INCOSE Los Angeles Chapter

Monthly Speaker Meeting

September 12, 2022

Thanks for joining! Please share our events with friends & colleagues

Agenda

5:30 PM – Introductions and Networking

6:00 PM – President's Remarks

6:10 PM – Systems Engineering Principles Summary

6:20 PM – *Are You Ready to Model? by Casey Medina, CSEP*

Considerations for building effective models

7:15 PM – Q&A

7:30 PM – Adjourn meeting

Welcome 3Q2022 New INCOSE Members!

- **INCOSE-LA** currently has 437 members from around the world
- 437 is 17% of the entire global INCOSE membership of 2568
- We conduct quarterly Workshops and monthly Speaker Meeting presentations
- Visit New Member Welcome Center: https://www.incose.org/about-incose/new-in-incose

Last	First	Organization	Company	Chapter	Type	Join Date
Alonzo	Ebony	Loyola Marymount University		LA	Student	9/5/2022
Avery	Johnna	Loyola Marymount University		LA	Student	9/4/2022
Awad	Emily		Embry Riddle Aeronautical University	LA	Student	8/17/2022
Bates	Samantha	Loyola Marymount University	Loyola Marymount University	LA	Student	9/6/2022
Bodeau	Jeffrey		LHP LSS	LA	Regular	8/1/2022
borja	Che	Loyola Marymount University		LA	Student	9/1/2022
Collins	Peter			LA	Regular	8/30/2022
Eqbal	Kambiz		Embry Riddle Aeronautical University	LA	Student	8/14/2022
Hhammerle	nicholas	Loyola Marymount University		LA	Student	9/2/2022
Hicks	Angela	Loyola Marymount University	Northrop Grumman Employee	LA	Student	9/4/2022
Johansen	James		Biola University	LA	Regular	8/9/2022
Laurie	Kashif			LA	Student	9/6/2022
Lew	Katie			LA	Student	9/4/2022
Orosz	Michael	University of Southern California	Information Sciences Institute	LA	Regular	8/17/2022
Phouikhambay	Tommy			LA	Student	8/6/2022
Rebuyon	Jared	Loyola Marymount University		LA	Student	9/6/2022
Russo	Adrienne		Linquest	LA	Regular	8/10/2022
Stoudemire	Jaymon	Loyola Marymount University	Student	LA	Student	9/1/2022
Talusan	Emmanuel	Loyola Marymount University		LA	Student	9/6/2022

INCOSE Upcoming Events

Advanced Virtual MBSE Workshop with Casey Medina

Sept. 17, 8:45 AM-1:15 PM

Register at:
https://tinyurl.com/tw5tbdzn

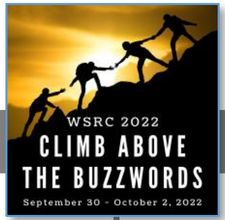
LA Chapter 2023 Officer Nominations

Nominations due OCT 28, 12:00 AM PST t:o
president@incose-la.org

INCOSE-LA Officer Duties

Western States Regional Conference Golden CO

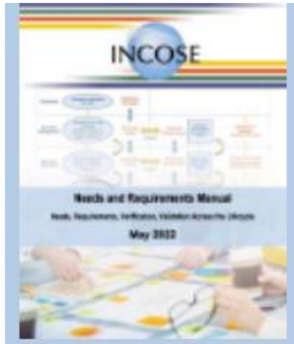
Sept. 29 - Oct. 2



Hybrid event--presentations and keynotes on SE topics
Register Here

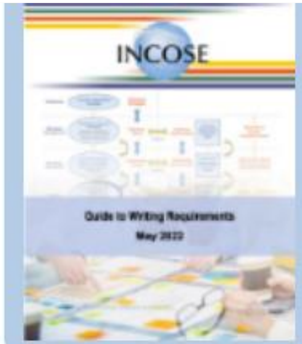
INCOSE Store Latest Product Releases

- Check out the newest publications at the INCOSE Store, free to INCOSE Members
- Access the INCOSE Store here.



Needs and Requirements Manual (NRM) v1.1

Download your free copy here:
https://bit.ly/3AE2s6s



Guide to Writing Requirements (GtWR) v3.1

Download your free copy here:
https://bit.ly/3MHWHZL

Guide to Writing Requirements Summary Sheet v3.1

Download your free copy here:
https://bit.ly/3Hek3F6

Guide to Needs and Requirements

Download your free copy here:
https://bit.ly/3z22o1l

New Technical Publications for INCOSE Members

INCOSE Members Newsletter Q2	Systems Engineering Journal
• Features New Member Welcome Guides and Welcome Center, page 9 • First login into https://www.incose.org/	• Six new technical papers just published in July issue, i.e.: • *Model-based systems engineering for small-lift launch facility* • Members must first login to INCOSE website to access using direct link: **Wiley Interscience - Systems Engineering**

Today's Presentation: ***Are You Ready to Model?*** by Casey Medina, CSEP.
An enlightening, interactive discussion as Casey Medina describes his experiences and revelations from deploying MBSE across a range of organizations

Casey Medina

EDUCATION
Bachelor of Science
Mechanical Engineering

University of Denver

Career Highlights

- Experienced instructor
- Dynamic, eloquent speaker
- Specialties: MBSE, Rqmts Analysis, Sys Architecture, Mechanical Design

Certifications
INCOSE, OMG
Medical device design
Patent holder

INCOSE CSEP
OMG Cert Sys Modeling Prof.
12 patents, 6 pending

WORK EXPERIENCE
Instructor
Consultant SE Best Practices
Systems Engineer

MBSE Practitioner/
Instructor and Coach
Terumo BCT, Medtronic

ENTREPRENEUR
Founder & President

Studio SE, Ltd
https://www.studiose.design/
MBSE Custom training

"The future of systems engineering is model-based, with a focus on life-long learning to keep pace with cutting-edge technologies."

Sept. 17 Virtual Workshop: ***Adv. SysML Concepts in Cameo,*** by Casey Medina, CSEP

Date: Saturday, September 17, 2022. Time: 8:45 AM-1:15 PM PDT
Fee: $25 INCOSE Members, $35 Non-Members, CAB Associates
Registration closes on Thurs. Sept. 15

Four-hour, hands-on workshop. Casey will explore intermediate and advanced uses of SysML language using Cameo Systems Modeler. We will learn to:

1. deploy opaque expressions
2. trigger events using Sequence Diagrams
3. use Simulation Toolkit to evaluate system behavior

Following registration, Studio SE will email a link for you to download Cameo Systems Modeler to the computer you use for this workshop. You must download and install Cameo on your computer by Friday evening, Sept. 16th. Two Cameo installation support sessions with Stephen Guine will be available from INCOSE-LA: Saturday 9/10 and Friday 9/16.

Workshop uses advanced concepts, previous Cameo/SysML experience recommended.

Questions: Dorothy Benveniste, president@incose-la.org.

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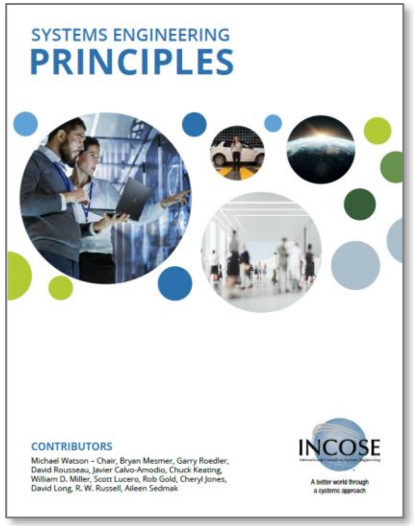
Register for Workshop**:** https://tinyurl.com/tw5tbdzn

A Review of the New INCOSE Systems Engineering Principles

13 Sep 2022 – INCOSE-LA Speaker Meeting

Rick Hefner, PhD, Caltech

rhefner@caltech.edu



INCOSE International Council on Systems Engineering

Scope and Structure

- Published in August 2022, available (free for members, $15 for non-members): https://www.incose.org/products-and-publications/se-principles
- Captures 15 commonly-accepted principles for SE
  - Designated as physical/logical principles or sociological principles
  - Can include sub-principles
- Transcends all types of systems, system application contexts, and system life cycle phases

PRINCIPLE 1:

Systems engineering in application is specific to stakeholder needs, solution space, resulting system solution(s), and context throughout the system life cycle.

DESCRIPTION: This is the first and foundational statement on systems engineering. The product (system) and its operational environment drive systems engineering and the system integrating physics, logic, and social and cognitive relationships (context) that are foundational to the specific product or system. Essential to this is the understanding of the mission or use of the product as formulated by the product goals. This includes the aspects of the system needed to operate in an elegant manner and thus considers the entire product life cycle.

Principle 1 represents all systems types.

EVIDENCE: The ubiquitous tailoring of systems engineering approaches provides strong support for this postulate. Systems engineering approaches must be consistent with the system needs during development and operations. The NASA Systems Engineering Consortium research surveying the NASA 17 systems engineering processes provides support for this postulate indicating 72% of companies interviewed have systems engineering processes unique to their product. More than 7% of the respondents (Componation et al. 2013) do not follow a standard process.

IMPLICATIONS: This principle states that any application of systems engineering considers the specific system needs and organizational characteristics in development or operation. The systems engineering methods applied to a product will and should vary in emphasis and application based on the nature of that product, its physical application environment, and its context.

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Systems Engineering Hypotheses

- Statements that research can prove (or perhaps disprove)
- These statements challenge some of the heuristic notions found in complexity theory and are set in a practical application context (with real boundaries and constraints) rather than in a theoretical infinite context
- A separate document is planned to capture SE heuristics and lessons learned from more narrowly focused system contexts

HYPOTHESIS 3:

Key stakeholders' preferences can be represented mathematically.

DESCRIPTION: A system results from a large set of decisions made by decision makers throughout an organization. To analyze a decision, three key elements are necessary: preference, beliefs, and alternatives. Hence, for a systems engineer to understand how an organization arrives at a particular system, an understanding of the set of decisions, each with their elements, is necessary. Each decision maker may have different preferences, beliefs, and alternatives. While each of these elements are challenging to understand, preferences are of particular interest to systems engineering as they relate to desired system goals. If different preferences are being used to make decisions on a system, then those decisions would be inconsistent with each other, meaning it is possible that given the same beliefs and alternatives decision makers may decide on different solutions. To enable consistent decision-making throughout the organization, systems engineers must elicit, represent, and communicate preferences of key stakeholders to drive to outcomes that the key stakeholder prefers. A mathematical representation supports the modeling of the preferences and enables analysis of the differences and commonalities in the preferences of different stakeholders.

EVIDENCE: Many systems engineering approaches use a representation of preference to guide decision-making. Goals in goal function trees, objective functions in multidisciplinary design optimization, payoffs in game theory (von Neuman and Morgenstern 1953), and utility functions in value-based engineering are just a few examples of mathematical representations of preferences used in systems engineering approaches. The premise of these approaches is that preferences are mathematically representable and enable a rank ordering of alternatives. Based on these examples, system engineers can create a mathematical function that rank orders alternatives in the same way that a preference does. Decision Theory also uses mathematical functions to rank order alternatives as an individual with their preference would and is widely advocated as a rigorous approach to design and systems engineering.

IMPLICATIONS: The accurate representation of stakeholder preferences enables the systems engineer to assess how well the system fulfills these preferences as the system progresses through its lifecycle. While system value modeling assumes a mathematical representation of preference exists, accurately representing preferences mathematically is still a significant challenge. The elicitation and formation of mathematical representations must become a significant task undertaken by systems engineers to adopt these approaches. Beyond enablement of approaches that strive to find the best system, mathematical representation of preferences also enables meaningful validation of the system. Mathematical representations of preferences allow comparison of the system characteristics with the stakeholder's preferences, answering the validation question: "does the system meet the stakeholder's intent."

Value (In My Opinion)

- The principles are good reminders of the scope and intent of systems engineering
- Most useful for experienced systems engineers to clarify terminology and perspective
  - Could you explain the implications of each principle on your work?
- Novice systems engineers may find the concepts and terminology complex