The Enchanted View
— Thinking About Systems —

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Enchantment Chapter UTEP Student Division Alive and Active

Fernando Castellanos
Student Division President

The UTEP INCOSE organization is a student division of the New Mexico INCOSE Enchantment Chapter. The organization was started by the Systems Engineering students from the University of Texas at El Paso in the spring of 2009.

Although it has been less than a year since its acceptance as a student organization, UTEP INCOSE has 14 members and has done many activities to motivate engineers to join. Some of these activities included tours to places such as Los Alamos National Labratory, ADC Telecommunications, and Western Refinery.

UTEP INCOSE members and faculty were given a presentation of the history of Western Refinery as well as a tour of their facilities. We learned about their program management and their operations.

ADC was another tour given to the UTEP INCOSE organization. We were given a brief presentation on ADC history as well as their advanced technology on fiber-optics.

Los Alamos National Labratory was the most recent tour. Heidi Hahn, member of the board of directors of INCOSE Enchantment Chapter, was very kind to help us coordinate a tour to LANL facilities. Students and faculty enjoyed this tour very much and are looking forward to the opportunity to visit Los Alamos National Labratory once again.

Future scheduled activities are: Computer-Aided-Design Workshops, Technical Writing Workshops, and ASEP Preparation Workshops. The UTEP INCOSE organization is planning a fundraiser and is currently supporting the annual Systems Engineering Day. Systems Engineering Day has become a UTEP tradition where guest speakers, representing industries from all over the country, gather at the UTEP facilities to speak to the students about the importance of systems engineering.

Our vision is to persuade engineers from other fields to join our organization, learn and get exposure to industry so that students can have a better understanding on how things are done outside academia. We believe that collaboration among students, professors, and industry professionals can prepare students for future challenges by giving them the tools needed to become successful engineers.

For more information on the Systems Engineering program at UTEP and Research Opportunities, visit http://imse.utep.edu , and http://rimes.utep.edu respectively. ∞

Joint Symposium Planning With PMI Rio Grande

Board member Tana Lucy invited Justin Johnson, president of the Rio Grande chapter of PMI (Project Management Institute), to the May 26 Enchantment Chapter board meeting. The discussion opened the possibility of holding a local joint symposium with a blend of systems engineering and project/program management topics.

Justin described a recent symposium sponsored by the PMI Chapter in Phoenix at which there were 650 attendees. They had 45 volunteers and it lasted 2 ½ days.

At the May 26 meeting it was decided to hold an initial 1½ to 2 hour brainstorming session later this summer. Tana will work with Justin to settle on a date and time for the meeting. Anyone interested in attending should email Tana at tblucy@sandia.gov. ∞

Atomic Museum Project Under Consideration

Member Woody Weed, who is a volunteer at the Atomic Museum, attended the May 26 board meeting to explore a possible community project.

One idea that emerged in the discussion was to offer help with the Naval Nuclear Propulsion Exhibit. Implementation of nuclear propulsion under Admiral Rickover is a real systems engineering story.

Next steps will involve board member Mark DeSpain contacting Museum officials. If that is positive and identifies potential project opportunities, a call to the membership for volunteers will occur.

2009 Circle Award Won

The chapter has been notified that it has again won a Gold circle award. The Gold, Silver, and Bronze Circle awards are presented every year to chapters meeting INCOSE's goals and standards.

Thanks to Heidi Hahn and Francis Peter for their work on the submission. Mark DeSpain will accept the award in July at IS10 in Chicago. ∞

SE Teacher Training at AFRL La Luz Academy

The Teacher Institute is a week-long science, technology, engineering, and math (STEM) professional development activity conducted by the AFRL La Luz Academy at Kirtland AFB.

On July 19 the Enchantment Chapter's Rick Dove is providing the kickoff keynote, on how SEs work on projects.

Participating math and science teachers listen to guest speakers, tour facilities, engage in various hands-on STEM activities, and discuss how these concepts can be taken back and applied in their classrooms. The concepts are tied to the Academy's various Flights for students in grades 5-12.

The Intro to Systems Engineering Flight is for eighth grade students. Students come to the Academy for three days of hands-on instruction. The curriculum introduces students to modern Systems Engineering principles through computer programming and robotics. Activities include building a small wheeled robot, and learning how to program it to maneuver through several increasingly challenging obstacle courses. ∞

Recent Meetings

Mary Compton, Sandia National Labs

April 2010—Rick Dove presented a talk entitled "Attacking the Growing System Security Gap – The Frontier of Systems Engineering." He discussed INCOSE's working group on System Security Engineering, and their work towards next generation security solutions that require system thinking applied to whole-system concepts of operation and systems architecture. He suggested systems must be as agile as the adversary, and mirror their six key characteristics of self organization, adaptable tactics, resilient reaction, evolving strategies, proactive innovation, and harmonious operation. He showed successful self-organizing security patterns already in practice, and how these concepts are influencing the roadmaps of research and development. Rick also discussed how working-group participants benefit.

February 2010—Pete McQuade's presentation introduced the audience to the basic concepts of Quality Function Deployment (QFD) for aerospace systems. The presentation discussed the philosophy and purpose behind QFD, and how QFD can be applied to help derive firm system requirements from "fuzzy" stakeholder expectations. The audience tried to build a QFD matrix for an intriguing problem, a High-G Entertainment System for Uncle Cliff's!

June 2010—Tom Tenorio discussed the Unmanned/Autonomous System Testing (UAST) Roadmap planned for delivery later this year. The UAST Roadmap includes chapters that address the testing of autonomy, the contrast between manned and unmanned testing, the Testing and Evaluation (T&E) alignment with the Unmanned System Integrated Roadmap (USIR), the USIR programs of record, the USIR technology forecasts, the UAST investment framework, the USIR performance envelope and technology category forecasts, and the USIR and UAST technology group use cases. The roadmap takes a graded approach – increasing the autonomy level gradually, from remote control to full intelligent autonomy. ∞

Other Announcements

Physical Protection Systems Design and Analysis Course Invitation.

Sandia's International Security Systems Group invites you to a no-charge two week course, July 26 through August 6, in Physical Protection Systems Design and Analysis. The course embraces Sandia's Design and Evaluation Process Outline, DEPO.

This 10 working day course consists of lectures, subgroup exercises, a response force field trip and a final exercise where students apply the knowledge presented throughout the class and present their solutions to their peers and staff. Students will understand and have applied the entire DEPO method and have acquired a network of international security experts they can contact as they apply learnings learned.

The course will be held in Albuquerque, near the Sensor Test Bed in building MO311. A security clearance is not required. To register for the class contact Susan Washburn at swashbu@sandia.gov or by phone at 505- 284-1577. ∞

Next Meetings

Mary Compton, Sandia National Labs

July 07: It's Not Easy Being Lean. Sheri Clark, Clark Consulting Group.
Abstract: It has never been more important to "do more with less", but how does an organization know which processes can be eliminated or changed without damaging the resulting product or service? Sheri Clark will discuss methods that can help an organization identify what is creating waste (in terms of time, people, materials) and how to develop effective solutions. This presentation will examine Lean definitions and methodologies, why it is applicable to all types and sizes of organizations and the relationship to quality. A starter's guide for Lean activities will also be provided.

August 11: Prescriptive and Adaptive Test Framework, Dr. Ricardo Valerdi, MIT.
Abstract: One of the interesting challenges in systems engineering is the successful realization of system of systems. Most of the energy towards this goal is focused on front end life cycle activities such as design and architecting. However, many challenges exist in the back end life cycle processes such as verification and validation. The existing paradigm of test planning for single systems is insufficient to handle the complexity involved with testing systems of systems. To address this, we are developing a decision support system to improve test planning for a special class of SoS: unmanned & autonomous. This class of SoS presents even more complex emergent behaviors which make testing an interesting mixture of art and science. This presentation will provide an overview of PATFrame (Prescriptive Adaptive Test Framework) which is being developed to support test planning in the DoD through the application of numerous methods such as cost modeling, real options, value-based testing, architecture modeling, design of experiment, adaptive dynamic programming, and ontology-based modeling. This project is part of a 3-University effort involving MIT, USC and UTA (http://mit.edu/patframe).

September 08: Choosing Your SE Competency Assessment Instrument, Jack Ring, Fellow, INCOSE.
Abstract: INCOSE, NDIA, and several individual companies are interested in a common way to assess the systems engineering competency of respective individuals. Several competency models and assessment methods have been devised but none have proven sufficiently general yet incisive to serve the variety of intended uses. The INCOSE Fellows volunteered to devise criteria for selecting a competency model and assessment method, essentially the measures of effectiveness for selecting among candidate competency models and assessment methods. This presentation reports on the current status of the perceived need, the development plan, the effectiveness validation method of the Fellows Action Item effort.

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Something to Consider…

Ready For an Experiment?

Ron Lyells, Honeywell

Do you enjoy those energetic conversations on System Engineering topics that just happen? Would you be interested in participating with your Enchantment Chapter peers in a four hour event that is all about energetic conversations?

It's called *Open Space*, a process that started years ago when someone noticed that the most productive ideas at a workshop occurred during the coffee breaks in small groups of animated discussion.

This would be an opportunity to sink our teeth into something of common interest. The outcome of an open space event is usually a set of ideas and options for action, something we could all take back to our own working environments and circumstances.

The theme would be something that everyone can get excited about, and known ahead of time. You get to shape the event as it happens - face to face, some time in the fall.

For example, we might explore:

- purpose and activities for the INCOSE Enchantment Chapter,
- the SE role and perspectives to be addressed in our organizations,
- the role of the SE on a project—desire vs reality—and ways to change that,
- or...something burning in your mind that you'll suggest.

We welcome your ideas and thoughts, something appropriate for Chapter member interest. Please contact any of your Board of Directors in person or by email, or feel free to contact me directly at ron.lyells@honeywell.com.

The Open Space Process provides a place and a time where we can all get together to explore some broadly themed problem that cuts across organizational, and geographic boundaries, but one that we all deal with. It is not a tutorial, nor a briefing, nor a highly scripted meeting.

It begins with an event announcement. If you choose to participate you will express your views and what you know, and you will come to learn from others. You might decide during the opening session that you are so passionate about some aspect of the theme that you are willing to lead a group discussion. Alternatively you might be more interested in popping in and out of various discussions and cross pollinating ideas from one group to another.

An experiment for us – yes; but not for the world. Since the mid-80's there have been thousands of Open Space events conducted across the globe, in every venue (from Corporate boards, to villages in third world countries, to government organizations). ∞

Did You Know…?

Bow Tie Architectures[1,2] are Adaptation Generators

Rick Dove, Paradigm Shift International

At the forefront of systems engineering are adaptable systems that can coevolve in uncertain environments with unexpected events. It is obvious that we need them in security and resilient networks[3]. But we also need them to keep up with rapidly changing system requirements, to prolong the life cycles of deployed systems, to accomplish true quick reaction capability, and to develop next generation standards[4] concepts that evolve at the speed of need.

The biological immune system is an excellent model. In Steven Frank's words[5]: *"...the genetic system spawned an adaptive subsystem to handle the unpredictable challenges of parasitic invasion. ... The challenge ... is clearly defined. The response requires recognition of invaders. Adaptive immunity uses a number of techniques to adjust exploration for better recognition of invaders versus exploitation of existing recognition tools. This dynamic balancing between exploration and exploitation occurs on short time scales. ... other adaptive systems rarely provide such clear challenge-response couples."*

Basically, the architecture has a relatively small library of fixed modules (at the central knot), which are constructed from a large variety of inputs (left bow), and that can be assembled into a very large variety of outputs (right bow), according to a set of protocols (assembly rules). The modules and the assembly protocols are relatively fixed and slow to change.

There is no fitness test within the bow tie architecture itself. The output might be viewed as speculative innovations or custom responses, in search of verification. The assembly process is highly constrained according to the protocol rules.

The knot itself is the fragile portion of the bow tie architecture, as its modules and rules are relatively fixed, and if they do not succeed in generating outputs that are appropriate for changing needs, the system fails to generate a successful response. The immune system as a whole has other mechanisms that test the fitness of the output, but these tests do not affect the content of the knot except on biological evolutionary time frames among a large population of similar but individually variable organisms – outside the scope of any one bow tie.

Nevertheless, life as we know it is testament to the effectiveness, based on the evolved selection of modules and protocol. For man made systems, this is where the systems engineering architect must focus creative thought for successful adaptive systems.

Threads to Pull:

1. Marie Csete and John Doyle. Reverse Engineering of Biological Complexity.
2. Marie Csete, and John Doyle, Bow ties, metabolism and disease.
3. Rick Dove. Patterns of Self-Organizing Agile Security for Resilient Networks.
4. Paul Hartzog, How Different is Your Bow Tie?
5. Steven Frank. The Design of Natural and Artificial Adaptive Systems.
6. Wikipedia. Bow tie (biology) .

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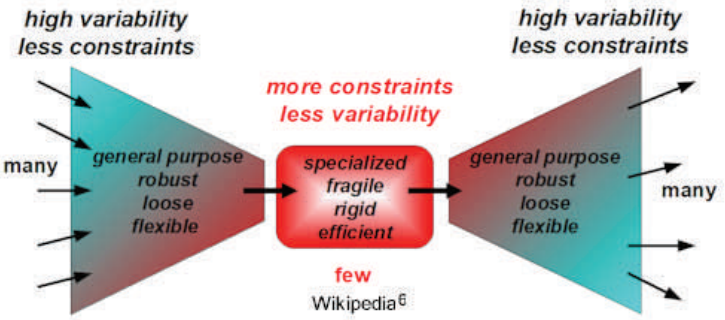

News From the Front

System Security Engineering Working Group at IS10

Rick Dove, Paradigm Shift International

The SSE-WG is holding a workshop at INCOSE IS10 in Chicago on Tuesday, July 13, all afternoon. Featured will be reviews of self-organizing security patterns in preliminary form, developed by members for potential expansion into essays for INSIGHT and for papers at a special security session being planned for IS11 in Denver. This project intends to lay the groundwork for next-generation system security strategy.

We will also discuss involvement in a security standards project, and timing for developing a system security section in the INCOSE Handbook.

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Conference News & Dates

2010 Q3 (near by or noteworthy)
Jul 11-15, Chicago, INCOSE International Symposium, IS10.
Aug 24-27, Denver, AUVSI's Unmanned Systems North America.
Sep 21-23, Denver, IEEE Avionics, Fiber-Optics and Photonics Conference.
Jul 24-29, Las Vegas, Black Hat Briefing.
Sep 13-15, Las Vegas, ISACA Information Security & Risk Management Conference.
Sep 13-15, Fort Worth, AIAA Aviation Technology, Integration, and Operations Conference.

2011 (noteworthy)
Jan 29-Feb 02, Mesa/Phoenix, INCOSE International Workshop IW11.
Jun 17-23, Denver, INCOSE International Symposium, IS11.

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Resources

Recently posted TED 20 minute videos:

Do big problems always require big solutions? Rory Sutherland says many flashy, expensive fixes are just obscuring better, simpler answers. Watch now

Richard Sears an expert in developing new energy resources, talks about our inevitable and necessary move away from oil. Toward ... what? Watch now

Nuclear power: the energy crisis has even die-hard environmentalists reconsidering it. Stewart Brand and Mark Z. Jacobson debate the pros and cons. Watch now

Craig Venter and team make a historic announcement: they've created the first fully functioning, reproducing cell controlled by synthetic DNA. Watch now

From Santa Fe Institute:

SFI's excellent periodic bulletins may be viewed or subscribed free here.

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Connect to Your Community of Practice

Chapter meetings with a focus on systems engineering are held monthly, usually the second Wednesday, except in December. The December meeting is an annual social event, with mingling, dinner, and a speaker chosen for enjoyment by systems engineers and guests alike.

Monthly meetings feature speakers from out-of-town that are visiting the area for other reasons, and local (more or less) 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. After chapter news, announcements and introductions, the presentation and discussion generally lasts until 6:00, all carried live on Live Meeting for those who can't attend. Recordings are not made.

Tutorials with in-depth 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 and event notices routinely go to all INCOSE members within the Chapter's geographic territory; but Live Meeting connections, special notices, and collaborative opportunities are generally limited to registered Chapter members. Obtain chapter membership on the INCOSE web site by changing your profile or so selecting as you renew membership. ∞

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