The INCOSE **Enchantment Chapter** presents:

2019 2nd Annual Systems Engineering Challenge Event

Network with your fellow SE professionals to explore SE challenges submitted by Chapter members – collaboratively discuss the nature of the challenge, brainstorm suggestions to overcome issues & amplify positive aspects.

Where: Nexus Brewery, 4730 Pan American Fwy NE, Albuquerque, NM 87109

When: Wednesday, September 11, 2019, 5:30pm – 7:15pm
Check in @ 5:30pm, networking 5:30pm – 6:15pm, discussion 6:15pm – 7:15pm, and optional dinner (on your own) 7:15pm – 9:00pm

Submit your challenge idea to Ann Hodges by COB September 6. In your submission, include the verbiage you want shared for the challenge and how you want to be identified (anonymous is fine).

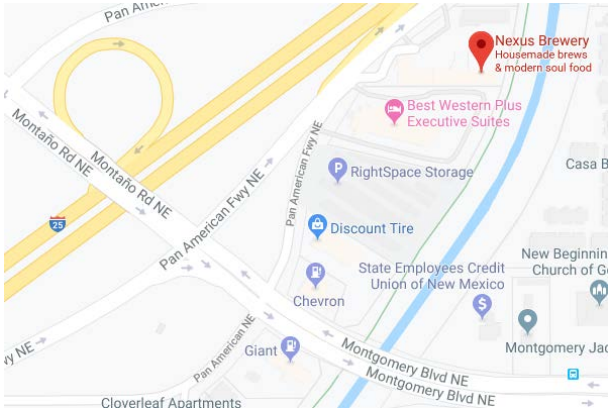
Admission: Free, *register via EventBrite* by September 10, 2019 at 5 pm. Event includes free appetizers and 1 drink of your choice (fine microbrewed beer or other) from Nexus.

Event limited to 35 guests! Must be 21 to consume alcohol

Follow the Enchantment Chapter on Social Media

https://twitter.com/EnchantIncose
https://www.linkedin.com/company/incoseenchantment

Nexus Brewery location:



SE Challenge Topics – 3 submitted

Challenge Topic 1 (Rick Dove):

What are the nascent evolutionary trends in the systems security environment that will shape necessary response capabilities in the Future of Systems Engineering? This is a question about the dawning problem space, not about solution strategies and tactics. Preliminary considerations will be suggested to spur discussion and refinement. (Nascent: just coming into existence and beginning to display signs of future potential.)

Challenge Topic 2 (Ann Hodges):

SE in early stage R&D - What are the challenges in applying SE to an early stage R&D? When should SE be applied to early stage R&D? Are there triggers that could identify when SE should be applied? Is there a compelling value proposition for "selling" the idea of applying SE to early stage R&D projects? What SE concepts have the biggest "bang for the buck" in these types of projects? What SE practices, when applied early in an R&D project, support future growth if there is a desire to "productionize" the R&D's focus area?

Challenge Topic 3 (Rick Dove):

Given a general encompassing profile of the problem space, what are the necessary general strategies for compatibility with the operating environments. This is a question about necessary general strategies, not about specific objectives for those strategies, nor about tactical approaches. Strategy objectives and tactics will be context dependent, appropriate for work after reasonable consensus on problem space and necessary strategy is achieved. Preliminary considerations for necessary strategy will be suggested to spur discussion and refinement.

Challenge Topic 1 Context

The Future of Systems Engineering (FUSE) is a multi-organization collaborative project with a key concern about the nature of systems security in that future.

The futures of SE and of systems security are determined by the nature of the environments in which they will operate. Those environments are the fitness functions that will naturally select compatible approaches, and select out those which aren't compatible, with prejudice.

No need to guess at what those environments will look like. William Gibson:

"The future is already here, its just not evenly distributed" … yet.

==========

A system interfaces with, and interacts with, its operating environment; and remains viable (capable of working successfully) and relevant (appropriate to current desires) only to the extent to which it is operationally compatible with the *current order*.

Cyber-Physical-Social systems: The social dimension will play a major role in the future of systems engineering, with key implications for system security.

The social dimension deals with symbiotic collaborative relationships among components in an SoI as well as among the SoI and its encompassing SoSs. (components include software, devices, people)

Topic 1. Profiling the Operating Environments

FUSE General SE CURVE	FUSE System Security CURVE
Caprice	
• Survivability (i.e., current order compatibility) • Occurrence and nature of emergent behavior • Game-changing technologies • Availability of symbiotic social relationships	• Innovative attack method • Dependency cascade • AI employment, quantum computing • Collaborative symbiosis (failed and new)
Uncertainty	
• Relevance (i.e., fits current desires) • Cohesion in the greater SoSs (multiple) • Integrity & symbiosis of social relationships.	• Cost vs perceived value (both sides) • Broken physical relationships • Broken/weakened social relationships
Risk	
• Viability (i.e capable of working successfully) • Cohesion among constituent parts	• Inadequate design consideration & execution • Addressing adversity effectively
Variation	
• Operational environments • Social compatibility	• Peer behavior, breech criticality • Social priority conflicts
Evolution	
• Toward more op environment complexity • Toward more SoI complexity • Toward shorter SoI static viability • Toward new technology options • Toward new malevolent threats to viability • Toward greater social involvement.	• IoT in general, external SoS • Component technical scope, internal SoS • Growing attack community (skills and scope) • Increasing technical innovation • Increasing perceived attack value • DevSecOps, increasing connectivity

Need: A short general list that encompass key necessary considerations.
Intent: Irrefutable considerations that can achieve broad consensus.

Topic 2. SE in Early Stage R&D

29th Annual INCOSE international symposium

Orlando, FL, USA

July 20 - 25, 2019

Ann Hodges, Distinguished Member of Technical Staff, CSEP, SAFe SPC4
Sandia National Laboratories

Sandia National Laboratories

A Federally Funded Research and Development Center Perspective

Systems Engineering in Early Stage R&D Projects

SAND2019-7310 C

What are the challenges in applying SE to an early stage R&D?

- SE practices may be unfamiliar to researchers
  - Need to reframe
- Determine set of right-sized practices that support future maturation and scalability
  - Right level of rigor
  - Nurture creativity and exploration
  - Preserve research quality, defensible research
- SEs more familiar with high rigor

When should SE be applied to early stage R&D? Are there triggers that could identify when SE should be applied?

- As early as possible
- Should be done for all projects

Is there a compelling value proposition for "selling" the idea of applying SE to early stage R&D projects?

- Right-sized rigor
  - Timing
  - Scope
  - Formality
- Develop "pull" vs. "push"
  - What are researchers' ideas for practices that preserve research quality?
  - Reframe practices to R&D terminology
  - Coach PI, technical team leads in practices
- Templates and examples
  - Don't start with a "blank sheet of paper"

What SE concepts have the biggest “bang for the buck” in these types of projects? What SE practices, when applied early in an R&D project, support future growth if there is a desire to “productionize” the R&D’s focus area?

- Core mission assurance requirements
  - Project charter
  - Milestone list
  - WBS
  - Budget
  - Financial reporting and analysis
  - Change control
  - Requirements management approach
  - Risk management approach
  - Configuration management approach
  - Non-conformance/issues management

Are these the right set of requirements?
Need your help – *participate in the ESRD Working Group!*

Topic 3. Profiling Compatibility Strategies

Strategies for creating and eliminating (…processes/methods associated with):
- **Opportunity & risk awareness**
- **Response actions/options**
- **Memory assimilation**
- **Decisions to act**

Strategies for improving:
- **Awareness/sensing**
- **Memory in culture, actions/options, ConOps/OpsCon**
- **Action/option effectiveness**

Strategies for accommodating likely migration to (that requires an infrastructure change):
- **New fundamentally-different types of opportunities**
- **New fundamentally-different types of threats**

Strategies for modifying:
- **Actions appropriate for needs**
- **Personnel and processes appropriate for actions**

Strategies for correcting:
- **Insufficient awareness**
- **Ineffective actions/options**
- **Wrong decisions**

Strategies for dealing with varying:
- **Effectiveness of actions and options**
- **Effectiveness of evaluations**

Strategies for expanding and contracting:
- **Capacity to handle simultaneous response actions**

Strategies for reconfiguring:
- **Elements of response actions**
- **Participants involved in response actions**

Need: A short general list that encompass key necessary considerations.
Intent: Irrefutable considerations that can achieve broad consensus.