life – serving something beyond yourself and developing the best within you – gives you something to hold onto. Learn more about the difference between being happy and having meaning as Esfahani Smith offers four pillars of a meaningful life.

From Caltech, watch: The Mechanical Universe, a critically-acclaimed series of 52 thirty-minute videos covering the basic topics of an introductory university physics course. Each program in the series opens and closes with Professor David Goodstein providing philosophical, historical and often humorous insight into the subject at hand while lecturing to his freshman physics class. Dynamic location footage and historical re-creations are also used to stress the fact that science is a human endeavor. ∞

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.

Chapter Board

Anthony Matta	President	575-915-6800	armatta@sandia.gov
Ron Lyells	VP/President Elect	505-263-1893	rlyells@aol.com
Ann Hodges	Secretary	505-844-6284	alhodge@sandia.gov
Mary Compton	Treasurer	505-845-9268	mlcompt@sandia.gov
Ron Lyells	Past President	505-263-1893	rlyells@aol.com
Rick Dove	Director	575-586-1536	dove@parshift.com
Heidi Hahn	Director	505-665-4606	hahn@lanl.gov
John Hunter	Director	505-284-6053	jahunter@me.com
Jason Jarosz	Director	505-844-6671	jpjaros@sandia.gov
Bob Pierson	Director	505-767-1210	bob.pierson@atacorp.com
Evan Richardson	Director	505-844-5581	edrich@sandia.gov
Ben Schaefer	Director	505-284-6403	bschaef@sandia.gov
Eric Smith	Director	915-747-5205	esmith2@UTEP.edu
Tom Tenorio	Director	575-322-4123	tenoriot@gmail.com

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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Call or email your news, reviews, announcements,

contributions, or suggestions to: Rick Dove, Newsletter Editor-In-Chief Phone: 575-586-1536 <u>dove@parshift.com</u>