



Let the Dialog Begin!

Ron Lyells, Chapter President, Honeywell

We as members of INCOSE have chosen to be part of this volunteer organization for a triad of reasons. Maybe we thrive on the personal connections we make. For others of us, maybe it is all about opportunities for learning and improving personal competence. In addition to these desires maybe some of you put a high value on the autonomy INCOSE brings, in that you have many options for involvement.

For this newsletter, I would like to focus on the connecting piece of this triad. In past newsletters I have talked about the concept of making culture, and have introduced a few concepts like cultural artifacts, our response to culture and the notion of culture keeping. We are introducing a new cultural artifact this month. Our own chapter twitter account, which has been setup by Anthony Matta, current president elect of the chapter. I personally have not used this social media option, but the younger members of our board are most encouraging. I invite you to join the experiment. This capability is being offered to allow you another way to connect to your Board of Directors, as well as another channel to connect with each other. So, get setup, and post something. Make it provocative if you are so inclined, but be respectful. The only thing I ask is to keep it relevant to our discipline and mission across an environment scope that can include our chapter, the state, region, and global reaches. You may span organization boundaries, people groups, and problem spaces.

The link to the chapter twitter account is <https://twitter.com/enchantincose>.

You do not need a twitter account to just view what is on this site. But if you want to contribute, you will need an account. You can get yourself setup with an account by going to twitter.com.

Let the dialogue begin!!



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Socorro Systems Summit—Oct 28-29

Professional Development and Organizational Benefit



Chapter Board

The Enchantment Chapter has a mission to support Systems Engineering needs and membership professional development and engagement. Underway is planning for a Systems Engineering 2-day multi-workshop collaborative event

for October 28-29, in Socorro, New Mexico, at New Mexico Institute of Mining and Technology (NM Tech).

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

Teaching is a push perspective, learning is a pull perspective. Effective learning is amplified when conducted as a team sport, among people driven by curiosity and a deep-felt need to know something more - a specific something. Collaborative-learning workshops chose topics screened for real appeal to real practitioners - who have a real application for the results. Participants self-selected, bring passionate questions and diverse perspectives, and never fall asleep. Collaborative learning is aided when topics do not have a clear established knowledge base, and when participants cannot claim dominant expertise. This is the basis for the October 28-29 Socorro Systems Summit this year at New Mexico Tech.

Communities of practice (CoP), defined as "people bound by informal relationships who share a common practice," are another very important collaborative learning mechanism. Communi-

ties of practice are fluid and interpenetrative rather than bounded, crossing internal and external organizational boundaries. A community of practice emerges when people with similar interests seek each other for discourse, experience sharing, and problem solving assistance.

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

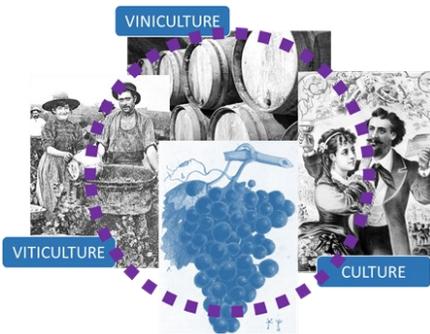
Late Breaking News

- Attendance fee has been set at \$100.
- Students may attend free, but must prepare in advance with research on topics of their interest, with faculty guidance.
- INCOSE President Elect Garry Roedler will be a featured plenary speaker and attend throughout.
- An optional Women in Engineering dinner social, led by INCOSE Fellow Regina Griego, will be held the 28th for all who wish to attend. Cost and location TBD.
- Event promotion is INCOSE-wide, with event posted on INCOSE home page, announcement appearing in June INCOSE Newsletter, and more to follow.
- A survey to select the eight workshop topics will be sent to membership in early July. Please respond, indicating topics of interest to you. See page 8 for suggested topic candidates.
- Workshop leadership is being recruited INCOSE-wide, but generally awaiting topic selection guided by the survey.
- Updates on event info are maintained on Chapter website www.incose.org/enchantment under the Library tab, with printable flyer at www.incose.org/docs/default-source/enchantment/161028-flyer-socorrosystemssummit-current.pdf?sfvrsn=2.

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Summer Social—Systems Life Cycle of the Grape—July 6



Mary Compton, Sandia National Labs

On July 6, 2016 the INCOSE Enchantment Chapter will host our third annual summer social, in the Rio Grande Room at the St. Clair Bistro, 901 Rio Grande Boulevard NW in Albuquerque. Check-in is between 5:00 and 5:30 PM. The event starts at 5:30 PM. Please join us for this opportunity to get to know your fellow Enchantment Chapter members.

This year's social begins with an overview of winemaking by Enchantment Chapter Board member Heidi Hahn. We will then enjoy tasting four of the St. Clair's excellent wines. Our server will discuss each of the four wines in more detail. Registration includes wine tasting, appetizers, and soft drinks. This event is limited to the first 36 participants.

Reserve your spot right away! It is free to attend this social. **Registration is required by July 5, 2016 at noon.** All participants must be 21 or over. To register please visit: <https://www.eventbrite.com/e/systems-life-cycle-of-the-grape-tickets-25780104988>. For more information contact incoseenchantment@comcast.net or Mary Compton at 505-845-9268.

INCOSE Handbook Tutorial—What You Missed

Mary Compton, Sandia National Labs

Twenty-eight people attended the INCOSE Systems Engineering Handbook v4 Tutorial sponsored by the Enchantment Chapter on May 12-13, 2016. The Chapter offered this tutorial to provide a local opportunity for learning or reviewing systems engineering and optionally prepare for the INCOSE certification exam.

The tutorial covered the certification process and version 4.0 of the Systems Engineering Handbook. The course included an overview of the INCOSE Systems Engineering Professional process, sample exams, and tips to help participants take the exam and fill out the certification application.

The tutorial drew attendance from all over the Enchantment Chapter territory (New Mexico and West Texas) and beyond. The attendees included eighteen INCOSE members, three non-members, and seven systems engineering students. Six of the seven students attending the tutorial were members of the INCOSE Student Chapter at the University of Texas at El Paso (UTEP). These students were accompanied by UTEP professor Oscar Mondragon.

Among the member attendees was Brian Selvy, an INCOSE member from Tucson, AZ.

Leading this tutorial was John Clark, a retired Chief Engineer and Corporate Sys-

tems Engineering (SE) Instructor at Northrop Grumman Corporation (NGC) with several years of experience applying SE and Software Engineering. John is an internationally recognized speaker and Subject Matter Expert in SE, an SE tutorials instructor in major SE symposia and webinars, and a founder and member of several NGC and INCOSE Working Groups (WGs). John is also the presenter of two series of Training Working Group tutorials, the first on the Fundamentals of Systems Engineering and the second on the Systems Engineering Handbook, which can be found at <https://connect.incose.org/Library/Tutorials/training/SitePages/Home.aspx>. ∞

Meet Jeni Turgeon—Membership Coordinator

Jeni Turgeon, Sandia National Labs



The Enchantment Board of Directors (BoD) has created a new Membership Coordinator position to improve membership communications, recruitment, and retention. Jeni

Turgeon (that's me) will be filling this role,

and I've contacted some of you already.

Understanding factors that encourage membership is an important part of retention; thus, as Membership Coordinator, I will contact each member prior to and after their membership dates lapse. If members choose to allow their membership to expire, we kindly ask that you provide some feedback on why you made the decision to leave. This will better inform the BoD on potential areas where we could improve what we offer to our members. I'll also ask if, as an expired member, you wish to con-

tinue receiving Chapter announcements and newsletters.

Most importantly, we would like to hear from you now while you are an active member. What encourages you to remain an Enchantment Chapter member? What would you like to see offered to members that we don't already offer? How could we entice you to become more active in Chapter activities? Any feedback is greatly appreciated, and you can share this with me at jturgeo@sandia.gov. ∞



Recent Meetings

Ann Hodges, Sandia National Labs

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

April 2016—Bill Schindel, President of ICTT System Sciences, presented *Got Phenomena? Science-Based Disciplines for Emerging Systems Challenges*. Engineering disciplines (ME, EE, CE, ChE) sometimes argue their fields have “real physical phenomena”, “hard science” based laws, and first principles, claiming Systems Engineering lacks equivalent phenomenological foundation. Bill argued the opposite, and how replanting systems engineering in Pattern Based Systems Engineering supports emergence of new hard sciences and phenomena-based domain disciplines.

He argued that laws and phenomena of traditional disciplines are less fundamental than the System Phenomenon from which they spring. The talk discussed that this is a practical reminder of emerging higher disciplines, with phenomena, first principles, and physical laws. Contemporary examples were presented.

May 2016—Dr. Paul Clements, VP Customer Success, BigLever Software, presented *Systems and Software Product Line Engineering – the State of the Industry*. Product line engineering (PLE) is a way to engineer a portfolio of related products in an efficient manner, taking full advantage of the products’ similarities while respecting and managing their differences. By “engineer,” he meant all of the activities involved in planning, producing, delivering, deploying, sustaining, and retiring products. PLE derives benefits from engineering the whole family rather than separately engineering each member. Numerous case studies show that exploiting the commonality throughout the products’ total life cycles can return substantial improvements in time to market, cost, portfolio scalability, engineer productivity, and product quality. No other engineering paradigm shift has, to our knowledge, brought about results that rival these. This talk explored how PLE is being used in industry today, and discussed how it has grown and evolved to meet the needs of such high-demand industries such as automotive, avionics, aerospace and defense, and more.

June 2016—Andy Pickard, Rolls-Royce Associate Fellow in Systems Engineering, presented *Cooks, Recipes and Ingredients*. To make a meal, you need ingredients and a recipe. A recipe defines sequencing, quantities, timing etc. This is analogous to a project’s processes (ingredients) and life-cycle (recipe). For a project, the attributes of cost, schedule and quality are properties that emerge from the recipes and ingredients. But how important is the recipe? The study behind this presentation found instances where a project’s recipe had a 16-fold cost difference using the exact same ingredients. This suggests that a good cook can make a great meal almost regardless of the ingredients. Many Project Managers inadvertently become chefs of their projects and create new recipes, attempting to recover their project. However, few managers can predict the outcome of the recipes they create. When things turn out badly, they blame the ingredients and not the recipe. This presentation showed how a business can characterize a recipe to meet business goals, define it in a structured way, and then use that definition to plan and monitor a project. ∞

Next Meetings *Ann Hodges, Sandia National Labs*

July 6: Summer Social—St. Clair Winery & Bistro—Systems Life Cycle of the Grape.

Produced by Mary Compton, Sandia National Labs, with Speaker Heidi Hahn, Los Alamos National Lab.

Abstract: Learn about winemaking and taste the wine at the St Clair Winery & Bistro in the Rio Grande Room. Check-in is between 5:00 and 5:30 PM. The event starts at 5:30 PM with an overview of winemaking by our own Heidi Hahn. Appetizers and soft drinks are included. Please join us for this opportunity to get to know your fellow Enchantment Chapter members. This event is free for you and max of one guest, but attendance is limited to 36 participants. Registration closes noon on July 5, 2016, or when 36 registrations are filled. All participants must be 21 or over to attend. For more information email incoseenchantment@comcast.net. Registration open to all at: www.eventbrite.com/e/systems-life-cycle-of-the-grape-tickets-25780104988.

August 10: How Ready are We to Routinely Consider Natural Systems Data and Solution Concepts?

Dr. Lawrence Pohlmann, Strategics.

Abstract: The biomimicry community would have us believe that the ‘genius of Nature’ is a ready source of inspiration for a wide range of our engineering, design, and sustainability problems. Should the SE community accept—and act on—this belief? This presentation starts with a brief overview of the objectives, activities, and findings-to-date of the INCOSE Natural Systems Working Group (NSWG). A major premise of the NSWG is that the SE community can, and should, more routinely consider natural systems data and solution concepts. This presentation proceeds to systematically address our readiness to do so from seven different, but interdependent, perspectives:

- Bio-inspired design (BID) process definition acceptance and consistency—Is there sufficiency?
- Technology readiness scales (TRS) and assessments—Do TRS’s apply in the BID context?
- Capability maturity models—What can we learn from the maturity model advocates?
- Process & product development precedence analyses—Are NS considerations applicable for unprecedented functions or systems?
- Change management concepts—Will it help to use these types of techniques to encourage BID?
- Corporate and customer culture and innovation climates—Is our organizational culture ready for this?
- Application scale and complexity—Do NS inspirations help in the kinds of work we do?

The presentation concludes with a set of recommendations to increase our readiness. Selected references are provided.

September 14: Agile Systems & Processes 105: Operational Awareness – Alert to Threats and Opportunities.

Rick Dove, INCOSE Fellow and CEO of Paradigm Shift International.

Abstract: Agility is required in operational environments that are Unpredictable, Uncertain, Risky, Variable, and Evolving (UURVE). Agility is enabled by common architecture and design principles—a static capability. Agility is facilitated by an agility-sustaining ConOps—a dynamic behavior, driven by operational awareness, proactively alert to internal and external threats and opportunities. This is true for systems of all kinds, from agile development and deployment processes, to agile systems and products that are deployed. This presentation will focus on the facilitating behaviors of operational awareness, and the enabling mechanisms for acting upon that awareness, with real examples. ∞



Not For Women Only

Regina Griego, Sandia National Labs



Are engineers a part of the political dialogue, or creating our national vision, for what we spend money on as a nation and as a world? Women are over 50% of the population. Engineered systems affect the everyday

lives of all people. The agenda of the engineering community dominated by men at least 20 to 3, and in leadership about 20 to 1, is not completely accounting for women.

I often ask myself, what would the agenda of the engineering community be if 50% or more of that community were women? In particular what if the engineering leaders were at least 50% women? If engineers have any real voice in what systems are built in the world, what would a voice sound like if women were represented equally?

As usual, I have to reach into my experience anecdotally; it grounds me. I have worked in three completely different business areas at Sandia: Nuclear Weapons Stewardship, Non-proliferation and Treaty Verification, and Satellite Ground Systems. Of those three, there were substantially more women in Non-proliferation and Treaty Verification, including a good number of women in management.

Another example: my daughter when she graduated in Industrial and Systems Engineering from the University of Arizona tried hard to find a non-defense job that made sense from a financial viewpoint; she was unsuccessful at that time.

Based on my experience and my own systems view of the world, I believe that women would turn toward systems that make the world more peaceful and im-

prove the overall quality of life. I do believe that some men are in this camp as well, but I believe the voice would be stronger and more clarion with powerful, smart women engineers in equal numbers to the men deciding that our priorities as a nation and as a world should be creating a better, less dangerous world for our children.

I ask myself why women are so few and I become very discouraged at the rate of change over the 33 years since I received my bachelors in Electrical and Computer Engineering. I am often still the only technical woman in a meeting of 10-15 people. The research [1] on the number of practicing engineers puts the average at 11%.

Wow, at this rate it will take 100's of years to achieve equal numbers. This is the same conclusion that a recent documentary made about women in public service and in media leadership [2]. They estimated that at the rate of change the numbers do not become equal for 500 years. How can we tolerate this as a nation? What is it going to take to create a disruptive shift, a sort of revolution?

I assert that we cannot wait. I believe the solutions, the systems that our world needs, are in the heads of many women. I believe the attunement with creating healthy communities is second nature to women.

During the INCOSE 26th International Symposium the group, Empowering Women as Leaders in Systems Engineering (EWLSE), is featured in two events.

I am leading a pre-symposium workshop for half a day on Sunday, July 17th. The overall goal of that workshop is to create the space for an honest dialogue about leadership in systems engineering, in particular from a women's perspective. The agenda for that workshop includes a panel "Beyond the Resume: Personal Journey of INCOSE Women Leaders," followed by a facilitated "world café" dis-

ussing aspects of leadership.

The panel will feature five panelists of recognized INCOSE women leaders with a moderator who is also well known in INCOSE, Anne O'Neill. Anne will create the space for sharing through a selected set of questions to the panelist and invite conversation from the audience. The facilitated sessions include four topics: "When are you at your best?", "Emotional Intelligence", "Storytelling", and "Power & Influence". These topics will be explored through two sessions of dialogue facilitated by awesome facilitators, both men and women.

The second event is part of the INCOSE IS Technical Program, a panel titled "Empowering Women as Leaders in Systems Engineering." There are six participants, two of which are men. I will be a panelist presenting on "The impact of culture on women in leadership."

At some point the conversation has to become very honest. We as an engineering community need to be asking the hard questions. Questions like: do awards that single out women make sense? How can I encourage young women and girls to enter a field that culturally requires you to morph who you are in order to survive, let alone thrive? Why is it taking so long. I mean, really, why? Until we become very honest with this conversation and create an urgency for change, I'm afraid my two daughter engineers will be asking similar questions 25 years from now.

[1] "Stemming the Tide: Why Women Leave Engineering," Nadya A. Fouad, Ph.D., Romila Singh, Ph.D., Mary E. Fitzpatrick, Ph.D., and Jane P. Liu, Ph.D., 2012 NSF University of Wisconsin-Milwaukee Report.

[2] "Miss Representation," Documentary by director, Jennifer Siebel Newsom, Initial DVD release: February 21, 2012.

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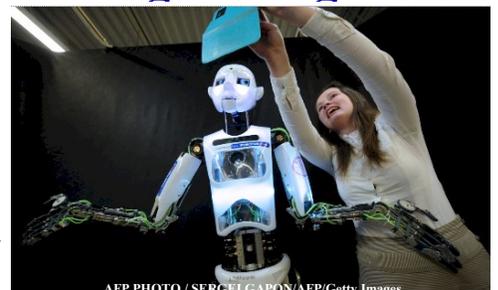
Girls Outperform Boys on Technology and Engineering

Heidi Hahn, Los Alamos National Lab

Girls outperformed boys on a national test of technology and engineering literacy that the federal government administered for the first time in 2014. Among eighth-grade students in public and private schools, 45 percent of girls and 42 percent of boys scored proficient on the exam, the National Assessment of Educational Progress, or NAEP. Overall, 43 percent of all students were proficient.

The test was designed to measure students' abilities in areas such as understanding technological principles, designing solutions, and communicating and collaborating. Girls were particularly strong in the latter. I hope that results such as these will help dispel widely-held biases about girls and women in engineering! Read full article at:

www.washingtonpost.com/news/education/wp/2016/05/17/girls-outscore-boys-on-inaugural-national-test-of-technology-engineering-skills



AFP PHOTO / SERGEI GAPON/AFP/Getty Images

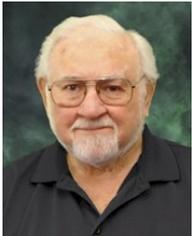
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Why You Should Attend the Socorro Systems Summit

Rick Dove, *Paradigm Shift International* The article below is part of a presentation Jack Ring made at the April 2016 COFES Conference (Congress on the Future of Engineering Software). Watching the video, I heard Jack underscoring the purpose of the Socorro Systems Summit coming this Fall. Jack is an INCOSE Fellow, and a frequent presenter at Enchantment Chapter meetings. Full video at: <http://cofes.com/ADMIN-STUFF/Video/Video-Player/VideoId/679/DaS-7-Jack-Ring.aspx>. ∞

Professional Development through Co-Evolution—A Team Sport



Jack Ring, *Educe, LLC*

I appreciate this opportunity to share ideas with you. These reflect my experiences in Educe LLC where we serve :

- those who know they don't know,
- those who don't know they know and
- those who don't know they don't know.

We do not strive to serve those who know they know because it takes too much time and effort to help them see that what they know just ain't so --- and then they don't appreciate it.

According to Dee Hock, co-founder of the VISA Corporation and author of *Birth of the Chaordic Age* the first steps are

- Commit to a compelling purpose and
- Commit to a few principles that foster synergy among your COMMUNITY OF PURPOSEFUL PRACTICE (COPP).

I suggest that we consider these ten degrees of synergy, starting bottom left with Connect, and ascending to Co-evolve. These indicate your degree of contribution in your COMMUNITY.

Your evolution to your personal best will enable your degree of contribution. If you can exhibit the behaviors in the right column then results will occur as shown in the middle column.

Read the chart this way ---

- 1) To **connect** you must have accessible attributes, so that each can discover another.
- 2) To **communicate** you must have a common language, so that interests and values can be shared.
- 3) To **converge** there must be shared self-respect to pursue the compelling purpose. Else each does their own thing.
- 4) To **commit** you must have the courage to plan, so that a principled relationship enables the COMMUNITY.
- 5) To **co-operate** means compatible actions enabled by your willingness to wait.
- 6) To **co-celebrate** means en-joying one another, if you commit to enough time and space and do enough Face to Face.
- 7) To **co-labor**, or help one another, you must have a desire to serve.

There's more. Most current literature stops at collaborate as if that's all there is. But Design and Sustainability offers more.

- 8) If you share your knowledge claims and appreciate others vetting them, then you can Co-learn through meaningful reflection.
- 9) Co-facilitate means everyone is a leader. In any group if you encourage and support N-party stewardship then the Return on Effort approximates e to the N power.
- 10) Co-evolve. If you have a joy-enabled Level of Consciousness then you will foster each one morphing toward a win-win-win result.

A joy-enabled level of consciousness may be a strange concept to some of you. That 10-level Personal Best stack may seem quite challenging. Is the capability to Co-evolve with your associates worth it? What's the Value Proposition?

Relationships	Results	Mediators
Co-evolve	Morphing toward Win-Win-Win	Joy-enabled level of consciousness
Co-facilitate	Value out/value in $\sim e^N$	N party stewardship
Co-learn	Meaningful reflection	Shared knowledge claims
Collaborate	Help one another	Desire to serve
Co-celebrate	En-joying one another	Time & space, face-to-face
Cooperate	Compatible actions	Willing to wait
Commit	Principled relationship	Courage to plan
Converge	Compelling purpose	Shared self-respect
Communicate	Share interests & values	Common language
Connect	Each discovers an other	Accessible attributes

Your Degree of Contribution

Your Personal Best

On the positive side the various COMMUNITIES in which you engage will always become more Fit For Purpose. They will Win more often.

Also, value will be earned by Do No Harm. This becomes more important as our world becomes more complex and chaotic. It may not be easy to achieve. For 2500 years, physicians have taken the Hippocratic oath to Do No Harm yet current data shows that approximately 50% of the therapies physicians devise today are not fit for purpose.

On the prevention side...

First, you will help prevent hubris and intellectual arrogance. The inability to admit error, thereby to learn.

Second, you will help prevent consensus from overriding critical thinking. Also called Group Think and Clan Think. Group Think occurs when consensus is reached even though some know the conclusion is incorrect. This is the "go along to get along" syndrome. Clan Think is when a COMMUNITY of strongly like-minded people agree without even considering alternatives.

Third, you will help prevent the occurrence of the Law of Unintended Consequences, which Robert Merton warned us about in 1936 and too many of us still commit 80 years later.

Changing yourself and facilitating change throughout your various COPPs can be a very daunting task. Or, you can leverage the strategy of the dandelion. Dandelion seedlings, like good ideas, are not impeded by walls. The air currents caused by walls lifts the seedlings up and over walls and takes them on their way.

So the issue is, are you sustainable? The question is not how sustainable are you? Instead it is a Yes or No question. If you are not sustainable, then all the effort we put into sustainability methods and tools will be futile.

If you are sustainable, you can write your clear, compelling purpose regarding sustainability, and write nine or so principles by which you will abide in your COMMUNITY.

If you are not quite sustainable, I recommend you: 1) become a Reflective Practitioner, 2) co-evolve your character, and 3) go make lots of little mistakes (and learning) but no BIG ONES. ∞



Systems Engineering Boot Camp at U. of Texas El Paso (UTEP)

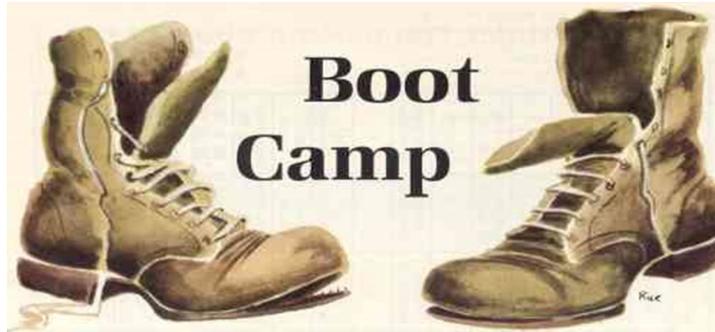
Eric Smith, University of Texas El Paso

UTEP has partnered with Lockheed Martin Aeronautics (LMA) to offer Lockheed's in-house System's Engineering (SE) Boot Camp at the El Paso campus. A Lockheed fellow will teach half of the course, while UTEP professors Oscar Mondragon and Eric Smith will co-teach. The LMA SE Boot Camp is Lockheed's response to the need for all entering engineers to be familiar with the systems engineering process.

The Boot Camp is a result of the efforts of the LMA Systems Engineering Directorate, in collaboration with other Lockheed divisions. Guidance is derived from ISO/IEC/IEEE Standard 15288 (2015) Systems and software engineering – System life cycle processes, the basis for the INCOSE Systems Engineering Handbook v4, and thus completion of the Boot Camp will help UTEP

students achieve higher results in the INCOSE Systems Engineering Professional (SEP) certification exam.

The Boot Camp consists of limited classroom instruction, combined with numerous collaborative activities that help participants build teaming skills as they work toward creating solution architectures for the course project. The emphasis is on practice based, experiential education. Sub-teams working on sub-systems progressively unite during the course in order to create a complete architecture.



The issues and surprises encountered during the collaborative activities expose and illustrate, in microcosm, the real-world challenges that will arise in real Lockheed projects. The training will make UTEP graduates more competitive in the systems engineering marketplace.

Within UTEP, graduate and undergraduate students will complete pre-requisite SE courses, which will build their SE vocabulary, in preparation for faster-paced activities with the Boot

Camp. The first offering of the SE Boot Camp will occur on the UTEP campus in January 2017, to be followed by offerings before every summer.

The pre-summer offerings will be attended by students chosen for internships within Lockheed, so that the Boot Camp will serve as an introduction to SE processes that the students will encounter within the corporation.

Within Lockheed Martin Aeronautics, the SE Boot Camp has already been completed by more than 1,000 engineers and employees, creating a large body of workers familiar with a broad outline of collaborative systems engineering processes. Boot Camp certificate holders are being invited to continue their education within the Online Master of Science of Systems Engineering program at UTEP offered by the Industrial, Manufacturing and Systems Engineering Department <http://imse.utep.edu/>.

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UTEP Presentations Featured at Chapter's June Board Meeting

Dr. Oscar Mondragón, Clinical Associate Professor, College of Engineering, Industrial, Manufacturing, and Systems Engineering (IMSE), is the director of the new online SE Master's Program. He made the first presentation, reviewing the program's ten courses, targeted at working professionals, which will begin in the Fall of



2016. Details will be featured in the next Newsletter; but if you can't wait, visit www.utepconnect.utep.edu and select the Online Programs tab.

The second presentation was made by Student Chapter president Sam Terrazas. Sam introduced the officers, reviewed the INCOSE Certification Interactive Game they have developed (featured in 2016Q2 Newsletter), and revealed an impressive set of Student Chapter goals. Note the monthly Guest Speakers planned. You can contact Sam at sterrazasquezada@miners.utep.edu.

Student Chapter Goals

INCOSE Certification for all members

- Dynamic learning process
- Mock tests
- Workshops

Have regular meetings once a month

- Guest speakers
- INCOSE updates
- SE Impact in the industry

Expand our membership through:

- Orientation meeting for new students
- Design graduation stoles
- Participation in school events

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Student Chapter Officers

				
Samuel Terrazas President	Jose Martinez Vice President	Bhriannon Tiscareño Treasurer	Aileen Tapia Secretary	Leonardo Orea Program Outreach



MBSE Patterns Working Group (PWG)

Bill Schindel, ICTT Systems Sciences and Co-Chair Patterns Working Group

The more effectively we learn, and act on what we learn, the better our lives. The Patterns Working Group exists because we are interested in improving the impact of individual and group learning about systems—making more accumulative progress, instead of repeatedly learning the same lessons.

What is the Patterns WG? The Patterns Working Group is a three year old INCOSE entity that began as the INCOSE MBSE Initiative Patterns Challenge Team and more recently transitioned to an INCOSE Working Group. The purpose of the INCOSE MBSE Patterns Working Group is to advance the availability and awareness of practices and resources associated with the impactful creation, application, and continuous improvement of MBSE Patterns over multiple system life cycles. The practice of MBSE using System Patterns is also referred to as Pattern-Based Systems Engineering (PBSE).

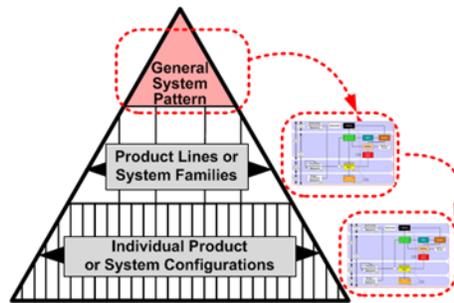
As used here, System Patterns are configurable, re-usable System Models that would otherwise be like those expected and found in the practice of MBSE (not limited to, but including, OMG SysML models). Through the availability and use of System Patterns, the outcomes targeted by MBSE models are made more accessible, in terms of ease (and skill requirements) of generation and use, associated modeling cost, schedule, risk, completeness, and consistency. Over time, System Patterns become points of accumulation of organizational learning and expertise, acted upon because they are the starting point of projects. Because they are configurable and re-usable models of families or classes of systems, model-based System Patterns involve some additional methods and disciplines that extend the ideas of MBSE (e.g., Pattern Management, Configuration Rules, model minimality, etc.).

INCOSE has recognized the importance of model-based methods, in establishing the strategic objective to accelerate systems engineering transformation to a model-based discipline. The work of the MBSE Patterns Working Group increases the value, leverage, and applicability of system models.

Learn more by checking out our WG web site, where our WG meeting minutes, sample patterns, related papers, and tutorials are posted: www.omgwiki.org/MBSE/lib/exe/fetch.php?media=mbse:methodology:pbse_extension_of_mbse--methodology_summary_v1.5.5a.pdf, or by downloading the INCOSE MBSE Methodologies Survey summary of MBSE Patterns Methodology, written by our working group, at: www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns.

What Does the Patterns WG Do?

First, we are interested in the smallest system models sufficient for the usual purposes of engineering and science—not leaving out what is needed, but including no more. Independent of the (multiple) standard or COTS modeling languages and tools we employ in this work, the underlying framework we use is the S*Metamodel, intended to capture that minimum representation. The resulting models are called S*Models. Second, we are interested in models that describe not just a unique system instance, but the recurring aspects of systems—what we learn and want to reapply, and what we expect to vary. These regularities, when captured using generalized S*Models that are re-usable and configurable for specific cases, are called S*Patterns. Among other purposes, they can describe platforms,



product lines, system families, the regularities of traditional or emerging sciences, or other regularities, generalized or specialized in various domains and instances.

Third, we are interested in shifting the historical emphasis of systems engineering, from process and procedure to the information that those processes produce and consume, in the form of model-based patterns and their configurations. This is similar to the foundation emphasis in the other engineering disciplines (and related physical sciences) on underlying phenomena (physical laws) first, over process and procedure.

What is the result? INCOSE and other papers and reports describe reduced model origination time in projects, where order-of-magnitude gains have been made possible by beginning system projects with a configurable whole system pattern instead of a blank model canvas. One reports a >25% gain in productivity of verification

planning and execution for safety-critical aircraft primary and secondary flight control systems.

Another report indicated a halving of the rate of verification review error escapes, based on applying patterns of re-

Manufacturing Process Patterns	Vision System Patterns
Embedded Intelligence Patterns	Systems of Innovation (SOI) Pattern
Product Service System Patterns	Product Distribution System Patterns
Life Cycle Mgmt System Patterns	Production Material Handling Patterns
Agile SE Life Cycle Pattern	Transmission Systems Pattern
Commercial Vehicle Patterns	Space Tourism Pattern
Packaging Systems Patterns	Lawnmower Product Line Pattern
Distribution Systems Patterns	Orbital Satellite Pattern
Plant Ops & Maint System Patterns	Oil Filter Pattern
Engine Controls Patterns	Military Radio Systems Pattern
Precision Parts Prod, Sales, and Eng Pattern	Higher Education Experiential Pattern

view, and another on the use of patterns in FMEA risk analysis. Joint projects have been undertaken by our WG and other INCOSE WGs, including the Agile Systems WG, the SoS WG, the PLE WG, and the Health Care WG. Industry work across different segments has yielded S*Patterns in a variety of domains.

Should you get involved? Check out the Patterns WG. More people are becoming interested and involved—at IW2016, the Patterns Working Group events included 88 participants. We hope that you will investigate further and consider joining our activities at IS2016 or otherwise—contact either of the WG leaders below.

Working Group Co-Chairs



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Candidate Topics and Issues for the Socorro Systems Summit

Rick Dove, *Paradigm Shift International*

What Systems Engineering issues do you have that need some inspirational thought? Are any of the suggestions below, or suggestions you can offer, of sufficient interest to encourage you and/or personnel from your organization to participate? Some issues of potential interest within the topics are also suggested. But what do you want? Send your suggestions to rick.dove@parshift.com.

- **High performance teaming**—A high-performance team is a group of people committed to a common purpose, showing high levels of collaboration and innovation. Why isn't this a compelling behavior that sucks all of us in naturally? What stands in the way? What requirements are needed to enable and facilitate a natural attraction to high performance teaming? .
- **T&E for unmanned and autonomous systems**—Autonomous systems are expected to show emergent behaviors that defy traditional T&E and require new T&E thinking. What are the requirements for an effective approach?
- **Meaningful customer involvement**—How do we enable and facilitate customer-involved acceptance of responsibility for effective requirements, workable schedules, development priorities, meaningful feedback, and collaborative re-assessment?
- **Sub-contractors as fully engaged team members**—How do we get a project team with subcontractors to optimize total team mission success, rather than contradictory individual benefits?
- **Design concepts of user-embraceable systems**—System quality is ultimately measured by user enjoyment, rather than requirements fulfillment. How do we design and implement with the goal of user enjoyment in the sense of system-user synergy?
- **Critical infrastructure resilience**—given that we don't have much of it, what are the impediments and what are the requirements for effective transformation of what we have?
- **Systems of Systems evolutionary integrity**—Systems-of-systems evolve as individual systems change. What are the requirements for maintaining SoS integrity with asynchronous and self-serving system evolution?
- **Organizational teaming for joint project pursuit**—What impedes discovery and appreciation of opportunities for working together among organizations, what is required to break down these impediments, and what can be done about them?
- **Agile hardware-development infrastructure and ConOps**—How can hardware development infrastructures enable and facilitate asynchronous unit testing and safe, rapid design change? Software uses an infrastructure of object-oriented development platforms and loosely-coupled web-page linkage. What are infrastructure requirements for equivalent hardware capability?
- **Agile security adaptable to adversary attack evolution**—What are the requirements for system and security strategy that will enable response with at least the agility of the adversary? What are implications for architecture, design, and ConOps?
- **IPT support infrastructure for data and communication**—Projects with multiple teams of individual discipline need an infrastructure that enables and facilitates communication and data sharing that manifest as a collective shared consciousness. What are the impediments and requirements for achieving this?
- **High-value relationships with/among academic institutions**—Where are compelling values and synergies for academic institutions and organizations to develop unimpeded productive relationships. What are the obstacles and requirements for overcoming them?
- **Systems engineering cultural transformation**—A systems engineering culture is an umbrella of shared values and behaviors that transcends the individual cultures of teams, departments, and disciplines—rooted in the appreciation of overarching system concepts and system relationships. What impedes a compelling draw toward the recognition and realization of value here? What is required for an effective transformation?
- **Systems engineering as multidiscipline enabler, art, and science**—Systems engineering has migrated to an engineering procedure and project management based discipline. How can we raise awareness and understanding to a systems level?
- **Integration in large-scale systems for operational upgrades**—System integration for upgrades/enhancements to large-scale programmatic systems under operating conditions has difficulties. Typical outage window aren't long enough to accommodate major upgrades, but lengthening the outage has negative effect on availability needs. What impedes seamless cutover? What is required to enable seamless cutover?
- **Fail-fast rapid innovation concepts**—How do we enable and facilitate innovative experimentation, driven by a focus on fast discovery of insufficiency or inadequacy? What is the compelling value proposition for budgeting and scheduling innovation experimentation? How can experimentation be managed for fast-fail discovery, and appreciated for value? ∞

Chapter Wins 2015 INCOSE Platinum Award

2015 is the first year that INCOSE offered a Platinum Award, a cut above the Gold Award. April 29, 2016, excerpted from letter sent by Steve Dam, INCOSE Director for Americas Sector:

Dear Enchantment Chapter: On behalf of the International Council on Systems Engineering (INCOSE), we are pleased to recognize the Enchantment Chapter as a **Platinum Circle Award Chapter** based upon its contributions and accomplishments in 2015. The Platinum Circle Award recognizes chapters performing to the highest goals and standards established by our organization.

Chapters organize technical and social programs, communicate key information about our organization and discipline, support technical activities, and enhance the member experience by facilitating an open, inviting environment where members receive valued products and services that enhance their careers. In fulfilling this mission, the Enchantment Chapter leaders and members have committed significant time and energy to further the goals of our organization.

This Platinum Circle Award will be presented at the 2016 INCOSE International Symposium in Edinburgh, Scotland. In doing so, INCOSE recognizes and celebrates the contributions and achievements of the Enchantment Chapter, its leaders, and its sponsors.





Resources

From TED, watch: *The unexpected benefit of celebrating failure*, by Astro Teller, head of Alphabet's project X (formerly Google X). "Great dreams aren't just visions, they're visions coupled to strategies for making them real." Teller takes us inside the "moonshot factory," as it's called, where his team seeks to solve the world's biggest problems through experimental projects. Find out X's secret to creating an organization where people feel comfortable working on big, risky projects and exploring audacious ideas.

From TED, watch: *How do creative people come up with great ideas?* Wharton professor Adam Grant upended decades of conventional motivational thinking with the thesis that giving unselfishly to colleagues or clients can lead to one's own long-term success. Adam Grant studies "originals:" thinkers who dream up new ideas and take action to put them into the world. Learn three unexpected habits of originals — including embracing failure. "The greatest originals are the ones who fail the most. You need a lot of bad ideas in order to get a few good ones."

From INCOSE Fellow, Derek Hitchens, a must see. Watch: *Systems Engineering Vs. Engineering of Systems*, an eye opening master-class video talk. Before retirement he held the British Aerospace Chairs in Systems Science and in Command and Control, Cranfield University at RMCS Shrivenham. Prior to that he held the Chair in Engineering Management at City University, London.
https://youtu.be/luNpu_KIXHI.

From TED, watch: *Why Privacy Matters*, Pulitzer winner Glen Greenwald says: "Every time somebody has said to me, 'I don't really worry about invasions of privacy because I don't have anything to hide,' I get out a pen, I write down my email address. I say, 'Here's my email address. When you get home, email me the passwords to all of your email accounts, not just the nice, respectable work one in your name, but all of them, because I want to be able to just troll through what it is you're doing online, read what I want to read and publish whatever I find interesting. If you're not a bad person, you should have nothing to hide.' Not a single person has taken me up on that offer." ∞

New Chapter Members

Jeni Turgeon, Sandia National Labs

Enchantment Chapter now has 127 active members and student members. We welcome the following new regular members:

Matthew Cribb	Sandia National Laboratories
Brett Johnson	VelaMira
Leila Johnson	VelaMira
Douglass Michel	Aegis Technologies
Christopher Niner	AECOM
Edward Sams	Sandia National Laboratories

We welcome the following new student member:

Erik Samaniego	University of Texas, El Paso
	∞

Connect to Your Community of Practice

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

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

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

Chapter meetings begin at 4:45 pm.

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

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

Mix with people who have the same professional interests as you do, but with a diversity of perspective beyond daily

workmates. It comes in handy when you need help or answers to questions outside your accumulated experience, need a connection at another organization, or simply want some mind stretching thought.

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

Chapter Board

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