Vol. 16, Issue 2, April — May 2018

NEWSLETTER

2008, 2012 President's Award for Most Outstanding Chapter

2004-14 2015-16

Do you Enjoy Receiving the Newsletter? Please Let us Know!

The Board of Directors believes the INCOSE-LA Chapter *Newsletter* is an invaluable way to provide our members information on current events, articles of interest, and general information on the Chapter. However, as with any organization the Board of Directors is obliged to annually review the budget, and the printed *Newsletter* is the single largest expense to our Chapter. In an effort to ensure the Chapter is meeting the interest and needs of the members, the Board would like to take this opportunity to ask the members to let us know if you would like to continue receiving a printed copy of the *Newsletter*.

The Board is asking that the members who like the *Newsletter* and would like to continue receiving a printed copy, please send an email to:

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Please put "newsletter" in the subject. And please feel free to add any comments or suggestions.

If you would prefer to no longer receive a printed copy of the *Newsletter*, no action is required.

Thank you for helping us serve you better.

News From the International Workshop

Several members of the Los Angeles Chapter attended the 2018 International Workshop (IW), and brought home deeper insights, more knowledge, and a renewed appreciation of their profession. The Workshop was held in the Hyatt Regency Hotel on the St. Johns River in Jacksonville, Florida. The hotel is to be complimented on its recovery from the damage done by Hurricane Irma just a little over three months previous.

The opening plenary set the stage for the workshop and the days to follow. Alan Harding, the departing President, reviewed the last year and the accomplishments of the organization. Alan commented on global challenges, such as the huge growth in complexity, connectivity, and integration plus artificial intelligence, automation, cyber threats, and public perceptions.

(See "IW 2018," on page 8)

Certified Systems Engineering Professional Testing and Associate Systems Engineering Professional Testing Coming to Southern California

For those who would like to take the written version of the Certified Systems Engineering Professional or Associate Systems Engineering Professional test, testing is scheduled for three venues in southern California:

- Saturday April 28, 2018 time TBD, Northrop Grumman Corp. Redondo Beach
- Friday May 4, 2018 4:30 p.m. Rockwell Collins, Irvine
- Saturday May 5, 2018 9:30 a.m. Loyola Marymount University, Los Angeles.

Watch for a Reflector Notice in your email providing the details on these opportunities.

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Autonomous Vehicles – a.k.a. "autonomous" or "driverless" automobiles, the Twenty-First Century answer to the Greyhound Bus slogan: "Leave the Driving to Us?"

The February 2018 speaker meeting (article below) featured a presentation on this developing world (literally) of systems. Kay Das made a presentation on this subject at the September, 2017 speaker meeting and will be speaking further on the subject at the May 8, 2018 speaker meeting ("The Connected Vehicle Revolution, continued"). Member Josh Sparber has done some research on his own and has written a complementary article (also below). Editor

Vehicle-Human Interaction and the Internet of Things (IoT)
February Speaker Meeting

The application of new computer-based and internet-based systems in automobiles (and other surface transportation systems) has seen explosive growth over the last few years and holds the promise of even greater use in the future. The February speaker meeting featured the advances being made in the world (literally) of autonomous automobiles, often referred to as "autonomous vehicles" (AV).

The speaker was Shaun Westbrook, a Principal Human Machine Interface (HMI) Lead and Futurist at Honda Research and Development Americas. Shaun's excellent presentation focused on Honda's pioneering advances in human machine interfaces. Shaun holds patents in interface technologies and has presented his work at Consumer Electronics Shows (CES), CES Asia, Los Angeles Automobility, and the North American Auto Show. His work covers areas in human mobility, consumer electronics, and artificial intelligence (AI). His HMI work aims to increase human confidence in future autonomous vehicles and decrease driver distraction for production systems.

Shaun's presentation addressed the approaching age of autonomy, in which connected robotics and autonomous vehicles become widespread. As this growth takes place, there comes a need to build human confidence in those AI systems. The Honda HMI concept and Acura Precision Cockpit were new human-machine interface, electric vehicle interior demonstrators that unlocked the benefits of connectivity and autonomous technology while offering an enhanced driving experience. When designing for autonomous user-experience (UX) systems, however, building drivers' confidence in the AI safety elements can also be a challenge. In order to tackle this challenge, successfully connecting the dots between different industries becomes necessary as the fourth industrial revolution continues to expand.

Shaun discussed the development process, noting that the time from a sketch to production is six years in automobiles. He described five levels of autonomy, one through five, with level five being completely autonomous – as in no steering wheel. Shaun commented that it is not unreasonable to achieve level four autonomy in ten years. Shaun opined that neuroscience is a discipline that needs to grow dramatically to help facilitate the maturation of the Autonomous Vehicle.

(See "Honda," on page 3)

The city of Los Angeles has about three times more automobiles than people.
"Real Facts," at Snapple.com

IEEE Connected and Automated Vehicle Summit and the Possible Role of System Engineering

By Josh Sparber

In good weather, Nancy and I took to the road to attend the IEEE Connected and Automated Vehicle Summit. The meeting was held on February 8, 2018 in Santa Clara, California.

My impression of the summit was that it was very well attended and very well presented by engineers fully engaged in the craft of building "Car 3.0," the Autonomous Vehicle. Participants from private industry and government attended, and several panels debated the latest ideas. The industry refers to driverless cars as Automated Vehicles, or "AV," Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), or Vehicle-to-Everything (V2X).

One of the most important takeaways from the summit was that the automated car would be as unlike today's car as the horse and buggy are unlike today's cars. A speaker from NIO (a global research and development complex based in China) stated they were building a robot resembling an automobile. Infotainment may become a major design driver as vehicles leave the transportation sector and join the consumer sector.

A "wicked" challenge, a non-trivial task

AVs have a long history, beginning with the General Motors Futurama exhibit at the 1939 World Fair. One reason why system engineers should be interested in AVs is that there are many "wicked" – highly challenging – system-level problems needing to be resolved. These problems include the deep situational awareness the AVs need to have embedded in them in order to navigate safely, plus problems that the new technology itself will introduce, including software "bugs." Here are some Gordian knots that need to be untied:

- Intensive Test and Evaluation before deployment: proving out AV systems may possibly involve petabytes, or even exabytes of data. Current AV throughput is about 4 terabytes/day/vehicle.
- Simulating the 3.4 million vehicle-hours between fatal crashes in the United States would take 390 years of continuous 24/7 testing. In spite of driver distraction (a root cause of 391,000 accidents and 3,477 fatalities in 2015) and fatigue, human skill far surpasses AV responses. Humans average two million miles per injury crash, 100 million miles per fatal crash. Google's Waymo simulated only 5,000 miles to a fatal AV crash. With the current technology, AVs in separate AV lanes do well. Some speakers proposed separate highway lanes for AVs.

(See "IEEE Summit," on page 3)

(Honda, continued from page 2)

Shaun concluded with some thoughts on the role of the futurist in the research and development environment and the evolving role of the interface for machine vision systems, with some of the prospective considerations:

- Artificially-intelligent robots
- Self-driving cars
- Neuro-technological brain enhancements
- Genetic editing

The "fourth industrial revolution" is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.

An appreciative audience participated in a question-and-answer session which wrapped up the meeting.

My biggest thrill is when I plan something and it fails. My mind is then filled with ideas on how I can improve it.

Engineering without personality doesn't have much value.

Soichiro Honda, founder Honda Motor Co.

(IEEE Summit, continued from page 2)

- Interoperability: It was generally agreed between many of the principals that no single technology identified (inter alia current 4G, future 5G, Long-Term Evolution, and added Dedicated Short Range Communication, lidar, radar, GPS, ultrasound and cameras, and mmWAVE) is separately sufficient for passenger protection. These technologies will need to share the operational environment. V2V communication may insert AVs into a mesh in which traffic information is shared.
- Networks will need to evolve and increase in scale per demography: diffuse for rural, highly skilled localized for urban areas, or even "islands of autonomy." An Analog Devices Inc. speaker anticipated Operational V2X will be available by about 2022 and 5G usage by 2025. Reducing cloud storage, net slicing and dynamic reconfiguration were mentioned as data handling stratagems.
- Information security: although only a focus of a few original equipment manufacturers, information security will need to be on everyone's plate. Data is seen as the "oil" of the new economy—a more complete set of security standards is needed to protect data.

(See "Driverless," on page 9)

The Acura Precision Cockpit, and admirers, at the Los Angeles Auto Show. Check out the video in the INCOSE-LA Connect folder. The slides used for the presentation are available in the Chapter's INCOSE Connect site. Go to Connect, chapters, Los Angeles, 2018 Chapter folder, C0 Event Results, C1 Chapter Meetings and Events, 20180218 Speaker Meeting. Photo courtesy Honda

22nd. Annual Ground System Architectures Workshop

By Past President Phyllis Marbach

The 22nd annual Ground System Architectures Workshop (GSAW) provided a forum for the world's space-related ground system experts to collaborate with other ground system users, developers, and researchers through tutorials, presentations, working groups, panel discussions, and, new for 2018, technical exhibits.

INCOSE-LA was fortunate to again collaborate with GSAW, the Software Process Improvement Network (SPIN), and the University of Southern California (USC) Center for Systems and Software Engineering (CSSE) in co-hosting an evening session titled: "Science, Technology, Engineering, and Math (STEM) – Driving the Future of Ground Systems."

As the space domain becomes more crowded and contested, ground systems are driven to continue to evolve technologically to meet our nation's challenges. Current and future technologies, such as speech recognition, smart speakers (e.g., Amazon Echo, Google Home), cloud computing, virtualization, and machine learning, are increasingly impacting our ground systems. The aerospace engineering community must encourage and support opportunities for the next generation to pursue more STEM-focused education and careers, to foster realization of these and other future technologies in ground systems. The evening session highlighted how industry is currently supporting STEM initiatives, particularly in the areas of space and ground systems, and what attendees can do to foster more interest in STEM education and careers in their own communities.

The session had two segments: panelists provided presentations during the first hour and an interactive panel session concluded the session. Presentations in the first session included STEM presentations from students, educators, and leaders from industry. The presentations described approaches and experiences getting students interested in STEM education and careers. The presenters discussed their work in cultivating interest in STEM education and careers in aerospace, in computer science, and in education. The presenters also discussed their personal experiences with STEM outreach. Stephen Guine described how knowledge of STEM fields is needed in defense industries. Paul Hudgins discussed how to attract students in STEM fields to defense industries.

The panel session followed up on the topics raised in the presentations and included discussion and questions on STEM education and careers, and on attracting students to ground systems and to systems engineering in general. Questions panelists answered included "How did you become interested in STEM?" Many panelists stated that they wanted to be pilots or astronauts when they were younger which drove them to studying science, physics, biology, aerospace or other STEM-related disciplines. Many panelists described an affinity for math, an underlying skill needed in STEM fields.

(See "GSAW," on page 10)

AIAA Los Angeles – Las Vegas University Student Branches Mini-Conference

By Membership Director Karen Grothe

Membership Director Karen Grothe attended the AIAA LA-LV University Student Branches Mini-Conference on Saturday, March 3, 2018 at the Northrop Grumman S Café in Redondo Beach. Beyond staffing a table with INCOSE information and giveaways, she was treated to informative presentations from aerospace industry representatives and students.

The event started off with an overview of STEM (Science, Technology, Engineering, and Mathematics) activities by Matthew Mundy of the AIAA LA-LV Chapter and from Monica Maynard of The Aerospace Corporation. Andrea Diamond then spoke about her after-school programs in STEAM (Science, Technology, Engineering, Art, and Mathematics), emphasizing the importance of art in presenting STEM to young students. She shared five NASA posters on the theme "What sustains innovators?" – Courage, Enthusiasm, Vision, Creativity, and Curiosity.

Dr. Nahum Melamed from The Aerospace Corporation discussed Planetary Defense from Near Earth Objects (NEOs), reminding us that Asteroid Day is on June 30. He talked about the devastating effects a relatively small asteroid could have if it impacted the Earth, discussing examples using Purdue's Impact Earth tool and JPL's NEO Close Approach Table. He also mentioned efforts to determine how to deflect asteroids, in particular simulating scenarios using the NEO Deflection App (available at cneos.jpl.nasa.gov/nda).

To wrap up the morning sessions, the student branches gave presentations on their activities. Four universities were represented: University of Southern California, University of California Los Angeles, California State University, Long Beach, and University Nevada Las Vegas (UNLV). These student branches are all involved in providing hands-on projects for students, including design competitions, unmanned aerial systems, rockets, design-build-fly aircraft, remote-controlled planes and 'copters, and 3-D printed aircraft. During the lunch break, there was time for networking and viewing student posters about many of the projects mentioned.

(See "Welch" continued on page 9)

New Remote Site for Speaker Meetings

INCOSE-LA would like to announce an additional option for our members to attend social events even if they are not able to be at the host site. This is a great opportunity to meet your neighbors in the systems engineering community. We have added a remote site in Woodland Hills. Free parking, sandwiches, snacks and refreshments are provided. Other sites are available throughout the area. Check the meeting announcements for details on the Woodland Hills site and other sites that might be in your area.

"Research is what I'm doing when I don't know what I'm doing." Wernher von Braun

How Do You Use Agile Methods on Highly Critical Systems That Require Earned Value Management? The April Speaker Meeting

Speaker: Phyllis Marbach, INCOSE-LA Past-President

Abstract: Phyllis Marbach was involved in establishing how projects using agile methods plan, measure and report their earned value at Boeing. During the course of that work she acquired data from two projects and assisted the Government Accounting Office with agile updates to the Scheduling and Cost Guides in 2015. Although you may have heard that projects developed using agile cannot also use Earned Value Management (EVM), this presentation will show how it can be done.

Projects using agile practices should have an identified period of performance. During that period of performance releases are defined that have specific features or capabilities. This is called a "roadmap." Each release is planned during a release planning meeting where dependencies, critical path and float are defined. Each of the features in the roadmap should be planned into the integrated management schedule as a work package. The detailed tasks of each feature are defined during the release planning and baselined when the work package is opened. Percent complete reporting of that feature, the high value work product in development, can be used for the EVM measures. So, even if a project is using agile practices they can apply EVM in reporting progress against their plans.

Biography: Phyllis Marbach retired from The Boeing Company Defense Space and Security Division as a senior software engineer in 2016. Phyllis has over 35 years of experience in aerospace programs including satellite ground stations, chemical lasers, the International Space Station, and various propulsion systems. Phyllis was a Boeing Designated Expert in agile software development, software engineering and systems engineering. The eight years in her role as an Agile Coach for Boeing, she coached commercial airplane, unmanned air systems, radio, avionics, and research programs. Currently she is a Scaled Agile Framework™ 4 Program Consultant and Immediate Past President of the International Council on Systems Engineering (INCOSE) Los Angeles Chapter, the second largest chapter in the United States. Phyllis has a Master of Science degree in engineering from the University of California – Los Angeles.

Details:
When: Tuesday, April 10, 2018, 5:30 p.m. to 7:30 p.m.
Where: The Aerospace Corporation, Building D8/1010, 200 N. Aviation, El Segundo, California, 90245
Cost: Members: FREE. Non-members: $10 (refreshments provided)
Registration link: https://conta.cc/2EU9ygL

"It's weird being married to a software engineer," Cooper jokes. "Anytime there's an issue in the relationship, he makes me file a bug. I thought we weren't spending enough time together so I filed a bug. He marked it, 'working as intended.'" Georgia Tech alumna Sarah Cooper, MS DM 20001.

First Robotics

INCOSE-LA and STEM Working Together for Aspiring Young Engineers

By Mark TenEyck

First Robotics is an international organization supporting high school students competing in Science, Technology, Engineering, and Math (STEM) related competitions. Teams are faced with an aggressive six week build schedule to budget, ideate, design, manufacture and test their creations in after school hours. The robots are designed to complete various challenges in driven and fully autonomous modes.

While the competitions are hectic, challenging, exciting, rewarding and sometimes heartbreaking, many of the students are unknowingly learning how to deal with the challenges every entrepreneur will encounter. The projects require fundraising, financial planning, time management, engineering, manufacturing and multiple trade off decisions to produce the best robots with the various funding and resources teams have at their disposal.

Mentoring has been an incredible journey and learning experience. Mentors always want their teams to succeed, but must delicately balance between advising and doing. Although, in reality, we really just enjoy getting our hands dirty as much, if not more than the students!

For the last two seasons I have worked with the students to adopt a systems approach to the development of their robots:

Identify the problems and needs
Identify the requirements
Design functional models to support the systems
Detailed design of high risk areas
Discuss trade offs
Build and test

Not all of the steps are in order or traditional. However, the approach has produced significant reduction in scrapped designs, spend and ability to meet the six-week deadline with a quality robot. Systems has helped them achieve an early understanding of the golden circle.

March Speaker Meeting: Leading Together: a Systems Engineering Approach to Aerospace Technology Maturation for Development Programs

Presented by Andrew Murrell in concert with John Borghese

Andrew Murrell is one of the Rockwell Collins Electro-Mechanical Systems (EMS) Systems Engineering Community of Practice (CoP) co-leaders, and recently received the INCOSE-LA President's award for 2017. Andrew graduated from Embry-Riddle Aeronautical university in Prescott Arizona with a Bachelor in Aerospace Engineering and Space Physics degree. At Rockwell Collins' EMS Andrew's product lines have included Commercial Airliner Pilot Control Systems and Horizontal Stabilizer Actuators. Over the five years at Rockwell, Andrew has had the opportunity to touch nearly every facet of the product life cycle.

(See "Borghese," on page 8)

Check out the details at: https://incose-wsrc.eventbrite.com

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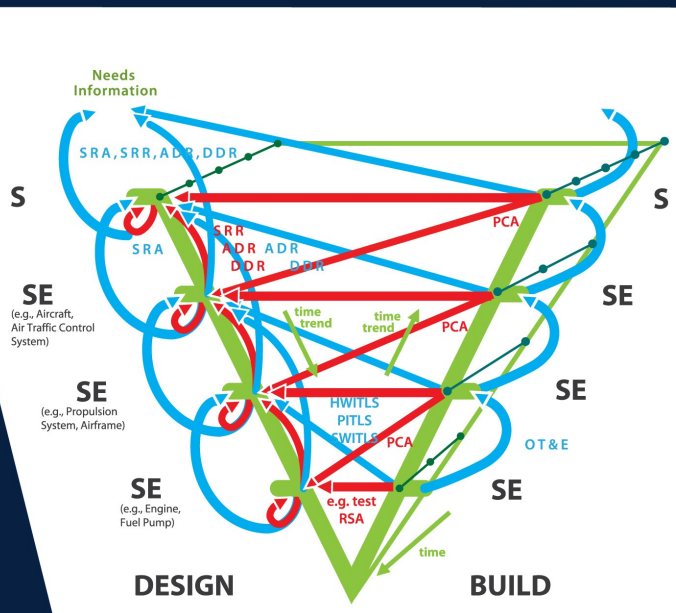
Upcoming Courses:

• Las Vegas, NV	23 Apr - 27 Apr 2018
• Washington, DC	20 Aug - 24 Aug 2018
• Las Vegas, NV	24 Sep - 28 Sep 2018
• New York, NY	15 Oct - 19 Oct 2018
• Washington, DC	28 Jan - 01 Feb 2019



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(Borghese, continued from page 5)

John Borghese is the Vice President of the Rockwell Collins Advanced Technology Center (ATC), a position he has held since 2005. Prior to his current position, John served as Vice President and General Manager of Display Systems in the Government Systems Business Unit. During his professional career, Mr. Borghese has held positions in general management, program management, and engineering. His background is in research and development of aircraft avionic systems and underwater acoustic systems.

At ATC, Mr. Borghese leads the development of new technologies and advanced capabilities. These include communication, navigation, and cyber resilient systems for aviation and research on autonomy and certification of autonomous systems. Under his direction, the center develops innovative technology solutions for future products.

Mr. Borghese earned a bachelor's of science degree in electrical engineering from the University of Southern California, and a master's degree in business administration from Boston University.

Mr. Borghese is a member of the NASA Advisory Council, Chair of the Aeronautics Committee, a member of the Spectrum Committee of the Aerospace Industries Association, and a member of the National Academies Committee on system wide safety assurance.

The presentation discussed the relationship between innovation and product delivery. Often programs, once won, must incorporate immature technologies while expecting the technologies to be available at as scheduled. This prediction of technology can lead to risk that needs to be managed and often will result in rejection of the proposal. The question becomes how do we universally measure the development of different technologies and what other elements must be accounted for when convincing our customer that we know what we are doing?

The presentation opened with a discussion of Rockwell Collins products utilized in commercial aircraft, followed by a discussion of purpose:

- to develop a method to concisely define a project
- to convince investors of project benefit
- to provide measurable performance milestones and decision gates
- to develop a transition plan to the business unit, and
- To unilaterally communicate to customers on progress.

"Heilmeier's Catechism" was cited as a part of the methodology:

- What are you trying to do? Articulate your objectives using absolutely no jargon.
- How is it done today, and what are the limits of current practice?
- What is new in your approach and why do you think it will be successful?
- Who cares? If you succeed, what difference will it make?
- What are the risks?
- How much will it cost?
- How long will it take?
- What are the mid-term and final "exams" to check for success?

(see "Heilmeier," continued on page 11)

(IW 2018, continued from page 1)

Incoming President Garry Roedler shared his vision for his role and INCOSE over the next year. He opened his remarks with a retrospective on the evolution of INCOSE and the progress made by the organization. Leveraging off the history and the growing influence of the organization and its leadership in establishing and defining the profession, Garry went on to share some introspective and observations.

The "take away" from the opening plenary was that INCOSE is a strong organization with leadership that recognizes the challenges and opportunities ahead – a leadership that is working for the betterment of the members and the discipline. This optimistic perspective echoed throughout the Workshop as the members of the working groups rolled up their sleeves and worked to make actions match the words.

Information about the IW and the presentations can be found at the INCOSE Connect website under "events" and "eventarchive." Reports on activities from the various working groups can be found by searching Connect for the working group or subject of interest.

Chapter President-elect Mark McKelvin shared his experiences:

The 2018 INCOSE International Workshop was held in Jacksonville, Florida on January 20-23. It is a major annual event for INCOSE members. The workshop provides a venue to engage and network with fellow members on technical topics. The event also serves as a meeting place for INCOSE leaders to manage the business aspects of the organization and for members to engage and plan within the working groups.

As an attendee to the IW for the first time, I found the experience to be slightly daunting, yet quite valuable. The IW is structured such that there is a number of technical working groups whose activities are interleaved with business activities. The business activities are intended to inform, train, and share information in support of the chapters and support of the business of INCOSE international headquarters. As an elected officer in the INCOSE-LA Chapter, the business meetings were valuable because I received information on officer training, such as identifying the INCOSE organizational structure, on the goals of the organization, its products, and on the outreach activities that are supported globally by INCOSE.

In between training presentations and participating as an Awards Committee member, I stopped by a few working groups. My strategy was to find the one working group that provides the greatest opportunity to learn something new and to contribute. Finding the right working group was the daunting task. Out of the many working groups available, I participated in the Automotive Working Group, Agile Systems Engineering Working Group, a track that featured numerous presentations on Model Based Systems Engineering, and the Systems and Software Working Group. Of these groups, the Systems and Software Working Group was the most interesting.

(See "Working Groups," continued on page 10)

Science is *not* consensus

(Driverless, continued from page 3)

A total driverless environment is currently infeasible: SAE automation levels range one to five: driver assisted, partial, conditional, high, and full. Each of these levels was related in detail to existing systems. However, none of them were anywhere near the level of full automation for all use cases. Ford Palo Alto came up with mobility centers, like Aircraft Traffic Controllers, to assist in complex situations. An Analog Devices speaker mentioned AV black boxes which would cover all aspects of liability in a crash. Appropriate reactions to adverse weather or road conditions call for data latency at the microsecond level. Cost of sensors will need to go down; otherwise, the cost of building AVs with the necessary increased situational awareness will be prohibitive. Although electronics can miniaturize, hydraulics and mechanics used currently do not.

The average person spends two weeks over his or her life time waiting for a traffic light to change. "Real Facts," at Snapple.com

Some of the presentations were particularly intriguing. One involved a queueing scenario in which AVs with lookahead traffic information avoided congestion at an intersection, unlike human drivers for whom the congestion built up. A chart displayed how AVs would avoid the buildup of driving "shockwaves," which human drivers seem to amplify. In contrast, a live video at a crossroad showed how human drivers handled complex interactions well through "micro-adjustments," whereas AVs do not yet possess these abilities.

For the majority of vehicles to be AVs, communication information would have to undergo "densification." Polarization or Code Division Multiple Access to increase spectrum usage aligned with highly directional beamforming radar to communicate to AVs within a small radius would be an enabler. Meanwhile, this extremely intensive RF energy environment would be of great concern to human health. European field intensity may already be at the maximum legally allowed level. Communication trade-offs, particularly signal amplitude trade-offs, would be particularly intensive.

Multiple ideas for effecting safety and communications did abound at the summit. For example, neural networks or voting functions weighting sensor inputs could produce sensor fusion to avoid path hazards. The pros and cons of decentralized data control (low bandwidth, but more processing), vice centralized data control (wide bandwidth but no data lost), or both (optimized, but more complex decision making), were scrutinized. One presenter suggested subjecting AVs to the "Boston Test," a worst case scenario, replete with weather-worn roadways and potholes.

New methods of Test and Evaluation have arrived. The company Octoscope has built an Octobox for testing wireless connectivity through Multiple Input Multiple Output. This technique uses multipath returns to verify communication. Aside from testing AVs, the versatile Octobox, according to the Octoscope website, can also check mobile, medical, robotics and military capabilities. Octoscope projects that AV test will increase 7.9% per year until 2020, and investment in AV testing is projected to grow to $293M by 2023.

I cannot include the full range and depth of the summit content; however, other resources that may be of interest to readers of this article exist:

American Center for Mobility: http://www.acmwillowrun.org/

"Where Auto Meets IoT: Enabling the Era of Electrified Automated Mobility on Demand," Santa Clara Convention Center, May 14-17, 2018: https://tmt.knect365.com/connected-vehicles/

5.9 GHz political conflict:

https://www.theverge.com/2017/11/1/16592704/vehicle-to-vehicle-communications-mandate-trump

https://reason.org/commentary/nhtsas-proposal-to-mandate-of-v2i-t/

Josh Sparber is a CSEP working for the Federal Government. He has maintained a lifelong interest in environmental issues. He obtained a Master's Degree in Environmental Policy and Management from the University of Denver in 2015.

Occam's razor: a scientific and philosophical rule that entities should not be multiplied unnecessarily which is interpreted as requiring that the simplest of competing theories be preferred to the more complex or that explanations of unknown phenomena be sought first in terms of known quantities. — Merriam-Webster

(Welch, continued from page 4)

After lunch, Charles Welch presented Northrop Grumman's work with the San Diego Zoo Global organization. Northrop Grumman is providing an Unmanned Air Vehicle to study the movement of sea ice and polar bears. Mr. Welch went on a two-week mission to Churchill, Manitoba, the "polar bear capital of the world," to fly a hexacopter Habitat Monitoring System consisting of two radar altimeters, cameras, video, GPS, and polar bear recognition software, all of which had to be insulated from extreme cold and reparable in the field.

Next, two students from UNLV made presentations. Valerie Lawdensky, a Ph.D. student, presented an overview of computational analysis of nuclear rocket engines. In her analysis, Monte Carlo software is used to analyze the nuclear performance of the reactors in several types of nuclear rocket engines. She is planning to do molecular dynamic models to analyze heat transferability and engine performance of ideal coatings. The ultimate goal is to use nuclear rocket engines to go to Mars, which would require assembling the rockets in low Earth orbit for safety reasons. Luis Cuevas, an undergraduate student, made a presentation on military aviation in Nevada and the Cold War. He covered the history of testing secret aviation projects at Area 51, like Lockheed Martin Skunk Works' U-2 for the Central Intelligence Agency, the supersonic A-12 which led to the SR-71 Blackbird, and F-117 stealth technology.

The event ended with a lively "Ask Me Anything" panel consisting of six engineers from various companies and in various stages of their careers answering whatever questions participants had.

Overall, the event was educational and inspiring, and many students and other participants asked questions at our INCOSE table about systems engineering and INCOSE.

(GSAW, continued from page 4)

Another question panelists answered was "What do we need to understand better to consistently achieve resilient enterprises?" Mark McKelvin said that to address a complex issue such as resiliency the problem solvers need knowledge of mathematics, engineering, science, and communications as well as the ability to work with others. A person needs to be able to work with a diverse set of technologies and apply them to achieve diverse solutions. Dr. Barry Boehm stated that a synonym of resilience is accident avoidance. Social sciences are as important as the hard sciences to make systems resilient.

Mark McKelvin stated that we need to establish and maintain a pipeline to students. The purpose of this "pipeline" is to facilitate exposing students at all levels, such as K-12, college, post graduate, and early career professionals to STEM through educational programs, classroom projects, mentoring, and financial support. Activities and support to maintain the pipeline and encourage students and graduates depend on the different communities since communities have unique needs.

L. DeWayne Cecil suggested advocates can find mentors and teachers in under-represented schools and then apply for the state space grants program to start programs such as what has been started at the Nesbitt Discovery Academy. To attract students to STEM fields we need to make it "cool." We need to start by listening to the student. We need to show how it pertains to things in which the student is interested. Then we can show how the student's interest is grounded in a STEM field, so they can relate their interest to that STEM field.

Panelists were:

- Dr. Barry W. Boehm, TRW Professor, USC Computer Sciences, Industrial and Systems Engineering, and Astronautics Departments who spoke about educating T-Shaped Software-Intensive-System Engineers
- L. DeWayne Cecil, Founder and Chief Scientist, Destination SPACE along with students: Lauren Ballard, Emily Brison, Jordan Miller, and Moriah Miller from the Nesbitt Discovery Academy who are participants in Destination SPACE (Satellite Program for Aerospace-Centered Education) and STEM
- Stephen K. Guine, Space Product Quality Manager, Northrop Grumman Aerospace Systems who spoke about STEM and Systems Engineering: A Continual Need and Natural Fit
- Paul J. Hudgins, Masters Student, Virginia Commonwealth University, and former Marine who spoke about A Student's Perspective on Computer Science Outreach; and
- Mark L. McKelvin, Engineering Specialist in Applied Software Technologies, The Aerospace Corporation who spoke about Fostering STEM Education.

In closing, a suggestion was made that we should find a way to establish a STEM consortium that combines funding from various STEM industries that want to attract students to STEM fields. Thanks go to Michelle Carter, Sr. Engineering Specialist, The Aerospace Corporation and Judy Kerner, Sr. Project Leader, The Aerospace Corporation for coordinating and leading the session.

(Working Groups, continued from page 8)

At first glance, the Systems and Software Working Group did not appear that interesting. However, as I found out on the last day of the IW, it should have been the one to attend for me from day one! Of course, in between chapter awards and chapter training activities. Overall, all of the working groups had at least one exciting topic. But for now, with what little time I have to devote to working group activities, I will engage with the Systems and Software Working Group.

Maybe this operating year I can help develop products that were discussed in the group, such as an article that discusses how to teach systems engineers software techniques and software engineers how to do systems engineering.

INCOSE Americas Sector Assistant Director of Events and Chapter Past-President, Eric Belle added:

Our President-Elect, Mark McKelvin, has provided an excellent review of the IW 2018 in Jacksonville, and I am impressed as to how well he represented the Chapter at a number of business meeting in which feedback from the chapters was sought. As one who has attended the International Workshop since 2008, I have never ceased to be amazed at the energy and dedication of the members who come together to volunteer their time and efforts to serve the INCOSE organization and to advance the knowledge base of systems engineering. The importance of this event cannot be understated as it, along with the International Symposium, are the two times during the year that we as systems engineers can meet to network with one another on an international basis and conduct the vital business of our organization in person. This year was no exception as important decisions were discussed and implemented at many levels from the Board of Directors down to many committees and working groups.

My favorite part, however, is the opportunity to re-engage with my many friends from across the organization and to make new ones at every event.

Next year we are fortunate to once again have the IW in our backyard as it returns to Torrance, California. I urge any and all of our members to make plans to attend and find out more about the organization and to use the occasion to build your respective networks and to take advantage of the opportunity to further your knowledge of trends within the profession of systems engineering.

The INCOSE leadership is continuing to strive for value for the systems engineering professional, by reaching out to industry and academia and by providing opportunities for the professionals in the field to hone their skills and expand their knowledge. IW 2018 is one example, and the future includes IW 2019, chapter events, tutorials, webinars, and the premiere event: the annual International Symposium, which will be held in Washington, D. C., this upcoming July.

There are few enough people with sufficient independence to see the weaknesses and follies of their contemporaries and remain themselves untouched by them. And these isolated few usually soon lose their zeal for putting things to right when they have come face to face with human obduracy.

Albert Einstein

The Board of Directors wishes to welcome the following new members to 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	Organization
Ayse Ulubay	Loyola Marymount University
Darcy Dewar	Embry Riddle Aeronautical University
Maria Lozano Corral	Loyola Marymount University
Beth Spiess	Moog
Joel Harris	California State University Los Angeles
Brandon Schadrie	University of Illinois
Jamie Johnson	Deloitte
Ali Abbas	
Chris Valcke	
David Gamble	Nymbysys LLC
Walter Kilar	AT&T
Anthony Legree	Embry Riddle Aeronautical University
Erik Solverson	AT&T

(Heilmeier, continued from page 8)

George H. Heilmeier, a former Defense Advanced Research Projects Agency director (1975-1977), crafted a set of questions known as the "Heilmeier Catechism" to help agency officials think through and evaluate proposed research programs.

Andrew discussed “readiness levels” as used by Rockwell Collins in working with the Department of Defense and concluded the presentation with applications from within the Advanced Technology Center.

The slides used for the presentation are available in the Chapter’s INCOSE Connect site. Go to Connect, chapters, Los Angeles, 2018 Chapter folder, C0 Event Results, C1 Chapter Meetings and Events, 20180318 Speaker Meeting.

Join INCOSE!
The International Council on Systems Engineering is the world’s authority on this science of the future.
Learn more at: www.incose.org

2018 Board of Directors

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Newsletter Editor	Jorg Largent	jorg.largent@incose.org	Student Division Ambassadors	Scott.Birtalan	scott.birtalan@ngc.com
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Chapter Awards Manager	Rick Hefner	rhefner@caltech.edu	Social Media Manager	Doris Gebelein	doris.gebelein@lmco.com
Professional Networking Chair	Scott Birtalan	scott.birtalan@ngc.com	New Member Ambassador	Collette Kurtz	kurtz905@aol.com
Representative to the SF Valley Engineer’s Council	Stephen Guine	Stephen.Guine@ngc.com	Volunteer Coordinator	Karen Miller	karmill888@aol.com

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The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization founded to develop and disseminate the interdisciplinary principles and practices that enable the realization of successful systems. INCOSE's mission is to share, promote, and advance the best of systems engineering from across the globe for the benefit of humanity and the planet.
The Los Angeles Chapter meets several times per year for speaker meetings and, in addition, sponsors tutorials, mini-conferences and other activities of interest to those in systems engineering or related fields.

UPCOMING EVENTS

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 . Like us on Facebook

April Speaker Meeting
Agile Systems Engineering and Earned Value Management
By Phyllis Marbach
Tuesday, April 10, 2018
5:30 p.m. — 7:30 p.m.
The Aerospace Corporation
El Segundo, California
See article on page 5 for details

April Tutorial
Agile Systems Engineering
Saturday, April 14, 2018
9:00 a.m. — 2:00 p.m.
Registration: https://conta.cc/2u1s2nf

Second Quarter Strategic Planning Meeting
The members' opportunity to be heard and contribute
Saturday, May 12, 2018
9:00 a.m. — 3:00 p.m.
The Manhattan Beach Community Church
303 South Peck Avenue
Manhattan Beach, California
Continental breakfast and lunch will be served
No cost for members
Registration: https://conta.cc/2u1fj3V

May Speaker Meeting
The Connected Vehicle Revolution, Continued
By Kay Das
Tuesday, May 8, 2018
5:30 p.m. — 7:30 p.m.
The Aerospace Corporation
El Segundo, California
https://conta.cc/2u3QcNU

2018 International Symposium
Saturday, July 7 — Thursday, July 12, 2018
Washington D. C.
Check the INCOSE website
(INCOSE.org, News and Events) for details

International Society for the Systems Sciences (ISSS)
62nd Annual Conference and Meeting
July 22 – 27, 2018
Oregon State University in Corvallis, Oregon
Theme: "Innovation and Optimization in Nature and Design"
For more information about the planned activities, speakers, sub-themes and key dates, visit: http://www.isss.org/world
email to: enquiryisss@gmail.com

Western States Regional Conference
September, 20 — 22, 2018
Ogden, Utah
For more details go to https://incose-wsrc.eventbrite.com