



## Student Intern from UTEP Chapter Contributing at LANL

*Chapter President Heidi Hahn, Los Alamos National Lab*

As you probably know, last year the Enchantment Chapter partnered with University of Texas-El Paso's systems engineering program to sponsor an INCOSE Student Division at UTEP. Since then, the Enchantment Chapter Board of Directors (BOD) and members have supported the Student Division in a variety of ways. In April, for example, Tom Tenorio, our immediate Past President, Fil Macias, and I attended UTEP's 3<sup>rd</sup> Annual Systems Engineering Days, and provided overview presentations to the students. The BOD also recently voted to provide funding for the Student Division President (this year, Octavio Castellanos) to attend the International Symposium. Regrettably, Octavio's summer internship obligations precluded him from attending the IS, but I am hopeful that the offer to cover registration costs for the Student Division President will become Standard Operating Procedure for the chapter.

But, lest anyone think that having a Student Division affiliate is a one-way street, I'd like to take this opportunity to tell you about one of the benefits that we, as Enchantment Chapter members and member companies, can derive through collaboration with our Student Division: student interns. By way of background, my employer, Los Alamos National Laboratory, has just published what I have been calling a "stealth" Systems Engineering Methodology that is applicable to R&D engineering activities taking place at the Lab. This is a policy document that mandates the use of a specific set of engineering processes (that look suspiciously like the SE Vee, just drawn linearly), tailored based on the level of risk associated with the engineered product. Still to be issued is a set of implementation guidance documents that provide the "how to" instructions for each of the process steps. Sounds like a perfect student project, right? I thought so, too.

As luck would have it, UTEP's program requires MS students to complete an internship with industry. I worked with the Student Division's faculty advisor, Eric Smith, to craft a work plan that would be satisfactory to UTEP and to identify students who might be interested in the kind of internship LANL had to offer. Samantha Dominguez joined LANL in early June. She has just completed the first year of her MS program, and has a 4.0 GPA. She has an interesting background, having had policy development experience in non-engineering sectors. She's been able to hit the ground running... as I write this, I'm sitting at the IS11 symposium and receiving drafts faster than I can respond to them! UTEP student interns bring with them not only their own individual skills and abilities, but also the resources UTEP provides. Samantha has been adept at reaching back to UTEP to draw on those assets. So, when you hire a UTEP intern, you quite literally get more than you pay for!

As an added bonus, Samantha has an interest in engineering ethics. We developed an engineering ethics course for LANL employees several years ago, and have been providing annual case-based refreshers. Samantha will be generating case studies for this year's course, as time permits – mostly as a filler while she's waiting on me!

I think Samantha would say that she's being challenged, and is learning. So would I! The internship experience really is a two-way street, with enrichment coming to both the student and the employer. I would encourage you all to take advantage of the opportunity to place a UTEP student intern in your organization!

∞

### The Critical Need for Autonomous Systems T&E

*Tom Tenorio, White Sands*

The robotics revolution continues to move autonomous capability prevalent in the virtual network world to autonomous action in the physical world. Many companies are fielding autonomous systems, but we have yet to see test and evaluation companies and organizations dedicated to testing the limits of autonomous systems.

The Autonomous Systems Test and Evaluation Working Group (ASTEWG) formed to advance the state of systems engineering in this area, recognizing the critical need for a new approach to T&E.

Emergent autonomy is a challenge for a variety of communities. ASTEWG appeals to those on the edge of autonomy to not

only consider the development of autonomy but also the T&E of autonomy. We must avoid the drive towards robust systems with brittle failure points. Creating resilient autonomous systems with graceful failure and rebound capability is the need.

Autonomous systems are an unfolding dynamic that the systems engineering community has yet to recognize as possibly the greatest single challenge we have ever faced. We are now building systems with more and more autonomous functions, necessary to overcome limitations in unreliable network connections and in the human supervisor.

The trend towards autonomy extends not only to the internals but also the externals. We are familiar with failures in fly-by-wire systems on airplanes. This same technology is migrating to other systems

because autopilot functions are increasingly critical to systems now relying on 100s of 1000s of lines of code. Traditional techniques simply do not scale to a world of software intensive systems of systems.

The cultural growth of systems engineering and test and evaluation as two separate communities complicates this effort. The success of a system is based on its ability to address a problematic situation. A's for effort must be replaced by A's for accomplishment.

Convening a critical mass of people to collaboratively engage in the problem remains the current focus of ASTEWG activities.

**To get involved contact:**

[tenoriot@gmail.com](mailto:tenoriot@gmail.com)  
[jring7@gmail.com](mailto:jring7@gmail.com)

∞



## Working Group News from IS11

### Model Based SE WG

*Ron Lyells, Honeywell*

A subset of the working group, the MBSE—Usability team, met at IS2011 to review a prototype collaboration environment that is being established to support individuals that would like to participate in this community of practice. This collaboration environment is intended to be established by the end of July.

The MBSE—Usability initiative is a collaborative effort to facilitate the improvement of SysML and associated modeling environments, even as the industry at large is working up the learning curve. This initiative was launched at IS2010 in order to accelerate the learning and sharing of modeling practices within the INCOSE community. A focus on usability was seen as a key issue for all the major stakeholders attending, which included not just practitioners, but representatives from the OMG and tool suppliers.

During the IW2011, about twenty-five individuals participated in a workshop to develop a set of use cases that represent the typical "work" that SysML modelers are currently faced with now and in the immediate future. These use cases are intended to provide the initial scope of systems process, tools, and SysML modeling for collaborating over the succeeding 6-8 months.

If you are an active SysML modeler, or just learning, you are encouraged to join the community. Stay tuned for further communication, in this news letter and the Enchantment web site, as we launch this activity.

**To get involved contact:**  
[ron.lyells@honeywell.com](mailto:ron.lyells@honeywell.com)

∞

### Systems Security Eng. WG

*Rick Dove, Paradigm Shift International*

The ½ day workshop at IS11 had seventeen in attendance and three by Live Meeting. The bulk of the meeting discussed issues associated with developing a security appendix for the INCOSE Hand Book, which is thought to be the most expeditious way to get material on system security engineering into the hand book in

advance of an eventual spread throughout the handbook in all appropriate places.

Discussion also considered developing system security engineering material for the SEBOK (system engineering body of knowledge) part of the BKCASE project, which is focused on providing definitive reference material for system engineering university curricula. The SEBOK will soon become a wiki that will be maintained jointly by IEEE and INCOSE.

It is possible that contributing a security section to the SEBOK could result in a published reference sooner than possible with the hand book, and that such material would be a foundation for a hand book appendix. A SEBOK section is limited to 1750 words, and undergoes a strong vetting process. There was considerable interest at the workshop to proceed with a hand book project that may, or may not, begin as a SEBOK contribution.

Beth Wilson, Raytheon's Corporate Advisory Board member to INCOSE, has agreed to lead the project, and will be developing organizational material for distribution shortly to anyone indicating interest in participating as a contributor or reviewer of material.

The workshop also reviewed the eleven essays that will appear in the July issue of INSIGHT on Systems of Systems and Self Organizing Security; and reviewed current status of the Self-Organizing Security Pattern Project, now with twelve patterns that have been published in various venues, including four that were presented at IS11.

Possible new projects were discussed with no resolution as yet. These included a security session for IS12 in Rome, Italy, the development of an ontology useful to system security engineering, and a system security engineering text book that could become an INCOSE product.

Opening a security standards project was considered and thought to be ill timed at this point as it would reinforce the check-list approach to system security currently in general practice.

The ontology project potential would likely be led by Ralph Hodgson, who is a recognized expert in this field and expressed high interest in such a project.

Detailed minutes of the workshop discussion and presentation are in the shared

documents IS11 folder on the System Security Engineering [WG page](#).

**To get involved contact:**  
[dove@parshift.com](mailto:dove@parshift.com)

∞

### Competency WG

*Heidi Hahn, Los Alamos National Lab*

The Competency Working Group is among the newest of INCOSE's WGs. Its charter is nearly complete and was expected to be signed off by the end of IS11.

The purpose of the group is to improve the practice of systems engineering through further development and adoption of competency management approaches. The group intends to build on existing competency frameworks, including the INCOSE framework, and evolve a globally accepted version, tailorable to the needs of the customer organizations.

There was much discussion of what these needs are, and a recognition that individuals and organizations use competency frameworks for a variety of purposes including individual- or organizational-level skill assessments, training needs analysis and curriculum development, professional development planning, development of maturity models for measuring SE competence, and research.

There was also recognition that the frameworks must be amenable to international use, which implies adaptability in the face of different legal requirements and cultural norms.

These various deployment scenarios/ uses will need to be considered as the framework is evolved. The primary focus of near-term development efforts will be on "soft skills" -- the interpersonal skills that increase SE effectiveness, including the social and motivational traits, behaviors and abilities used by an individual or group to successfully perform a task -- and SE-Project Management intersections, including probing the commonalities and the differences between the two disciplines.

An INCOSE-PMI collaboration is in progress, and the WG will monitor and build on the results of this effort.

**To get involved contact:**  
[goldhahn@concentric.net](mailto:goldhahn@concentric.net)

∞



### Recent Meetings

Mary Compton, Sandia National Labs

**April 2011**—The officers of the INCOSE-UTEP student division administration, led by president Octavio Castellanos, unveiled their commitment to grow the organization by providing members with novel ideas and services. INCOSE-UTEP will expose students to industry workforce atmospheres with activities including field trips, conferences and opportunities for students to network.

One notable development is the creation of the INCOSE UTEP website, <http://engineering.utep.edu/incose/>, where members and interested parties can get useful information and upcoming events are reviewed. Also, for the first time, INCOSE-UTEP is reaching out to the community, exposing high school students to STEM (Science, Technology, Engineering, Math) related activities by inviting a select group of students of a local high school to tour and network with them. It is their goal to travel this semester and make extra efforts to search for funding sources among uni-

versity contacts, supporting companies, and UTEP's Student Government.

Their last administration started an ASEP Test preparation session for students seeking to graduate with the credentials of an Associate Systems Engineering Professional. They intend to continue this effort during the upcoming summer term.

They have purchased supplemental preparation material, and include activities that build student achievement and employability.

**May 2011**—Craig Nichols, Sr. Systems Engineer at L3 Communications, talked on Architectural Patterns for Self-Organizing Systems-of-Systems. One major ability to develop is self-organizing SoS architectures, the focus of the presentation.

First self-organization was characterized. Then four different SoS were reviewed for characteristics that support their self-organizing architectures: Ushahidi, Al Qaeda, swarm robotics, and self-organized learning environments. These four examples were abstracted as candidate SoS architectural patterns that may be useful for informing SoS architectural design.

**June 2011**—Glenn Fink, a senior researcher at Pacific Northwest National Laboratory, presented a talk On Developing a Knowledge Base for Collaborative Situational Awareness in Critical System Problem Solving. Systems that depend on humans collaborating in real time to solve immediate critical problems have not had the benefit of data that measures the performance of situational awareness.

Toward that end, cyber defense competitions arising from U.S. service academy exercises offered a platform for collecting data that might inform requirements for human system integration and for further research on behaviors during challenging real-time situations, such as cyber defense.

Glenn's team collected data during the Pacific-rim Regional Collegiate Cyber Defense Competition (PRCCDC), and analyzed it for the behavior of cyber defenders. They proposed that situational awareness predicts performance of cyber security professionals. The presentation focused on their collection and analysis of competition data to support their hypothesis.

∞

### Next Meetings

Mary Compton, Sandia National Labs

#### **July 13: Defending Software Applications from Threats Through Code Analysis**

Stephen Sutton, Co-chair INCOSE Anti-Terrorism Working Group, Independent Consultant (recently retired from TASC, Inc.)  
**Abstract:** This presentation is based on work that the author and his colleagues did at TASC, Inc. in 2009 - 2010. Eighty to 90% of cyber-attacks target the applications on the internet and private/public networks. This trend continues and grows which implies that vendors, developers, and purchasers apparently do not pay sufficient attention to US Department of Homeland Security warnings and guidance. In our presentation, we present the application vulnerability problem, the most frequently encountered weaknesses and vulnerabilities, and a process for conducting code analysis that can help the software community to identify potential vulnerabilities and improve the resiliency of software applications to cyber-attack.

#### **August 10: Waste Processing Cost Recovery at Los Alamos National Laboratory—Analysis and Recommendations**

Steven R. Booth, Engineering Economist, Process Modeling and Analysis, Los Alamos National Laboratory  
**Abstract:** Los Alamos National Laboratory implemented full cost recovery for waste processing in fiscal year 2009 (FY2009), after a transition year in FY2008. Waste processing cost recovery has been implemented in various forms across the nuclear weapons complex and in corporate America. The fundamental reasoning of sending accurate price signals to waste generators is economically sound, and leads to waste minimization and reduced waste expense over time. However, Los Alamos faces significant implementation challenges because of its status as a government-owned, contractor-operated national scientific institution with a diverse suite of experimental and environmental cleanup activities, and the fact that this represents a fundamental change in how waste processing is viewed by the institution. This talk describes the issues involved during the transition to cost recovery and the ultimate selection of the business model.

#### **September 14: Human Systems Integration Railroad applications: HSI beyond DoD**

Jennifer Narkevicius, Co-chair INCOSE Human Systems Integration Working Group, Managing Director Jenius LLC  
**Abstract:** Human Systems Integration (HSI) is the management and technical approach to incorporating human considerations into the design and implementation of systems and can be used to improve performance, enhance safety, and reduce cost in railroad applications. While primarily used in military materiel acquisition, HSI can be used in infrastructure including large scale systems like railroads, to help meet safety and operations effectiveness goals which translate to reduced operational expenses over the long term. The underlying technical approaches, based in the human domains, are the same across organizations employing complex, large-scale technologies.

∞



### Joint Dinner Presentation with PMI Rio Grande

Ann Hodges, Sandia National Labs  
Mary Compton, Sandia National Labs

On June 8, 2011, Dr. Ralph Giffin III from the Stevens Institute presented a talk entitled “Applying Project Management and Systems Engineering to Complex Problems” at a dinner meeting held at the Albuquerque Uptown Marriott.

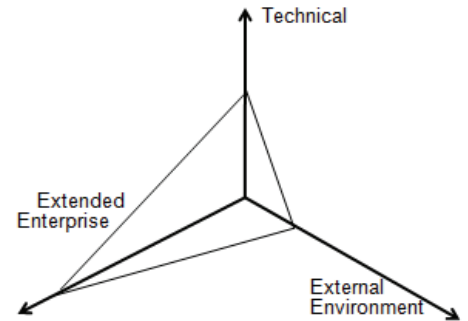
Product complexity is better understood by systems engineers and project managers than project complexity. However *both* types of complexity are significant contributors – or detractors – to project success and must be managed.

Dr. Giffin discussed different attributes of project complexity in the context of the development of the Alaska pipeline. Explored attributes of the Alaska pipeline project were categorized into 3 factors:

- **technical:** e.g., “never been done before”, quality control, ...
- **external environment:** e.g., environmental challenges, related infrastructure challenges, legal battles, new NEPA legislation, plethora of stakeholders, schedule-driven (oil embargo and cost/day for oil companies), and
- **extended enterprise:** e.g., geographically dispersed workforce (over 400 miles of pipeline) consisting of 70,000 workers, 18 agencies with shutdown authority, consortium of oil companies funding the effort, tolerance of “bad behaviors” of workforce so workforce wouldn’t unionize, dealing with organized crime.

The degree of control for each of these factors can be represented in a 3-axis figure,

an axis for each factor. The more overall control that a factor has, impacted by aspects such as risk mitigations or work controls, the closer the point is to the center of that axis. For example, the figure shows moderate technical complexity, low external environment complexity and high extended enterprise complexity.



Dr. Giffin also mentioned the work of Dr. Aaron Shenhar’s project classification *Novelty, Technology, Complexity, and Pace* (NTCP) framework. ∞

### Resources

**INCOSE Webinars** – 29 and counting are archived in INCOSE Connect at [www.incose.org/practice/webinars.aspx](http://www.incose.org/practice/webinars.aspx).

**Architecture that senses and responds.** TED brings Carlo Ratti, who directs the SENSEable City Laboratory at MIT and studies the built environment of cities -- from street grids to plumbing and garbage systems -- using new kinds of sensors and hand-held electronics. Other projects flip this equation -- using data gathered from sensors to create dazzling new environments. [Watch](#) the [Digital Water Pavilion](#), react to visitors.

**A visible quantum object.** TED brings Aaron O’Connell, the first person to measure quantum effects in an object large enough to see with the naked eye. Physicists are used to the idea that subatomic particles behave according to the bizarre rules of quantum mechanics, completely different to human-scale objects. In a breakthrough experiment, Aaron O’Connell has blurred that distinction by creating an object that is visible to the unaided eye, but provably in two places at the same time.

[Watch now >>](#)

**See to believe**—From TED, printed organs for humans. [Watch](#) a bladder walking and talking, with a kidney debut. ∞

### Haiku Slam

Rick Dove, *Paradigm Shift International*

Hey now, hey now, haiku haiku one day:  
July moon rising  
haiku time is here again  
empty white space cries

...apologies to the Dixie Cups ([Iko Iko](#)) and James Crawford ([Jock-A-Mo](#)).

Bob Pierson sticks his toe in...  
furious user  
demands documentation  
money long since spent

Jack Ring returns again, with...  
cyberstorms will win  
when all leaves look the same  
none-all are bogus

Rick offers...  
shall I work today  
or shall I work tomorrow  
system thinking thoughts

**MILLIONS of DOLLARS  
COULD BE YOURS**

Send your system engineering haiku to [dove@parshift.com](mailto:dove@parshift.com). Look up haiku rules [here](#). Winners will be announced in the Q1 2012 newsletter as among the best of the 2011 submissions, and each will receive an NM lottery ticket for a real slim chance at \$\$\$Multi-Millions.

### New Chapter Members

Francis Peter, *Management Sciences*

Welcome new INCOSE members to Enchantment Chapter, with membership at 109:

|                |                                     |
|----------------|-------------------------------------|
| Jay Brotz      | Sandia National Laboratories        |
| Mike Gruer     | Honeywell International             |
| Jim Harmon     | Wagner Power Systems                |
| Dan Treibel    | SAIC                                |
| Fawn Turner    | Sandia National Laboratories        |
| Phillip Turner | Sandia National Laboratories        |
| Trina Walsh    | Ball Aerospace & Technologies Corp. |
| Steve West     | Boeing Directed Energy Systems      |

Welcome new Student Chapter members of the University of Texas, El Paso, with membership at 16:

Sergio Alvarez

∞

∞



### UTEP Student Chapter

Octavio Castellanos, Chapter President

The Enchantment/UTEP student chapter of INCOSE will hold its next general meeting on Thursday 9/01/2011. In addition to welcoming new students and inviting them to become members, the student chapter will hold elections for Vice President and President Elect. An evaluation sheet will be distributed to evaluate officer and administration performance of the 1<sup>st</sup> term as well as to gather feedback on recommendations by fellow members.

At the INCOSE 2011 International Symposium three UTEP posters appeared: *Optimizing Ethics into the Joint Requirements Planning Process* by Samantha Dominguez, *Emergency Management Frameworks as a Complex Adaptive System* by Mark G. Sassenfeld, and *A Novel*

*Zachman Framework Matrix with Attributes and Causal Loops for Complex Systems* by Stefan Hempel. Additionally, Eric Smith presented a full-day tutorial entitled *Bias Amelioration in Tradeoff Studies*.

Tours of industry to expose students to local and out-of-town systems engineering application is still the purpose that drives the motivation of this administration. We look forward to taking on the challenge of increasing our membership numbers and continue providing support to our student body.

### Gold Circle Award at IS11

President Heidi Hahn, on behalf of the Enchantment Chapter, received the INCOSE Gold Circle Award at IS12, for contributions and accomplishments in 2010. The Gold Circle Award recognizes chapters adopting best practices and reaching

the highest goals and standards established by our organization.

### Mark Your Calendar

**IW12**, the INCOSE International Workshop, will be held January 28-31, 2012 in Jacksonville, Florida. Details will be available in late September. Get involved in some working group participation.

**IS12**, the INCOSE International Symposium, will be held July 9-12, 2012 in Rome, Italy. Paper submissions are due November 3, 2011, fast approaching.

**CSER**, the Conference on System Engineering Research, will be held March 19-22, 2012 in St. Louis, MO. The [Call for Papers](#) is open with abstracts due August 5, 2011, and full papers due September 2, 2011.

## 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 4:45pm. After chapter news, announcements and introductions, the presentation and discussion generally lasts until 6:00pm, 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.

### Chapter Board

|                 |                |              |                          |
|-----------------|----------------|--------------|--------------------------|
| Heidi Hahn      | President      | 505-665-4606 | goldhahn@concentric.net  |
| Woody Weed      | Vice President | 505-845-9267 | jwweed@sandia.gov        |
| Tom Tenorio     | Past President | 575-405-0008 | tenoriot@gmail.com       |
| Tana Lucy       | Treasurer      | 505-844-9730 | tblucy@sandia.gov        |
| Mary Compton    | Secretary      | 505-845-9268 | mlcompt@sandia.gov       |
| William Bearden | Director       | 505-665-3398 | bearden@lanl.gov         |
| Mark De Spain   | Director       | 505-844-5132 | mjdespa@sandia.gov       |
| Rick Dove       | Director       | 575-586-1536 | dove@parshift.com        |
| Jorge Hernandez | Director       | 505-284-2737 | jgherna@sandia.gov       |
| Ann Hodges      | Director       | 505-844-6284 | alhodge@sandia.gov       |
| Ron Lyells      | Director       | 505-828-5625 | ron.lyells@honeywell.com |
| Francis Peter   | Director       | 505-255-8611 | fepeter@comcast.net      |
| Bob Pierson     | Director       | 505-767-1210 | pierson@aptec.com        |
| Eric Smith      | Director       | 915-747-5205 | esmith2@UTEP.edu         |
| Sharissa Young  | Director       | 505-845-3272 | sgyoung@sandia.gov       |

### Published quarterly by

INCOSE Enchantment Chapter,  
New Mexico.

Published material does not necessarily reflect the views and opinions of the Board of Directors, or the Editor of the publication.

**Call, email, or fax your news, reviews, announcements, contributions, or suggestions to:**

Rick Dove, Newsletter Editor  
Phone: 575-586-1536  
Fax: 575-586-2430  
dove@parshift.com