NEWSLETTER

GOLD CIRCLE AWARD
2004-14

PLATINUM CIRCLE AWARD
2015

2008, 2012 President's Award for Most Outstanding Chapter

INCOSE
International Council on Systems Engineering
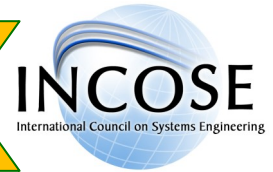
Welcome to CSER 2017!

The Los Angeles Chapter of INCOSE is delighted to welcome the attendees at CSER 2017 and is honored to support the University of Southern California and the CSER leadership team.

2017 First Quarter Strategic Planning Meeting

The first Strategic Planning meeting of 2017 was held on February 18. Due to a need to relocate the meeting from Caltech the meeting was held at the La Cañada Congregational Church, (courtesy of Dick Emerson).

President Phyllis Marbach opened the meeting by welcoming all in attendance and then reviewing the agenda. The agenda was leverage off of the strategic planning and accomplishments in 2016 and the town hall meeting held in January, 2017.

The members can look forward to another year of opportunities. Planning is in work for:

- Three tutorials
- Three more quarterly planning meetings
- Eight speaker meetings (so, how are things going on Mars?)
- Eight networking events.

Errors are not in the art but in the artificers. Sir Isaac Newton

The President's Corner
The Meeting with INCOSE Leadership
By Phyllis Marbach

INCOSE President Alan Harding met with our Chapter board and members during the International Workshop. President Harding joined the us at soirée hosted by the Chapter on January 31. In preparing for the event, Alan asked me to talk about INCOSE-LA's goals. Paul Cudney asked me what they were. Fortunately, I thought through my goals for the Chapter in writing the article for our previous newsletter.

First, my goal is to continue to operate at the high level of operational support to the membership that has been in place for many years. Next, we will actively support INCOSE's Strategic Objectives: Impactful Forums, Diverse Alliances and Growth.

Impactful Forums are supported by continuing to organize and hold conferences; CSER 2017, a one-day mini-Conference in 2018 and a Western Regional Conference in 2019.

A note to our regular readers: This edition of the *Newsletter* contains the usual information on systems engineering and Chapter events you have come to expect. The Board of Directors elected to include the attendees to CSER in the distribution so as to let them know a little about the members of the Chapter and some of the many activities in our Chapter.

Inside This Edition

Observations from the International Workshop

By Josh Spaber

The International Workshop (IW) has grown in significance over the last decade. Indeed, overflow for lunch on the first day, January 28, 2017, a Saturday, was amazing. Space had to be created for attendees at the back restaurant. The closing plenary session disclosed that IW attendance is expanding yearly, reaching 532 this year.

I was importuned at the IW by a colleague, in a friendly way, to write the reasons why the conference stressed System Engineering use of Model-Based Systems Engineering (MBSE). While "why" is usually the question children ask before they receive a booster shot, engineers also face needling from their peers and higher ups. Usually this also involves a point: why invest in MBSE? The expected answer involves practical benefits in cost, schedule and performance.

The World Asks Why MBSE, System Engineers Say Why Not

Saturday, I spend most of my day listening to the plenary and informative speakers on MBSE. While MBSE is still evolving, it is already proving its worth. When practiced correctly, early adopters have already received benefits:

- MBSE is a single source of truth — to govern the information in systems now in use or to be designed. Ed Carroll of Sandia National Labs (SNL) stated that one satellite had 6,000 parts and 832 pages of functional requirements. With MBSE, one product with a baseline of 30 stated requirements grew to 350 requirements on further examination. Designers often do not go beyond traditional precedents in eliciting a full set of requirements.

- MBSE is even more efficient than systems engineering alone because it saves long term costs in production from product failures and defects due to requirement tracing shortfalls or to interactions overlooked by either engineers or stakeholders. In a literature review by SNL of 67 case studies, Ed Carroll showed cost savings of 21%, 55%, and 62% using SE, MBSE and Model-Based Product Line Engineering (MBPLE) and on time deliveries of 59%, 62% and 75% with systems engineering, MBSE, and MBPLE.

- MBSE can begin before a project starts and has been asked for in source selection.

- An MBSE model can be custom built. An engineer at Terumo (a manufacturer of medical devices) started with sequence diagrams that appealed to the marketing division for a blood cell growth medical device. With activity diagrams and context diagrams the engineer was able to correctly capture functionality — usually these are drawn up later. The "customer's voice" was satisfied and requirements gaps were uncovered.

Total dependency on smart stuff is not very smart.
Professor Larry Leifer

Model-Based Systems Engineering Workshops at the Jet Propulsion Laboratory

INCOSE-LA President Phyllis Marbach interviewed Chi Lin, Manager, Jet Propulsion Laboratory (JPL) Systems Engineering and Formulation Division, Engineering Development Office, and INCOSE Corporate Advisory Board Representative for JPL. Lin recently spearheaded the NASA/JPL Symposium and Workshop on Model-based Systems Engineering (MBSE) in Pasadena, California. The workshop was held January 25-27, 2017. Lin has been an advocate for MBSE for many years and agreed to answer a few questions about the workshop for the INCOSE-LA membership.

President Marbach: What year was the first MBSE workshop at JPL?
Lin: 2013.

President Marbach: How often is the MBSE workshop held and how many has JPL hosted?
Lin: We hold the symposium every two years, and we have held three (2013, 2015 and 2017). We have scheduled it either before or after the INCOSE International Workshop (IW) so that out-of-town attendees coming for one event can attend the other as well. This has worked out well since the IW has been held in Southern California recently.

President Marbach: What kind of changes have you seen between the first MBSE Workshop and the most recent MBSE Workshop regarding the use and acceptance of MBSE?
Lin: I have seen a steady increase in interest in establishing MBSE capabilities in government agencies, industry, and academia. The first workshop shared ideas about how organizations started their MBSE initiatives. The focus was more on the promise of MBSE. At the recent workshop many organizations provided overviews that indicate they have now started using MBSE for various systems engineering applications in their programs. More importantly, the benefits of applying MBSE have begun to be realized and supported at the institutional level as well as at the grass roots level.

Furthermore, the first workshop was about discovery. The second workshop was about the value proposition for MBSE. The third workshop began to bring in systems analysis and digital enterprise integration. I think this reflects the evolution of MBSE development and infusion for the past several years.

President Marbach: How many people attended the recent MBSE Workshop and what kind of change have you seen to the number and type of attendees?
Lin: This year we had just fewer than 300 participants, most in person with a few remotely via WebEx. The first workshop was about 100 attendees. We also had more attendees in top leadership positions at this workshop, which I see as a sign of interest and commitment from the enterprise executive level in the use of MBSE. We also saw an increase in attendance by the Department of Defense and Mission Assurance communities at the recent workshop.

President Marbach: What were the demographics of the attendees, such as number of companies, countries, types of domains/industries represented?

Lin: We had attendees from NASA, the European Space Agency, the Japanese Space Agency, the Department of Defense, Draper Labs, the Aerospace Corporation, Sandia National Laboratories, the National Science Foundation, INCOSE, and MITRE. Industry participants have included BAE Systems, The Boeing Company, Booz Allen, Ford, General Motors, Proctor & Gamble, Lockheed Martin, Northrop Grumman, Orbital Sciences, and Raytheon. Participants from academia have included Caltech, Florida Institute of Technology, Georgia Tech, McGill University, Massachusetts Institute of Technology, Purdue University, and Stevens Institute of Technology. We also had great vendor participation this year, including NoMagic, Siemens, Vitech, Phoenix Model Center, and Intercax. Attendees came from all over the world, including the US, Canada, Japan, the United Kingdom, the Netherlands, Italy, Germany, France, Spain, and Australia.

President Marbach: What was the biggest surprise from the MBSE Workshop?
Lin: I would say there were two surprises. I was pleased with the appreciation and recognition for the importance of formalisms and ontologies. These concepts are taking root as it becomes understood that ontological foundations for SE disciplines are needed in order to integrate various types of models and support integrated analyses. This was evidenced in Dr. Steve Jenkins' talk on formalism, reasoning and ontologies, which was one of the most cited talks throughout the three-day event. The other surprise is the level of interest of applying MBSE to address and help manage risk and technical uncertainties. I think this is because, in part, dealing with uncertainties is an essential part of both the systems engineering function and the mission assurance function.

Practitioners are seeing potential benefits in using MBSE to their job.

Unity Workshop to Prepare for GameSIG Competition

By Phyllis Marbach

GameSIG is an intercollegiate competition in which student teams from all nearby campuses submit games to be judged by a panel of industry veterans. The event is a great opportunity for students of computer science, art, and business to work together as a team on a project and get actual industry insight on their efforts.

GameSIG and INCOSE-LA hosted a second GameSIG Showcase Workshop to prepare for the 2017 Video Game Competition to be held on June 10 at Fullerton College.

The workshop was held at Santa Ana College on February 25, 2017. The half-day event taught key concepts and techniques for using "Unity" to develop games. Unity is a cross-platform game engine developed by Unity Technologies and is used to develop video games for PCs, consoles, mobile devices and websites. First announced only for OS X, at Apple's Worldwide Developers Conference in 2005, it has since been extended to target 21 platforms.

INCOSE-LA mentors Connor Wynveen, Bill Chang, Shirley Tseng and Phyllis Marbach, along with other members of the GameSIG group, Varaz Shahmirian and Bill Fisher, were available at the workshop to advise teams and help them prepare their Submission Forms for the Best Engineered Game Award. More information about the competition can be found at gamesigshowcase.org. A marketing-style YouTube video of the game and the Submission Form will be submitted in May. Teams must submit at least three of the submission forms filled out at three different times during the development of their entry in order to compete for the Best Engineered Game Award. Filling out the form in the beginning, and periodically throughout the development, as well as at the end of development encourages early planning of the architecture and design of their candidate game. The periodic updates help facilitate the team's learn what is working well and what needs to be changed.

INCOSE-LA has been supporting

A Report From the Americas Sector

Marilee a winner
Reaching out to Students
By Phyllis Marbach

- MBSE is a natural tool to use in engineering — to some extent, engineering itself is modeling. System engineering and modeling are being taught in secondary schools, as well as at all levels of collegiate engineering at several schools: Georgia Tech, Cornell, LMU, University of Arizona, and several others.

Modeling includes regular model-based engineering (MBE), as well as MBSE, as expressed through System Modeling Language: SysML. The combination of MBE and MBSE is known as MBx. The use of MBx initially involves some upfront engineering costs — similar to buying a Tesla X. While this all-electric automobile has a comparatively high initial cost ($35,000), it will exhibit remarkable yearly cost savings in energy. Similarly, while MBSE, entails some upfront costs, it shows promise for sizable savings across the continuum of a program.

The Object Management Group (OMG) that created System Modeling Language (SysML) version 1.0 is hot on the trail of MBSE improvements. Sanford Friedenthal explained the anticipated work of the OMG standards group in transitioning SysML from just an extension of Universal Modeling Language (UML) to successively more and more capable versions. Sandy noted that the development of SysML paralleled the development of Computer Aided Development and Engineering. Sandy went on to envision potential updates:

- Interactive viewing with geometric models,
- Extensible system engineering based on industry standards,
- Interoperability at the element level — the propagation of changes, and the exchange of version information between models.

There is a dizzying number of standards related to SysML. Among these are UML, the Unified Architecture Framework, UML Test Protocol, Extensible Markup Language, Business Process Model and Notation, Requirements Interchange Format, Meta–Object Facility Versioning and Development, Software and Systems Process Engineering Metamodel, Diagram Definition, Profile for Safety and Reliability and Open Source Lifecycle Collaboration, among many others.

Diverse Alliances are supported by our GameSIG Workshops and the Best Engineered Game Award in 2017 as well as the Mars Rover event in September and the GSAW/SPIN/INCOSE-LA Event in March, to mention just a few of our alliances.

Growth is supported by all of our membership events as well as a planned CSEP and ASEP testing. Another growth opportunity for INCOSE is for the Los Angeles Chapter to be a Good Neighbor to Mexico by helping get a chapter started for INOCSE members living in our southern neighbor.

Members of the Chapter voted for a vision statement to help define a strategy for the Chapter during the Town Hall held Jan 10. The top two vision statements were: "Encourage systems thinking for wider community problems" and "Engage with forward thinking companies". During the January 31 social event we asked all attendees to vote on the top 10 vision statements from the Town Hall. "Encourage systems thinking for wider community problems" received the most number of votes and this is now our strategic direction for 2017. Those who attended the Strategic Planning Meeting on February 18, 2017 discussed how we might go about encouraging systems thinking and what wider community problems we will target first. This will be the topic of another article in a future newsletter.

President Marbach: Is attendance at the MBSE Workshop by invitation only?

Lin: Yes. Although participation by WebEx has not been limited.

President Marbach: Several of the keynote speakers and panelists mentioned successful MBSE use on programs. Could you mention the programs at JPL where MBSE is being used and the difference it is making?

Lin: There are several planned flagship missions, such as Mars 2020, Europa, and the proposed Asteroid Robotic Redirect Mission, that are adopting MBSE. Although the degree in the use of MBSE is different for each mission, as a whole, we have seen efficiency gains and the early detection of inconsistencies. In particular, Todd Bayer presented how Europa scored positively by applying MBSE techniques to address the five grand SE challenges that he laid out 6 years ago and are cited in the INCOSE MBSE Vision 2025.

President Marbach: Do you expect that JPL will continue to host an MBSE Workshop?

Lin: It was an honor to organize and host the workshop, and it is my strong belief that events such as this are essential to help the SE community accelerate practice modernization and transformation to digital processes. Hosting future events like this is definitely our intent. That being said, whether JPL will continue to host depends on demand, or if other organizations would like to take the torch.

President Marbach: Is there anything else you would like to share with our INCOSE Membership?

Lin: Many of us have shared the view that MBSE is an aid to systems engineers to perform systems engineering. It does not replace systems thinking and system engineering. Pursuing SE modernization via MBSE is a journey that we all need to contribute to and share information on technical, tooling and/or social adoption. As it mentioned in my opening address, when we work together as a community we will achieve more to help accelerate the transformation for systems engineering modernization.

Join a Space Consortium
An Opportunity in Southern California
By Karen Grothe

Part of infrastructure working group son thereofAfdff

There are opportunities to support community outreach (see GameSIG article on page 3-5,) mentoring, speaking and participating in Chapter events.

Other potential outreach concepts were discussed, such as a "good neighbor" outreach to the systems engineers in Mexico. The possibility of hosting future conferences and symposia as a part of the Americas Sector were also mentioned.

In addition to the obligatory business items, several other topics are discussed.

Josh Sparber reported on the meeting of the Critical Protection and Recovery (CIPR) Working Group (WG) at the recent International Workshop.

The mission of this working group is to:

Extend the work of the International CIPR WG Chapter to advance the state of the art in revitalizing, preserving, and finding pathways to sustainment of local and global life-supporting systems.

A major portion of the time was spent discussing the continuation of a topic of special interest in 2016: value to the members of the Chapter. Value to the members has been an ongoing focus for leadership (see "Fourth Quarter Planning Meeting," December 2016 — January 2017 edition of the *Newsletter*).

To follow up on the intentions of the 2016 planning, the Board of Directors conducted surveys at the Town Hall Meeting (see "Town Hall Meeting... The Questionnaire," January 2017 — edition of *Newsletter*) and during the Chapter soirée at the International Workshop.

Phyllis consolidated the results of the survey and identified the top five values for the members:

1. Encourage systems thinking for wider community problems
2. Make systems engineering personally meaningful to new and potential members
3. Engage with forward thinking companies
4. Develop an educational path for execution of state-of-the-art systems engineering practices (certification)
5. Make systems engineering implementable across domains.

The attendees discussed the topics and then wrote notes and comments on implementation. Phyllis collected the notes and will correlate and compile them as a basis for continued discussions and implementation.

How to become a member?

Education, provide speakers, how does that happen?

Goals

Mars rover: can we make something like this an outreach to high school student? Sept. 17 or 24?

Ditto gameSIG

Does the chapter benefit from having CSEPs and ASEPs? How does it benefit the member?

How about a video of us talking about systems engineering on our website?

INCOSE-LA Vision 2025? Is there such a thing?

Josh put up eye charts and read them to us, turning his back on the audience

Data is not information, information is not knowledge, knowledge is not understanding, understanding is not wisdom.

The internet is a telephone network that's gotten uppity.

Clifford Stoll

Check out a Use-Case-Oriented Vision Statement!
https://www.youtube.com/watch?v=EQFYedsXg7M&feature=share

One of the purposes of the systems engineering process, and a challenge to the systems engineering professional, is to recognize, at any point in time, that a project, in spite of all the best of efforts and intentions, is an intrinsic failure and to stop the project (avoid target fixation).

The Importance of Correct Communication...
...as illustrated by some headlines:

Red Tape Holds up New Bridge
Astronaut Takes Blame for Gas in Spacecraft
Kids Make Nutritious Snacks
Stolen Painting Found by Tree
Iraqi Head Seeks Arms
Police Begin Campaign to Run Down Jaywalkers
Juvenile Court to Try Shooting Defendant
New Study of Obesity Looks for Larger Test Group
Squad Helps Dog Bite Victim
Farmer Bill dies in house
British left waffles on Falkland Islands
Miners refuse to work after death
Teacher strikes idle students
Two Soviet ships collide, one dies

Truth is ever to be found in simplicity, and not in the multiplicity and confusion of things. Sir Isaac Newton

It is the weight, not numbers of experiments that is to be regarded. Sir Isaac Newton

No problem can be solved at the same level of consciousness that created it.

Not a member? Join INCOSE!

Learn more about becoming a member by clicking on http://www.incose.org/membership/valueofmembership.aspx

Name	Organization
Mona Barjasteh	Loyola Marymount University
Brian Marquez	Loyola Marymount University
Ronald Uchimiya	Loyola Marymount University
ali ghobadi	Kaiser Permanente
Turner	Loyola Marymount University
Brian DeJarnett	
Amanda Cueto-Moll	Thirty Meter Telescope
Alexander Masetti	Moog Inc.
John Miles	GMTO Corporation
dhipthee pujar	Loyola Marymount University
Philip Cojanis	Aerospace Corporation, The
June Kobayashi	Northrop Grumman Corporation
Amit Natu	Leagal Zoom
Abdulaziz Almusaed	Loyola Marymount University
michael kanter	Kaiser Permanente
Gurinder Chauhan	Loyola Marymount University
Bryan Calungcagin	Northrop Grumman Corporation
Grant Green	Lockheed Martin Corporation
Stephen Spenler	Kapsch TrafficCom

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UPCOMING EVENTS
For more details on Chapter-sponsored events and registration, go to incose-la.org

Is Systems Engineering Really Engineering?
Presented by Steve Jenkins
Tuesday, April 11, 2017
The Aerospace Corporation
El Segundo, California

MOBIUS — Supersynchronous Earth Orbits for Lunar Missions
Presented by Madhu Thangavelu
Tuesday, May 9, 2017
The Aerospace Corporation
El Segundo, California

Systems Engineering "V" Model Applied to CALTRANS
Presented by Randy Woolley
Tuesday, June 13, 2017
The Aerospace Corporation
El Segundo, California

Systems Engineering in Power Generation Industry

Presented by Ali Moharrer
Tuesday, July 11, 2017
The Aerospace Corporation
El Segundo, California

For more information on these and other events of interest in the Los Angeles area, look for a Reflector Notice in your email, and check the Chapter website: www.incose.org/los-angeles
Also like us on facebook!

2016 Holiday Gala
By Karen Miller