



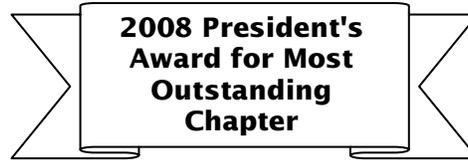
NEWSLETTER



2002, 2004-08



2003



UPCOMING EVENTS

August Speaker Meeting

“Deploying the NASA

Systems Engineering Framework”

SPEAKER: P. A. “Trisha” Jansma

WHEN: August 18, 2009, 5:30 p.m. to 8:30 p.m.

WHERE: Jet Propulsion Laboratory’s von Karman Auditorium

Remote sites will be available via webcast

COST: Members: free; non-members: suggested donation \$10

RSVP by August 14, 2009

See page 4 for more information

For registration and more information go to:

www.incose-la.org

August Tutorial

“Simulation-Based Engineering of Complex Systems”

NOTE: Limited Seating!

By Drs. John R. Clymer and Carol Jacoby

WHEN: August 28, 2009, 9:00 a.m. to 5:00 p.m.

WHERE: Cal State, Fullerton

COST: Members: \$120; non-members from CAB companies: \$150; others: \$170

RSVP by August 26, 2009

See page 2 for more information

For registration and more information go to:

www.incose-la.org

Professional Networking Event

September 1, 2009 — save the date!

See page 4 for more information

For up-to-the-minute event details:

- ◆ Check future editions of the Newsletter
- ◆ Watch your email for the Reflector
- ◆ Visit the INCOSE-LA website at www.incose-la.org

INCOSE - LA: HERE FOR YOU

By Jorg Largent

Words from the INCOSE-LA website:

- INCOSE shall foster the definition, understanding, and practice of world-class systems engineering...
- To provide a focal point for dissemination of systems engineering knowledge...

The Board of Directors is working toward that end, and we encourage the membership to take advantage of the opportunities the Chapter provides for professional development and networking.

Face-to-face discussions of “how to” apply the process are the most beneficial way to improve one’s knowledge of the process and to apply it effectively to the tidal waves of new technologies that will be integral to new systems. In May Elaine Thorpe of the Boeing Company spoke to the Chapter on the challenges facing the Human Systems Integration practitioner as a new generation of “tech-savvy” users become a larger part of the user community. Her discussion of the challenges (how does one model an emergency landing, and how does one develop the necessary “liveware?”) and of her experiences in deftly developing these systems for future applications was highly educational and insightful. And, speaking of tidal waves, in June Jimmy Thai of SAIC discussed the systems engineering challenges faced in the development of a global tsunami warning and mitigation system for 26 countries in the Indian Ocean region — a large and daunting task.

The Chapter has come up with the next-best thing for those who cannot get to one of the “face-to-face” speaker meetings: remote site webcasts. Remote sites are an integral part of the speaker meetings and are hosted at various locations throughout the Los Angeles area, providing convenient, real-time participation.

In addition to the speaker meetings, the Chapter hosts or sponsors tutorials, conferences, and a website — all with the purpose of helping the members learn about the systems engineering challenges and solutions that are a part of the future.

The members of the Board of Directors are here to help you keep from getting swamped by the growing and changing challenges in the application of the systems engineering process.

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The founding troika of Caltech were astronomer George Hale, physicist Robert Millikin, and chemist Arthur Noyes. They were dubbed “Tinker, Thinker, and Stinker” by an uncredited campus wag.

Credited to the Caltech 101 column in the Pasadena Star-News.

August Tutorial “Simulation-Based Engineering of Complex Systems”

By Drs. John R. Clymer and Carol Jacoby
August 28, 2009, 9:00 a.m. to 5:00 p.m.

At Cal State, Fullerton

**COST: Members: \$120; non-members from CAB
companies: \$150; others \$170**

RSVP by August 26, 2009

RSVP online at www.incose-la.org or by email to registration@incose-la.org (please include “August Tutorial” in subject line).

NOTE: LIMITED SEATING!

WHO SHOULD ATTEND: Systems engineers, modeling and simulation experts, software engineers, project managers, industrial engineers, intelligence business enterprise designers, societal systems researchers and sociologists, biological and ecological researchers, economists, and others interested in understanding, designing, and operating complex systems will benefit from this tutorial.

BENEFITS: Participants in the course will have:

1. Gained insight into architecting and performing functional analysis of Complex Adaptive Systems (CAS).
2. Learned an approach for gathering and validating CAS requirements.
3. Gained hands-on individual and team experience in applying this approach using a simulation tool.
4. Learned the foundation for applying these CAS SE techniques in the workplace.
5. Worked with a practical example of complex systems: Model-Based Systems Engineering Problem.
6. Learned how to use ExtendSim (Imagine That Inc. at www.ImagineThatInc.com) and OpEMCSS (Operational Evaluation Modeling Context-Sensitive Systems) model development procedure.
7. Learned logic and statistical concepts for simulation, convergence, and sensitivity analysis.
8. Learned about Feature Facts, Situational Universes, decision ambiguity, crisp and fuzzy rules, Air Traffic Control Model, Traffic Control System, and others.

The students will have hands-on experience actually building a model in a computer lab and will walk away with enough knowledge to start a CAS project.

ABSTRACT: Study of a large number of complex systems during the last 40 years by Dr. Clymer and others, including computer, transportation, manufacturing, business, and military systems, has shown that complex systems are best characterized as a set of interacting, concurrent processes. This discovery inspired the development of Context-Sensitive Systems (CSS) theory, based on mathematical linguistics and automata theory, as a way of thinking about complex systems using interacting concurrent processes. During the 1968-1971 time frame, Dr. Clymer developed a graphical modeling language, Operational Evaluation Modeling (OpEM), to express CSS models of both

existing and conceptual systems. During the same time period, an alternative approach, Petri nets, was developed independently of OpEM. Subsequently, after 20 years of using procedure-oriented simulation programs to design and evaluate complex systems, a graphical, object-oriented, discrete-event simulation library, OpEMCSS, was developed that works with ExtendSim to enable rapid development of CSS models and simulations in the OpEM language.

Since an OpEMCSS simulation is an abstract description of a complex system, understanding how the simulation works assists the systems engineer in understanding how the complex system works, allowing the system design to be optimized to meet stakeholder requirements. In this tutorial, it is shown that CSS theory, OpEM modeling language, and OpEMCSS library can be applied to understand Complex Adaptive Systems and to perform Model-Based Systems Engineering (MBSE).

MBSE mitigates system development problems that are caused by the failure to optimize the interoperability and synergisms among all component algorithms and methods at the overall system level. Further, the interactions of the system with its external systems and the dynamic demands of the operational environment on the system must be included in a MBSE system-level model and evaluated for tradeoffs.

An OpEMCSS system model provides the structure and ontology needed to connect detailed component models for MBSE. The MBSE approach presented in this tutorial is:

1. Apply the OpEM top-down systems design methodology.
2. Perform system-concept and top-level design tradeoffs to optimize stakeholder requirements using OpEMCSS
3. Produce a systems design specification that includes component interface and qualification requirements using a design-capture database tool.
4. Develop detailed models of alternative component algorithms and methods using OpEMCSS special blocks.
5. Perform virtual systems integration and system validation and verification using the system-level OpEMCSS simulation.
6. Determine impact of requirements changes and conduct detailed design trades using the system-level simulation.

OpEMCSS graphical simulation library works with the commercial software tool ExtendSim, which was chosen for two major reasons. First of all, ExtendSim is relatively inexpensive for people to buy and use.

The OpEMCSS icon-blocks automatically provide more than 95% of all simulation code that in the past had to be programmed by hand. In context-sensitive systems, these programming details are very complex and would otherwise require extensive programming skill and effort to accomplish. ExtendSim, with the OpEMCSS library, gives systems practitioners the ability to experiment with complex, context-sensitive interactions and quickly build a model. Time is not wasted dealing with complex programming details and writing extensive code, but rather the emphasis is on complex systems design, analysis, and evaluation for MBSE.

All CAS have emergent behaviors that result due to the interactions of their components. There are three kinds of interactions discussed in this tutorial, but one interaction,

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The Board of Directors wishes to welcome the following new members in the Los Angeles Chapter of INCOSE:

Note: The information listed below is from the member directory and is based upon your initial membership application. If the information is not correct or complete, then please access the member directory (at www.incose.org) to update your information.

| Name | Title | Company |
|-------------------|----------------------------|------------------------------------|
| Charlotte Gerhart | | Naval Post Graduate School |
| Ellen Ellis | | Naval Post Graduate School |
| Shazad Contractor | | |
| Roy Butler | Engineer | Jet Propulsion Laboratory |
| Donald Tlougan | Mission Assurance Engineer | Northrop Grumman |
| Juan Ayon | Senior Engineer | Jet Propulsion Laboratory, Caltech |
| Douglas Abraham | Senior Engineer | Jet Propulsion Laboratory |
| Lynn Garofalo | | |
| Michael Cook | Systems Engineer | Boeing |
| Mark Laney | Chief Engineer | EXN Engineering |
| Peter Mastro | Developmental Engineer | US Air Force |

(Continued from page 2)

communication and adaptation, leads to emergent behavior in a CAS. Such behaviors occur only if components are working together; they do not occur when operating any single component alone. Thus, we cannot understand each component as it operates independently to gain an understanding of the whole system. Often the emergent behavior of the system is not predicted when a system concept is proposed, and its occurrence is a surprise when the system concept is built. This is why simulation of the entire system is an important part of MBSE.

As an example of a system having emergent behavior, a distributed vehicle traffic control network located in a large city is discussed in this tutorial. This traffic control network is an example of a System of Systems (SOS), where each system in the network independently provides specific services and each system can operate independently of the rest of the SOS. Additional services are provided through collaboration among the networked systems. Network-Centric Operation (NCO) of related business units and combat system platforms are other examples of SOS that are currently of research interest.

Each major intersection has a vehicle traffic light controller to determine traffic light timing. In this system, each traffic light controller uses its perceptions about incoming traffic flow to optimize light timing, thus minimizing local vehicle waiting time. The result of each traffic light controller adapting light timing to accommodate traffic flow coming from other intersections is to minimize the average waiting time in the entire network. Global minimization of traffic waiting time results as a consequence of the emergent behavior of this system, which is the self-synchronization of each traffic controller's light timing with other controllers.

As light timing control in the overall traffic grid evolves, a complex but definite pattern in network operation, north-south, red-to-green transition times, emerges out of an initial random light pattern. The emergent behavior of the traffic grid cannot be

explained through an understanding of each controller alone. Understanding only comes when we study the interactions of the controllers as they adapt their behaviors in response to perceived information about incoming traffic flow, achieving self-synchronization of all traffic light controllers in the network.

ExtendSim+OpEMCSS can be used in any field that is concerned with entities that perform a set of tasks that lead to satisfaction of a measurable goal that may or may not be explicitly known or stated. Such fields include project management, systems engineering, software engineering, industrial engineering, business organizations, societal systems and sociology, biological and ecological systems, economic systems, and others. Thus, this tutorial is designed for a broad spectrum of people who wish to gain an understanding of complex systems and MBSE. It will be shown that, although complex systems have behaviors that are often difficult to understand, the underlying ExtendSim+OpEMCSS modeling building blocks comprising a complex system model are simple and easy to understand.



BIOGRAPHY: Dr. John R. Clymer

obtained his Doctor's Degree in Electrical Engineering from Arizona State University in 1971. He currently is a Professor of Electrical Engineering at California State University, Fullerton (CSUF). He consults on a regular basis in the area of systems engineering (mission analysis and conceptual systems design), simulation, and artificial intelligence. In addition to consulting, he has held numerous lectures and has presented technical courses throughout the United States and abroad. His teaching assignments have included Computer Engineering,

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August Speaker Meeting

“Deploying the NASA Systems Engineering Framework”

P. A. “Trisha” Jansma

ABSTRACT: Have you ever wondered what NASA is doing to stay on the leading edge of systems engineering? Did you know that NASA has a Systems Engineering Excellence Initiative to stimulate and enable the development and advancement of a sound systems engineering capability across the Agency? As part of that initiative, the NASA Office of the Chief Engineer is taking a proactive approach to deploying the three-axis NASA Systems Engineering Framework that was defined in the NASA Procedural Requirements for systems engineering – NPR 7123.1A NASA Systems Engineering Processes and Requirements. The NASA Systems Engineering Framework consists of three elements that make up the NASA systems engineering capability: 1) common technical processes, 2) tools and methods, and 3) workforce, knowledge, and skills. The integrated implementation of these three elements is intended to improve the overall capability required for the efficient and effective engineering of NASA systems.

Since NASA management did not want the Systems Engineering Framework to become “shelfware,” they committed the resources to ensure that it was actively deployed into the NASA systems engineering community, and that it actually impacted the way that systems engineering is implemented across the Agency. This presentation describes the three elements of the NASA SE Framework and all the activities being done in each element. It also describes the approach, methods, and mechanisms being used to deploy it across the Agency, and how the NASA systems engineering community is being informed and trained.



BIOGRAPHY: P. A. “Trisha” Jansma is the Lead for the NASA Systems Engineering Framework (SEF) Deployment Subgroup for the NASA Systems Engineering Working Group (SEWG) for the NASA Office of the Chief Engineer (OCE). She is also the Deployment Lead for the Systems Engineering Advancement (SEA) Project at the Jet Propulsion Laboratory (JPL), California Institute of Technology in Pasadena, California. With over 30 years at JPL in both line and project management positions, she has a broad background in systems and software engineering in scientific, engineering, and business environments. Jansma has extensive experience in the management, design, development, and delivery of cost-effective, software-intensive systems. She has experience in all facets of project life-cycle development, from initial feasibility analysis, proposal development and conceptual design through documentation, implementation, user training, enhancement, and operations. Jansma has a B.A. in Mathematics from Point Loma Nazarene University, an M.S. in Computer Science from the University of Southern California, and an Executive M.B.A. from the Peter F. Drucker Graduate School of Management at Claremont Graduate University. She has also taught Systems and Software Engineering at the graduate level.

Particulars for August Speaker Meeting

Remote sites will be available

Members: FREE

Recommended donation for non-members: \$10.00

WHEN: Tuesday, August 18, 2009, 5:30 p.m. to 8:00 p.m.

Meeting Schedule:

- 5:30 - 6:20 p.m. Registration, networking
- 6:20 - 6:30 p.m. Welcome and announcements
- 6:30 - 7:45 p.m. Presentation followed by questions and answers

RSVP by August 14.

RSVP on line at www.incose-la.org or RSVP by email to registration@incose-la.org (please include “INCOSE-LA August Mtg” in subject line).

WHERE: The host site for this speaker meeting is the von Karman Auditorium at the Jet Propulsion Laboratory, 4800 Oak Grove Drive in Pasadena. Remote webcasts are planned.

DIRECTIONS: Take the 210 freeway to La Canada and take the Berkshire/Oak Grove exit (there are signs for JPL). Go east, turn left onto Oak Grove and follow Oak Grove until you enter the JPL complex. Park in visitor parking on your left, just before the guard gate. Cross the street and go back down the sidewalk to the von Karman Auditorium.

Site contact: Chris Delp, phone 818-319-3251, email christopher.L.Delp@jpl.nasa.gov.

REMOTE SITES: The Boeing Company, Huntington Beach (open to Boeing-badged persons), the Antelope Valley College, and The Aerospace Corporation in El Segundo.

NOTE on Aerospace: A reservation is required for individuals who would like to attend the speaker meeting at Aerospace. Note: Foreign nationals MUST register by August 3 to allow time for approval process. Attendees must bring picture identification (driver's license, passport, or green card). Please annotate your reservation with “Aerospace.”

**Curious about what JPL is doing in space?
The von Karman Visitors Center will be
open at 5:00 p.m.**

Professional Networking Event

By Nehal Patel

Tuesday, September 1, 2009

Huntington Beach area

INCOSE-LA is planning the second Professional Networking event. This event is being planned for September 1, 2009 in the Huntington Beach area. The purpose of the gathering is to welcome new members and to provide an opportunity for Chapter members to gather in an informal setting and to network with other professionals. This will be a great way to meet other members of the INCOSE-LA Chapter and systems engineering profession.

Look for more details to come on the Chapter website at www.incose-la.org, via our Chapter Reflector email, or send an email to Nehal Patel (nehal_p1_patel@raytheon.com).

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System Control, Continuous Systems Simulation, Operational Analysis and DES simulation, Optimization and Mathematical Programming, and Artificial Intelligence (fuzzy logic and control, neural networks, and expert systems). Dr. Clymer's current research is focused in the area of intelligent-systems design, including multi-agent systems (SOS and NCO), and Model-Based Systems Engineering methods, applying integrated simulation, artificial intelligence, reinforcement learning, and evolutionary programming methods to advance the state of technology in those methods and the use of SOS and

NCO. He is a founding member of the Applied Research Center for Systems Science at CSUF. He is a member in good standing of IEEE and INCOSE.

Dr. Carol C. Jacoby brings 28 years of experience as a systems engineer and manager in the aerospace and defense industry to her teaching. She was the

manager of the Hughes Mission Analysis Center of Excellence, and System Architect for both defense and transportation programs. Dr. Jacoby has built a reputation as an expert in developing complex information-intensive systems. Currently, she is the founder and of Jacoby Consulting, specializing in front-end systems engineering and decision analysis.

Dr. Jacoby has taught systems engineering courses throughout the country. She was one of the first to apply systems engineering techniques to highway transportation systems during the early days of Intelligent Transportation Systems (ITS). She co-authored the Systems Engineering Guidebook for ITS for Caltrans and the Federal Highway Administration. She is the author of numerous technical papers and the book, *Simple Spreadsheets for Hard Decisions*, which teaches planning for the future by modeling likely outcomes.

Not everything that can be measured counts. Not everything that counts can be measured.
Old Flight Test maxim



The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization founded in 1990. Our mission is to advance the state of the art and practice of systems engineering in industry, academia, and government by promoting interdisciplinary, scalable approaches to produce technologically appropriate solutions that meet societal needs.

The Los Angeles Chapter (INCOSE-LA) meets several times per year for dinner meetings and speaker meetings, affording systems engineering professionals an opportunity to network and to strengthen their skills. In addition, the Chapter sponsors tutorials, conferences, and other activities of interest to those in the systems engineering field or related fields. Chapter officers are as follows:

2009 Board of Directors and Appointed Positions

Elected Officers

| | | | | |
|----------------|-----------------|----------------------------------|----|-----------------------------|
| President: | Eric Belle | eric_c_belle@raytheon.com | or | president@incose-la.org |
| Vice-President | Rosalind Lewis | rosalind.lewis@aero.org | or | vicepresident@incose-la.org |
| Past President | John David Boyd | john.boyd@incose.org | or | pastpresident@incose-la.org |
| Secretary | Beth O'Donnell | elizabeth.l.o'donnell@boeing.com | or | secretary@incose-la.org |
| Treasurer | Marsha Weiskopf | Marsha.V.Weiskopf@aero.com | or | treasurer@incose-la.org |

Elected Officers

| | | | | |
|----------------------|---------------|----------------------------|----|------------------------------|
| Membership: | Paul Cudney | paul.f.cudney@lmco.com | or | membership@incose-la.org |
| Programs/Speakers: | John Silvas | Silvas_john@bah.com | or | programs@incose-la.org |
| Tutorials/Education: | Shirley Tseng | shirleytseng@earthlink.net | or | setraining@incose-la.org |
| Ways and Means: | Dana Pugh | dana.pugh@incose.org | or | waysandmeans@incose-la.org |
| Communications: | Edi Ung | ma1teez@yahoo.com | or | communications@incose-la.org |

Appointed Positions

| | | | |
|--|------------------------|-----------------------------|-------------------------|
| Newsletter Co-editors: | Edie Ung, Jorg Largent | ma1teez@yahoo.com | jorg.largent@incose.org |
| Newsletter Production Manager: | Lee-Ann Seeling | LSSeeling@aol.com | |
| Reflector Manager: | Susan Ruth | susan.c.ruth@aero.org | |
| Industrial Relations Manager: | Jose Garcia, Jr. | jose.s.garcia-jr@boeing.com | |
| Technical Society Liaison: | Edmund Conrow | ehcrisk@yahoo.com | |
| Chapter Recognition Manager: | Michael Maar | michael.c.maar@boeing.com | |
| Lead Site Coordinator | Anna Warner | anna.warner@boeing.com | |
| Webcast Event Manager | Chris Delp | cdelp@jpl.nasa.gov | |
| Website Technical Manager | Benjamin Luong | Benjamin.Q.Luong@boeing.com | |
| 2009 Mini-conference Chairman | Shah Selbe | shah.selbe@boeing.com | |
| 2009 Mini-conference Technical Program Chair | Dick Emerson | remerson9@gmail.com | |
| Venue Chair | Shah Shelbe | shah.shelbe@boeing.com | |
| Representative to San Fernando Valley Engineers' Council | Stephen Guine | Stephen.Guine@ngc.com | |

Those interested in INCOSE membership please contact Paul Cudney - paul.cudney@incose.org. If you wish to be placed on our email distribution, please contact Susan Ruth - susan.c.ruth@aero.org.

Return Address:

**800 S. Pacific Coast Hwy. #8-205
Redondo Beach, CA 90277**

Forwarding Address Requested

**Do you have a message for 400
systems engineering professionals?**

The INCOSE-LA chapter is accepting advertisements from consultants, other professional organizations, organizers of professional conferences, companies seeking to employ systems engineers, and academic organizations. Please contact the Chapter Communications Director, Edie Ung at ma1teez@yahoo.com or Co-editor Jorg Largent at jorg.largent@incose.com.

Your message to systems engineers could be here!