TGCC Monthly Meeting
Anthony Bullion – Chapter President

August 26, 2021

Agenda

- New Members
- Upcoming INCOSE Events
- INCOSE IS
- OTC
- Closing

New Members & Resources

- Jennifer Mindock, Kalle Christiansen, Satya Akundi, Lawrence Mastromoro, and Michel Farhat
- Chapter Information & Resources
  - https://www.incose.org/incose-member-resources/chapters-groups/ChapterSites/texas-gulf-coast/chapter-home
  - LinkedIn
    - https://www.linkedin.com/groups/3790414/
- Any chapter questions or suggestions for future speakers
  - Email tgcc.incose@outlook.com
- Getting to Know INCOSE
https://www.youtube.com/watch?v=vpStSoz2tI0

Upcoming INCOSE Events

- INCOSE New England chapter will be hosting its third annual fall workshop on October 22nd and 23rd, 2021. The workshop will be conducted as a two-day virtual event.
  - The workshop is aimed at creating a forum for the systems engineering community to network, share ideas, knowledge, and practices, and learn more about the most recent innovations, trends, experiences, and issues in all aspects of systems engineering from world-class thought leaders in the field.
  - https://www.neincose.org/2021-incose-ne-fall-workshop
- INCOSE-LA Speaker Meeting, **Role and Importance of Negotiation, Persuasion and Conflict in Systems Engineering**, September 14th 5:30 to 7:30 PST, Zane Scott presenting
- Enchantment Chapter NM, **Verification and Validation (V&V) of Complex Systems: A Holistic, Model-Based Approach**, August 27th , 8 to 4 pm MT
  - Tutorial Virtual led by William Miller, Executive Principal Analyst with Innovative Decisions and Adjunct Professor at Stevens Institute of Technology
  - Register via EventBrite - https://www.eventbrite.com/e/vv-of-complex-systems-a-holistic-model-based-approach-tickets-161417473007
  - INCOSE members: $0; non-members or Corporate Advisory Board associate members: $25; students: $0. You will receive an email receipt from EventBrite, which will act as your confirmation. If you do not receive a confirmation, have trouble registering or paying, or to register and pay by check, contact Mary Compton at mlcompt@sandia.gov.

31st Annual **INCOSE** international symposium

VIRTUAL EVENT
July 17 - 22, 2021

Accelerating through Adversity

When everything seems to be going against you, remember that the airplane takes off against the wind, not with it. - Henry Ford

KEYNOTE SPEAKERS

Victoria Coleman

USAF Chief Scientist Senior Advisor to the Director at CITRIS & the Banatao Institute, University of California Former Director of DARPA
View Biography

Masayoshi Arai

Director-General, Commerce and Information Policy Bureau Ministry of Economy, Trade and Industry (METI), Government of Japan
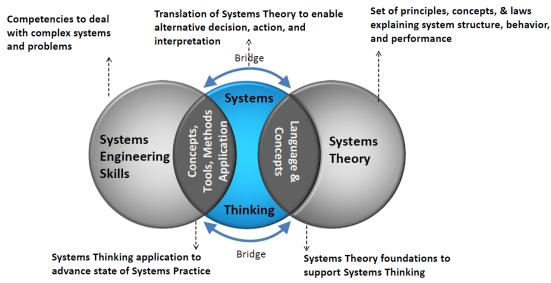**View Biography**

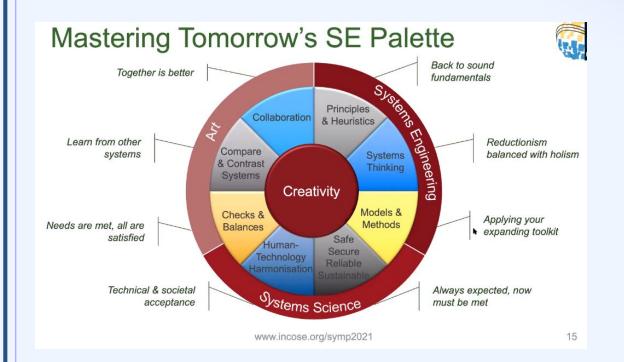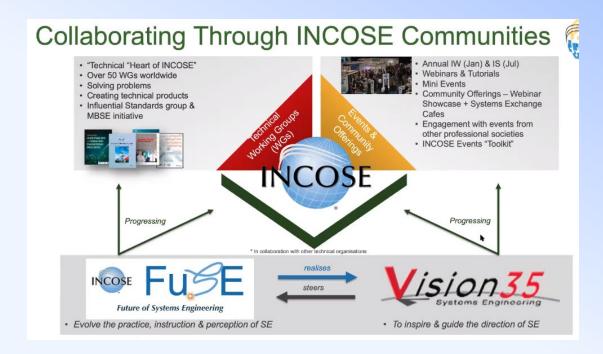**Lex Hoefsloot**

Co Founder of Lightyear
View Biography

Systems Thinking Relationships

Competencies to deal with complex systems and problems

Translation of Systems Theory to enable alternative decision, action, and interpretation

Set of principles, concepts, & laws explaining system structure, behavior, and performance

Bridge

Systems

Systems Engineering Skills

Concepts, Tools, Methods Application

Language & Concepts

Systems Theory

Thinking

Bridge

Systems Thinking application to advance state of Systems Practice

Systems Theory foundations to support Systems Thinking

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https://www.incose.org/symp2021/home

Mastering Tomorrow's SE Palette

Collaborating Through INCOSE Communities

Technical Leadership for Systems Engineers by Dave Walden, ESEP
Key Takeaways
- Key soft skills necessary – communication, conflict management, etc.
- Defining your technical leadership vision, purpose, objectives
- Leadership versus management, definitions and scope
- Use of breakout groups for activities worked well

Artificial Intelligence and Systems Engineering

Myth Busting Neural Networks

- They work just like the brain does
  - Busted: we don't KNOW how the brain produces decisions, opinions, emotions, thoughts
- As they grow in size and speed they get smarter
  - Busted: often better-designed smaller networks outperform larger ones. Size alone doesn't matter.
- Solving a hard or complex problem shows that an AI is nearing human intelligence
  - Busted: Deep Blue mastered chess but can do NOTHING else remotely resembling human behavior or thought

Training Data and the Lifecycle

Training Data and the Lifecycle

- Apply systems development lifecycle to Data used in training
- Requirements / Planning
  - What data is needed
- Analysis
  - Coverage, negative examples, adversarial, edge cases, bias in data
- Design of Data
  - How to use the data
  - Augment, Synthesize
- Implementation

Analysis → Design → Implementation → Maintenance → Planning → Analysis

Training Data is Key

SE and Training Data

Bias Often Comes from Data Selection

Systems Thinking: use an **unreal world** to counter bias

- Bias in the **world** vs. bias in the **data**
  Application: identify male nurses and female nurses in photos

- In the world: 93% of nurses are female

- Should data consist of 93% female nurse photos?

- A "real world" dataset might misclassify men as doctors

- Better dataset would be 50/50

Some AI bias may come not from OUR biases, but from our poor training

http://www.freestockphotos.biz/stockphoto/15411, PD
https://www.publicdomainpictures.net/en/view-image.php?image=209297&picture=nurse, CC0

Artificial Intelligence and Systems Engineering

- For more info:
  - Python (coursera.org)
  - Deep Neural Networks (Andrew Ng, deeplearning.ai website)
  - Python Data Science Handbook by Jake VanderPlas

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Name	Company	Title	Chapter	Country	Certification
TIMOTHY BRADY	NASA JOHNSON SPACE CENTER	Engineer	Texas Gulf Coast	USA	CSEP
James Bullion	BOOZ ALLEN HAMILTON	Senior Systems Engineer	Texas Gulf Coast	USA	CSEP
Reynaldo Climacosa	BARRIOS TECHNOLOGY	Systems Engineer	Texas Gulf Coast	USA	CSEP
Lenny Delligatti	DELLIGATTI ASSOCIATES, LLC	Managing Member	Texas Gulf Coast	USA	CSEP
David Hetherington	SYSTEM STRATEGY, INC	Principal	Texas Gulf Coast	USA	
Tomas Juknevicius	DASSAULT SYSTEMES, UAB	Mr.	Texas Gulf Coast	Lithuania	
Jim Marsh	IBM	Solutions Engineer	Texas Gulf Coast	USA	
Tasha Penner	SHELL	Systems Engineer SME	Texas Gulf Coast	USA	CSEP
George Salazar	NASA	Human-Computer Interface Technical Lead	Texas Gulf Coast	USA	ESEP
Joshua Sparber	SELF	System Engineer	Texas Gulf Coast	USA	CSEP
Drew Stovall	BIGLEVER SOFTWARE	VP Engineering	Texas Gulf Coast	USA	
Tony Williams	JACOBS	Chief Engineer, SE&I	Texas Gulf Coast	USA	ESEP
Timothy Wood	ERC INC	System engineer	Texas Gulf Coast	USA	CSEP

Attendance = 740+
- (increase of 40% from a year ago)
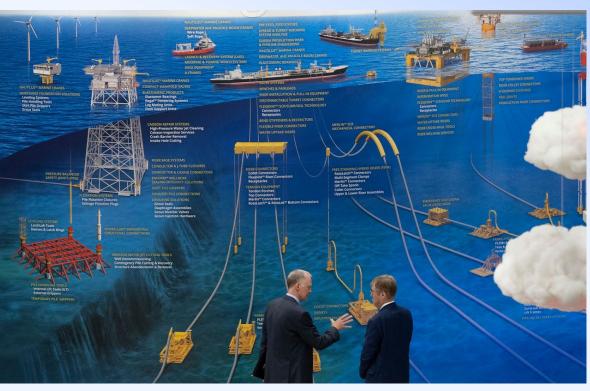
Professional Development Portal
- Expect in Q1 of 2022

Recommendation to follow CDC guidance and limit any non-essential face to face meetings/events

Offshore Technology Conference

Offshore Technology Conference

Effective integration of Project Management (PM) and Systems Engineering (SE) is essential to deploy successful offshore systems in the rapidly advancing space of digitalization and automation systems. Both SE and PM have formal methods to help guide projects and products through the life cycle. Where these two philosophies converge to deliver value is an intricate balancing act between overburdening processes that slow progress and deficient processes which allow flaws to propagate throughout the system and ultimately result in poor performance or failures. This session highlights some recent advancements and success stories and how to overcome challenges with implementing PM and SE in an immersive data rich ecosystem. Each author discusses practical applications in the current environment and demonstrates how they leveraged digitized information to create value and enable successful digital transformation initiatives.

Facing The Challenges Of Implementing Systems Engineering
J.A. Bullion, Booz Allen Hamilton

Transformation Of Digital Requirements: An Enabler For Successful Complex Projects
J. Marsh, IBM USA; A. Hudson, Barrios Technology

Standardization of Procurement Equipment Specifications: Establishing A Strong Foundation For Oil & Gas Capital Project Development And Delivery
A. Postema, International Association of Oil & Gas Producers

Benefits Of Using Requirements Management Tools On A Digitized API 170 Document
R. Climacosa, S. Matlock, J.A. Ollero, Barrios Technology; D.L. Miller, American Petroleum Institute

Data Centric Verification To Streamline Project Planning And Execution
M. Reed, Shell Oil

Attendance:
- 35 in person and 30+ online

Key Feedback
- Overall attendance significantly affected by COVID, estimate about ¼ of normal
- Good audience participation, online questions were challenging
- Most forum attendees were O&G participants

Offshore Technology Conference

Systems Engineering in Practice: Stories from Experts in the Field

- This panel session will bring together four recognized expert practitioners in the field of systems engineering. Each panelist will present a personal story of their experience working in systems engineering.
    - The audience will learn how the complexity of missions between NASA and OTC is fundamentally the same, as are the failure risk and classifications.
    - The audience will learn that many people in oil and gas may be practicing systems engineering to some degree already, possibly without recognizing it as such.
    - The audience will learn how a "fixer" used Model-Based Systems Engineering to rescue a series of failing projects and deliver the systems on time and within budget.
    - The audience will learn how systems engineering techniques can help us to better understand the warming Arctic region as it expands with increased tourism, fishing, exploration, and related traffic along with the promise of vast undersea oil, gas, and other mineral assets.
    - Finally, the audience will be given the opportunity to ask questions and engage in conversations with the panelists.

Moderator – Don Gelosh

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- Dr. Don Gelosh is the Director of Systems Engineering Programs at Worcester Polytechnic Institute (WPI).
- Dr. Gelosh has over 45 years of experience including 26 years serving in the US Air Force and post-retirement work in government, industry, and academia.
- Dr. Gelosh holds an INCOSE ESEP-Acquisition certification and is a member of the Washington Metro Area Chapter.
- Dr. Gelosh currently serves as the INCOSE Services Director.

Panelist – Rob Perry
Title – Systems Engineering – Finding Goldilocks…

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- Rob Perry is CEO and President of Reach Production Solutions, offering innovative solutions to the Oil & Gas industry.
- Previously, Mr. Perry was global Systems Engineering Director and global Director of Subsea Processing at FMC Technologies and then Technip FMC.
- Mr. Perry also spent 22 years at BP, where his last role was Vice President of Deepwater Facilities Technology,
- Mr. Perry is a member of SPE and INCOSE and an early member of the Oil & Gas Working Group.

Panelist – Jon Holladay
Title – Engineering the System, a NASA and OTC Perspective

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- Jon Holladay is the Systems Engineering Technical Fellow for NASA where he leads a team of world class subject matter experts to provide consultation to a dozen or more NASA programs each year.
- His career includes key roles in a variety of NASA missions and programs.
- Mr. Holladay is a member of the INCOSE Corporate Advisory Board, a Senior member of AIAA and member of the International Astronautical Federation.

Key Takeaways
- Key similarities and challenges between aerospace and O&G
  - Safety
  - Challenging environments
  - Risk Management
- Application of systems engineering effort dependent upon the challenges
  - Goldilocks
  - Level of acceptable risks
  - Complexity of organization and project
  - Form follows function & importance of Use Cases

Systems Engineering – finding Goldilocks…

.. OR: what is the right degree of systems engineering rigor for me?

Rob Perry REACH
Production Solutions

"Every great pilot has a pre-flight checklist, but doing that pre-flight checklist doesn't make you a great pilot"
- Michael Griffin (former NASA Administrator)

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"If you have one hour to save the world, how would you spend that hour?"
"I would spend 55 minutes defining the problem and 5 minutes solving it."   - Albert Einstein

Key Takeaways
- Digital systems modeling
- Importance of systems thinking
- Evolutionary development due to uncertainties
- Political and climate challenges
- Understand the environment, constraints, and technical gaps
- Use of visuals for communications, increases understanding

Key Takeaways
- Importance of Use Cases evolved to MBSE
- Use of block diagrams to bridge specialty engineers to systems engineers
- CUSTARD
  - **C**ontext – what's the system and entities outside the system
  - **U**sage – use cases
  - **S**tates and modes
  - **T**iming
  - **A**rchitecture – structure of system
  - **R**ealization – map functionality to elements
  - **D**ecomposition – apply over and over

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