AIAA American Institute of Aeronautics and Astronautics Los Angeles - Las Vegas Section

Newsletter

June 2018

IN THIS ISSUE:

To send comments or submissions, or to purchase advertising, please contact the newsletter editor:

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The 2018 AIAA Los Angeles-Las Vegas Section Awards Banquet

By Lisa Kaspin-Powell
Newsletter Editor, AIAA Los Angeles-Las Vegas Section

The AIAA Los Angeles-Las Vegas Section Awards Banquet on May 10, 2018 was a memorable evening in which many people were recognized, including long-time Section members, leaders from cutting-edge industry, and the next generation of engineers and scientists. The Section extends its gratitude to The Aerospace Corporation for sponsoring the event.

Lars Hoffman speaks after accepting the AIAA Los Angeles-Las Vegas Section Technical Excellence Award on behalf of SpaceX.
Photo: Ken Lui (Events/Programs Chair, AIAA Los Angeles-Las Vegas Section)

The evening began with the featured speaker, Lt Col Tucker "Cinco" Hamilton, an Experimental Test Pilot for the Air Force and the Developmental Test & Evaluation Lead for the F-35. Hamilton credited the movie *Braveheart* with inspiring him to join the Air Force ROTC to become a test pilot, because the movie made him realize that freedom comes at a cost. He described his year at the Air Force test pilot school as "the best aviation experience in the world!" Hamilton learned how to fly a MiG, a Blackhawk, and an Osprey; and he even learned to fly a blimp "I have no idea why!" One and a half days of real-life training equaled an incredible 6 weeks of simulator training.

Hamilton then described the F-35. It is the first dual role stealth fighter, and sends more data than any other platform. The plane penetrates into an enemy air system, possesses very effective AESA radar, tracks everything in front of the pilot, and has a distributed aperture system. Infrared cameras transmit everything to the pilot's helmet, turning night into day. The F-35 fuses a massive amount of data from the sensors together while at the same time selecting the right information for the pilot.

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The 2018 AIAA Los Angeles-Las Vegas Section Awards Banquet

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Top left: Lt. Col Tucker Hamilton gives the keynote speech. Top right: Robert Peltekov (at left) accepts the James Wertz Scholarship from Dr. Wertz. Center left (left to right): 2018 AIAA National Middle School Regional Essay Contest winners Gabrielle Dorst and Alexandria Lam, with Section Chair Bob Friend and STEM K-12 Chair Matthew Mundy. Bottom left: Bob Friend (left) congratulates Palos Verdes Science and Engineering Fair second place winner Andrew Lang. Bottom right: Palos Verdes Science and Engineering Fair first place winner Alisa Hathaway talks about her project. *(story continued on page 6)*

Complex System Sustainment Community of Interest (COI)

By Charles Vono, AIAA Associate Fellow

Associate Fellow Charlie Vono is a retired USAF colonel and retired defense contractor engineer and manager. In retirement, he writes and speaks on sustaining complex systems. You can find more about him in the AIAA Distinguished Lecturer Manual or his website: http://charlesvono.com.

What happened when AIAA members interested in pushing the state of the art in sustainment discovered the new AIAA tool, Engage? What is the best way to look at complex system sustainment? What is a COI and why does it help their efforts?

My View of Sustainment

In my writings on sustainment, I have proposed a "fundamental theorem of sustainment".

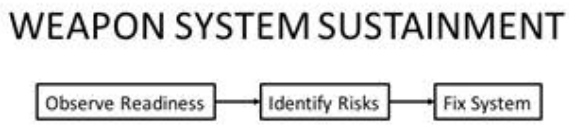
A fundamental theorem is a statement that is necessary to create the associated domain of knowledge. For instance, the Fundamental Theorem of Arithmetic states that any positive integer n can be represented in exactly one way as a product of primes pi. The Fundamental Theorem of Algebra says that every Polynomial equation having Complex Coefficients and degree n > 0 has at least one Complex Root. The fundamental theorem of natural selection asserts that the rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time.

In sustainment, the fundamental theorem is: "An effective sustainment organization will always find ways to affordably detect threats to the system in time to correct them before the mission is impacted."

I go on to describe a management model that helps sustainment organizations carry out this philosophy. An on-going, systematic and complete observation and assessment program creates the data needed to succinctly describe emerging failure modes in sufficient time to establish mitigations.

For instance, an on-going crack detection program can provide enough information for decision-makers to declare a risk to an A-10 wing with enough time to design and implement a fix during a timely programmed depot maintenance event. An on-going solid fuel degradation surveillance program can help decision-makers determine when the next Minuteman III motor washout and re-pour should occur.

For complex systems, the assessment, risk, and fix programs take on major roles in the sustainment organization. The inputs, outputs, and processes in these 3 on-going programs are determined by the warfighter's needs for availability, reliability, and 2 or 3 other mission-specific "-ilities" (which I call readiness factors) such as accuracy or loiter time.



Starting from these basics, an entire complex system sustainment management model can be constructed and followed with excellent results. It is, basically, the methodology used by ICBMs to keep their weapon system meeting the deterrence mission for over half a century. The model is self-improving, constant, applicable, memorable, practical, and integrated. In other words, it is anti-fragile, or at its worst, it is still robust. It is unaffected by changing laws, regulations, or fads. It is applicable to the very complex systems in use today and easily remembered when needed. Its common

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International Space Station Microgravity Space Medicine: Functional Effects of Spaceflight on Human Health

AIAA Los Angeles-Las Vegas Dinner Meeting, March 20, 2018

By Lisa Kaspin-Powell
Newsletter Editor, AIAA Los Angeles-Las Vegas Section

What health dangers do astronauts face when they live in space for long periods? A group of scientists from Loma Linda University are finding the answers, which they shared with the AIAA Los Angeles-Las Vegas Section at the Manhattan Beach Library last March 20, 2018. The featured speakers were Drs. Michael Pecaut, who studies the effects of spaceflight on the immune system; Xiao Wen Mao, who studies the effects of radiation and the space environment on the nervous system and the eyes; and Mary Kearns-Jonker, who is investigating the use of cardiovascular cells to repair birth defects and heart attack-related damage.

Michael Pecaut spoke first, on the space radiation environment and its associated risks.

Pecaut explained that the main hazards to humans in space were microgravity, isolation and confinement, changes in light-dark cycles in space, a hostile and closed environment, the distance from Earth, and radiation. As far as radiation is concerned, NASA is concerned about cancer, acute and delayed risk of damage to the central nervous system, long-term degenerative effects of radiation exposure, and acute radiation-related sickness or death. Space safety radiation dose limits are designed to limit fatal cancer risk to 3%, prevent radiation sickness, and limit the risks of brain and heart disease.

He explained further that on Earth, the sun is the greatest source of radiation, with levels varying over 11-year cycles. Solar particle events are much shorter--on the order of 2-3 days--but give a much higher dose of radiation than cosmic rays. However, the Van Allen belts block much of the radiation from reaching Earth. In space, while radiation is at a low dose level, it continues over a longer period and therefore has more biological impact. On the International Space Station, even though aluminum and water are used as shielding, charged particles colliding with these materials can create secondary particles, creating another source of radiation.

In addition, two kinds of particles from galactic cosmic rays cannot be blocked: iron and carbon. Scientists at Loma Linda University are studying their effects through experiments with proton accelerators, such as that at the university and at Brookhaven National Laboratory.

So what exactly does radiation do? Pecaut explained that it directly damages DNA, RNA, proteins, cell membranes, and cell organelles (cell compartments that produce energy and process proteins). In addition, the damaged cells could affect the surrounding cells through cell-cell signaling.

Radiation will cause the most damage to cells that grow and divide more rapidly, such as cells of the immune system. At the same time, immune function is also affected by other stresses, such as psychological stress from work, disrupted sleep, and isolation. In fact, the immune system interacts with all other systems of the body-- musculoskeletal, cardiovascular, nervous system, reproductive, and urinary.

Astronauts also face physical stresses: over the short term, they are subjected to launch and landing loads; and over longer time periods, microgravity.

What do we know about the biological effects of space travel? Studies have been performed investigating the changes in astronauts aboard the ISS. One of the most famous long-term studies involves astronaut Scott Kelly, who spent a year aboard the ISS, and his twin and control Mark, who remained on Earth. However, we have more data from mouse experiments, from multiple space shuttle missions. A notable effect seen in these experiments was the weakening of the immune systems of the mice.

As the space shuttle Atlantis took off on its final flight, it carried one such mouse experiment. The scientists

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The Viking Mars Missions Education and Preservation Project (VMMEPP) is going to interview the people who worked on the Viking missions!

Ms. Rachel Tillman, Executive Director and Founder of VMMEPP, will be interviewing the personnel of the Viking missions from June 26th through July 15th.

Please contact her (retviking@gmail.com) if you worked on the Viking missions and would like to be interviewed. Please indicate if you are an AIAA member, and indicate which Section.

VMMEPP will let the Los Angeles-Las Vegas Section know who they will be interviewing if the interviewees are AIAA members.

All our archives will be posted for the benefit of AIAA and the public once the interviews are edited and produced.

The Viking Mars Missions Education and Preservation Project is focused on preserving the history, artifacts, original documents, and data from the Viking Missions, to inspire current and future leaders and thinkers, and to instill collaboration and equity into missions of tomorrow. To learn more about VMMEPP, please visit https://vikingpreservationproject.org/

Future Events

June 26-28. Spacecraft and Launch Vehicle Dynamic Environments Workshop. The Aerospace Corporation, El Segundo, CA. For more information and to register, visit http://bit.ly/2G0SFgB

Saturday, June 30, 2018, 9:30/10am - 4/4:30 pm. Planetary Defense and Asteroid Exploration mini-Conference. PLEASE SEE AD ON PAGE 7

Saturday, July 14, 9:30 am – 4:30 pm. AIAA LA-LV 2018 Neil's Day & July Meeting. Sci-Fi vs Sci-Tech: Dialogues between the Two Realms. With Apollo 11/Vikings Anniversaries Celebration. Various speakers / panelists from Sci-Fi film production and Aerospace & Sci-Tech Industry/Academia. PLEASE SEE AD ON PAGE 11

July 19-21. Satellite Education Conference, CSULA, Los Angeles, CA. On-line registration opens April 2, 2018. For more information, visit http://www.sated.org/conferences/index.htm

Thursday, August 9, 5:30 pm – 9:30 pm. AIAA LA-LV August Dinner Meeting. NASA Solar Systems Imaging / Mapping. Speaker: Brian Day. PLEASE SEE AD ON PAGE 16

August 23-26, 21st Annual Mars Society Convention, Pasadena Convention Center, Pasadena, CA. For more information and to register, visit
http://www.marssociety.org/save-date-21st-annual-international-mars-society-convention/

Saturday, September 8, 1:00 pm - 5:00 pm. Seventh Annual Mars Rover and Professional Society Expo. S-Cafe at Northrop Grumman, Redondo Beach, CA (south of Marine Ave. at Simon Ramo Dr.) Free parking and admission. Speaker: Charles Baker, NASA-JPL Curiosity Mission Engineer. RSVP at https://conta.cc/2M11wPP For questions, contact Fred Lawler, 714-369-9516, fredlawler@hotmail.com

September 17-19, AIAA Space Forum, Orlando, FL. To register, visit https://space.aiaa.org/Register/

The 2018 AIAA Los Angeles-Las Vegas Section Awards Banquet

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Everything in the cockpit of these highly complex jets needs to be tested. There are many different missions, necessitating a lot of different development tests. Each test requires 45 days of mission planning and more than 40 people, and one control room per plane.

Hamilton showed videos of the testing, which included an arresting hook system; a landing on an aircraft carrier; a low energy catapult shot to determine the lowest the plane can fly and still lift off; a tailslide video from the outside and the cockpit point of view; an arrestment of cable in which the pilot flew at 180 knots, which sawed off the cable; and a drag chute testing in Alaska on ice to make sure it would work in Norway.

The most captivating video showed the near deadly and life-changing collision of Hamilton's F-15 with another F-15 in a training run over the Gulf of Mexico. He described the plane on fire, pulling the ejection, experiencing an eerie quiet during his descent in a parachute, and even losing his survival equipment during the descent. A fishing boat finally rescued him after he had floated in the dark waters of the Gulf for two hours. Hamilton described the experience as "a blessing in disguise when you survive a close call. You don't want to think about how you misprioritized [your life] when you're in the Gulf of Mexico facing death."

Hamilton then commented on the technology that takes over the aircraft to prevent ground collisions: the Automatic Ground Collision Avoidance System (Auto GCAS Save). He observed that while pilots initially didn't like handing over control and thought the technology was not yet mature, the autonomy worked. Because Hamilton testified before Congress about the fact that the F-35s were originally not supposed to have the Auto GCAS technology for another 8 years, the time was shortened to 2 months.

Hamilton came very close to being selected for the astronaut program, and stated how *Star Trek - The Next Generation* inspired him. Among 18,300 applicants, he and 119 others were chosen for an interview. Hamilton was selected on the strength of his graduation from test pilot school, academics, STEM outreach activities, and military records. While he was not selected, he did not view it as a failure: "You get to meet all these amazing astronauts and candidates. It's really about getting to know you. How will you fit with other people?"

The experience led Hamilton to realize that "What you experience as you go through this life is what matters. What if you don't make your goal? Or what if you make the goal and say, what now?" He emphasized that the most important take-away is that people should live their lives fully, no matter if they achieved their goals or not, or even changed them.

The AIAA awards came next in the program. Gwynne Shotwell, who was not present, was recognized with the Goddard Astronautics Award for her leadership and vision in the field of space exploration and contributions to aerospace technology. The award is the highest honor that the AIAA bestows for notable achievements in the field of astronautics. She donated the cash portion of the award back to the AIAA.

A new AIAA Fellow was announced: Eugene Lavresky, from The Boeing Company. Four new associate fellows were also announced: Thomas P. Barrera, from LIB-X Consulting; Jeffrey M. Michlitsch and Vinay Goyal, both from The Aerospace Corporation; and Naveed Hussain, from The Boeing Company.

Matt Mundy, the Section STEM K-12 chair, then acknowledged the high school winners. First, the Section recognized the winners of the 2018 AIAA National Middle School Regional Essay Contest. The theme of the essay involved NASA's selection of 12 new astronaut candidates. The essay writers had to describe their impact at the NASA, United States, and international levels. The winner, Keila Bara, was unable to join the festivities, but Gabrielle Dorst and Alexandria Lam, the first and second runners-up respectively, spoke about their essays. Dorst described how to grow food aboard the International Space Station. Lam spoke of how astronauts have the greatest potential of inspiring the next generation of scientists, and that the educational side of an astronaut's job is the most important.

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AIAA LA-LV Mini-Conference Series:
Planetary Defense & Asteroid Exploration Mini-Conference 2018
Saturday, June 30, 2018 from 9:30 AM to 4:30 PM PDT

With featured presentations and panel discussions by
Dr. Nahum Melamed, Project Leader, Aerospace Corporation
(Planetary Defense & Asteroid Exploration / International Asteroid Day Introduction)
(NEO Deflection App)

Dr. Niraj Inamdar, Associate Physical Scientist, RAND Corporation
(The Story of Our Solar System as Told By Asteroids)

Col. Charles Vono, USAF Retired
(Keeping Complex Systems Working for Decades)

Dr. Joel C. Sercel, (Trans Astronautica Corporation (TransAstra)

Philip Groves, "Asteroid Impact" IMAX Producer & Writer, Apophis Pictures, LLC
(Planetary Defense Education Through Media)

Prof. Madhu Thangavelu, Director, Lecturer, and Faculty Member, USC/ISU
(Planetary Defense Systems)

For the speaker biographies and topics, and to register, visit
http://events.r20.constantcontact.com/register/event?oeidk=a07efexkaff5f158a55&llr=p9tbt6cab

Redondo Beach Public Library (2nd Fl. Meeting Rm.)
303 N Pacific Coast Hwy, Redondo Beach, CA 90277
$35 AIAA Professional Member Price
$40 Non-AIAA Member -Regular Price
$25 AIAA Student / Educator Member Price
$30 Non-AIAA Member -Student / Educator
$20 Presentation Only -No Meal
$15 Bring Your Own Lunch / Snacks (BYOLS)
(No Refund within 7 days of the event)

The 2018 AIAA Los Angeles-Las Vegas Section Awards Banquet

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Next, the winner of the 4th Annual James Wertz Scholarship was presented. The award is given to recognize ingenuity, collaboration, and achievement in scholastics, activities, collaboration, and communication. Robert Peltekov, a student at Palos Verdes Peninsula High School, received the award for his extracurricular activities in addition to all of his scholastic achievements.

The winners of the Palos Verdes Science and Engineering Fair were announced next. Their posters were also on display at the awards banquet. Alisa Hathaway, a student at Peninsula High School, won first prize for her project "Detection of Improvised Explosive Devices using a Phased Array Radar System." Andrew Wang, a student at Palos Verdes High

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Planetary Defense & Asteroid Exploration Mini-Conference 2018 (continued)

June 30 is the International Asteroid Day. In previous years, the AIAA LA-LV Section has held or supported the Near Earth Objects (NEOs) Deflection App Hands-on Workshop or solo presentation for this special date. This year on June 30, the Section is hosting a mini-conference covering the different aspects of planetary defense, to bring more public attention to this interesting and important subject.

The mini-conference will introduce the NEO (and other possible) threats, covering past events, real-time close approaches and Earth impact risk, NEO discovery, tracking, and mitigation concepts. Recent advances, progress, and updates in the related efforts, including the NEO Deflection App, various approaches and issues for planetary defense (eg, deployment, upkeep and updating of planetary defense radars, controls, intercepters, and directed energy approaches), and asteroid exploration (eg, mining and economics) will be discussed. This important subject not only has great impact on the aerospace community, but also the survival, civilization, prosperity, sustainment, and continuation of humanity.

Our planet is at risk of being struck by NEOs such as asteroids and comets. We need to find hazardous space objects and deflect them before they impact the Earth and cause damage or disaster. It has happened in the past, and many NEOs frequently pass close to the Earth/Moon system today, some unnoticed.

More and more of these objects are being discovered and monitored daily, dramatically updating our view of the solar system in this regard thanks to dedicated efforts by planetary scientists, engineers, and support from the society.

It has been brought to attention for many years that effective asteroid deflection & planetary defense systems should be researched and prepared. The systems and the underline science & technology should be brought to a state of readiness associated with the risk. Society should also be prepared and readied for potential emergency due to an unmitigated impact to minimize the potential damage and ensure the maximum survival.

Please join us and bring your questions or suggestions to participate in this important and interesting event. We care for and support the Aerospace communities, and also the defense & survival of the Mankind, the Civilization, and the Earth & the Solar Systems.

*If you / your organization would like to host an exhibition table in this mini-conference, please contact us for details and arrangement:
LA Section Events/Programs Chair, AIAA Los Angeles - Las Vegas Section
949-426-8175 events.aiaalalv@gmail.com

Professor Madhu Thangavelu, Lecturer of Astronautical Engineering in the USC Viterbi School of Engineering and Visiting Lecturer with the International Space University, is pleased to share some course projects and links to his publications with the AIAA Los Angeles-Las Vegas Section. He conducts the ASTE527 Graduate Space Concept Synthesis Studio in the Department of Astronautical Engineering within the Viterbi School of Engineering and teaches Space Architecture in the School of Architecture at the University of Southern California. He holds degrees in both disciplines. He is also an adjunct faculty of the International Space University based in Strasbourg, France, an institution that trains promising young space professionals for leadership in international space activities. Recently, he has been nominated as a director of the National Space Society.

Here is a list of the course offerings from each year:
https://sites.google.com/a/usc.edu/aste527/home
One of his articles is pertinent to his ASTE527 course offering, Introduction to 2017 Renaissance:
http://www.thespacereview.com/article/3453/1

The 2018 AIAA Los Angeles-Las Vegas Section Awards Banquet

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School, won second prize for "Investigating charging effects and electrostatic discharge of dusty surfaces in plasma." Leo Guo, a student at Peninsula High School, won third prize for "Modeling the Ideal Structure of Energy Barrier to Minimize the Energy Loss of Electron Wave Undergoing the Quantum Tunneling Process."

Next, the Section volunteers were recognized. Santosh Kumar was recognized for volunteering at all of the Section dinners. Ken Lui, the Program/Events Chair for the Section, received an AIAA Special Service Citation from the AIAA national headquarters for his outstanding service. He has done a tremendous amount of work towards increasing the diversity and the popularity of the events. Lui also received a cash award. He deserves special recognition for all of his year-round efforts! The award was presented by Jeff Puschell, the newly elected Region VI representative.

Lastly, industry achievements were recognized. Virgin Galactic received special recognition for the success of the first powered test flight since the tragic loss of SpaceShipTwo VSS Enterprise in 2014. On April 5, 2018, the SpaceShipTwo VSS Unity reached Mach 1.87 and a maximum altitude of 84,271 feet (nearly 26 km) before landing at the Mojave Air and Space Port in California. Todd Ericson, Vice President of Virgin Galactic, was present for part of the evening.

The evening ended with the presentation of this year's AIAA Los Angeles-Las Vegas Section Technical Excellence Award to the SpaceX Heavy Rocket Team for the debut launch on February 6, 2018 of the Falcon Heavy. Lars Hoffman, the Senior Director of Government Sales for SpaceX, accepted the award, and showed a short video. He also gave a big announcement: SpaceX received approval on the week of the awards banquet to build the BFR in the Port of Los Angeles!

In summary, the Section awards banquet was a memorable evening and a tremendous success. Congratulations again to all of the awardees, and many thanks to all of those who put the event together. Special thanks go to Ken Lui, the Program/Events Chair, and to the volunteers: Santosh Kumar, Stephen Guine, Pamela de Liz, Philip Baily, William Kelly (who supported registration and check-in at the event), Chelsea Poma (the organizer/teacher for the Science Fair), Nathan Morrissey, and librarians from the Manhattan Beach Library. The Section thanks The Proud Bird for hosting the event.

Many thanks are due to the AIAA Los Angeles-Las Vegas Section 2017-2018 Council for their service.

See you in 2019 to celebrate next year's achievements!

Complex System Sustainment Community of Interest (COI)

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lexicon and ease of use make it practical. And since it was developed using systems engineering, it remains internally consistent after decades of refinement.

It is easy enough to click on the "Presentations and Publications" menu in my web site and read about all the various processes and procedures derived from this fundamental theorem.

A Community View of Sustainment

However, this approach is limited because my brain is limited. This is why several of us AIAA members have taken advantage of the new governance to start a Complex Sustainment Community of Interest (COI).

COIs are ad-hoc groups self-organized and facilitated via web-based AIAA Engage tool to share and discuss common aerospace interests.

In May 2017, AIAA stood-up its new governance model which was designed to give the Institute a strategically focused Board and a member-driven voice through the Council of Directors. A key point of the governance overhaul was to provide an easier mechanism for members to form a community around some topic.

COIs can be technical, geographical, or more broadly based (integration, policy, issues, etc) in nature and span the breadth of the three Divisions within the Council of Directors – Regional Engagement Activities Division, Technical Activities Division, and/or the Integration and Outreach Division. It is the AIAA equivalent of online group tools or community blog sites.

From this engagement in the COI, AIAA will be able to see what is important to the members and the aerospace community which will aid with the development of new products and services for the membership. A single COI may have a focused scope, the aggregate view of all COIs should help keep AIAA fresh and looking to the future.

Your View of Sustainment

You can be a part of this great experiment and share your ideas on sustainment simply by going to Engage and joining our "Complex System Sustainment" thread. Our long-term goal is to nail down enough of the fundamentals of sustainment such that we can start hosting conferences loaded with technical papers that help thousands of sustainers to do their jobs better.

As you "Engage" in our Sustainment Community of Interest, you'll likely think of another area that you'd like to get more brains thinking about. The door is open for you to start your own COI. Just go to http://aiaa.org/Col-Application/ and the application form will download. It is a Microsoft Word document entitled "Higher-Logic-Community-Set-Up-Application-v4". Send the completed form to Karen Berry (karenb@aiaa.org).

What We Are Not

As you join our COI, be aware that this is not a COI about sustainability. Sustainability is what designers consider and production managers carry out before the Sustainment Phase of a system. Our COI will certainly address this area from time to time, but our focus is the Sustainment Phase of a system.

The sustainment phase is characterized by the emergence of a capabilities baseline, loss of priority and resources, and loss of the urgency of a "design to FOC" schedule. Connections to the warfighter during the sustainment phase are just as critical as ever since the operators are meeting the mission using the system. They come to rely on an experienced capability. And they will scream if a capability is lost – even if it was never a design criterion. Sustainers must maintain that capability despite a loss of priority. Loss of priority includes funds, other resources, and executive oversight. (Sure, it can be a pain to have to brief the Secretary of Defense. But that scrutiny results in immediate actions to correct issues.)

The third characterization, loss of a schedule, means that the sustainers must determine the correct schedule for fixes based on the risk being dealt with. And integrate that with all the other risks. And combine this

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AIAA LA-LV 2018 Neil's Day & July Meeting
Sci-Fi vs Sci-Tech: Dialogues between the Two Realms
With Apollo 11/Vikings Anniversaries Celebration
Saturday, July 14, 2018 from 9:30 AM to 4:30 PM PDT

Apollo 11/Vikings Anniversary Representative
Robert L. Norcross Jr. (Apollo 11)

Various speakers / panelists from Sci-Fi film production and Aerospace & Sci-Tech Industry/Academia
Rod Pyle (Space Author) (Moderator)
Aldo Spadoni (Northrop Grumman - Retired, IAAA) (Moderator)
Prof. Madhu Thangavelu (USC) (Moderator)
Rick Sternbach (best known for his space illustrations and his work on the Star Trek television series)
Harriet Brettle (Strategic Partnerships Team coordinator of the Space Generation Advisory Council)
Dr. Rostislav Spektor (Aerospace Corp.) (Conventional & Electric Propulsion)
Allan Grosvenor (Masten Space Systems) (BSG/Viper, Aerodynamics)
(and possibly more)

Exhibitor: Rick Sternbach (and possibly more)

1st Panel: Sci-Fi
2nd Panel: Middle ground / Independent
3rd Panel: Sci-Tech

For more information and to register, please visit
http://events.r20.constantcontact.com/register/event?oeidk=a07effulyj83d501d2a&llr=p9tbt6cab

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$20 Presentation Only -No Meal
$15 Bring Your Own Lunch / Snacks (BYOLS)
(No Refund within 7 days of the event)

Science Fiction (Sci-Fi) films such as Star Trek, Battlestar Galactica, and Star Wars have fascinated and inspired people around the world, and pushed the boundaries and advances of the human imagination and the space / aerospace science and technology.

Science and Technology (Sci-Tech), on the other hand, have been the foundation and backbone of daily space operations and successes like the Apollo 11 moon landing, Vikings on Mars, and the most recent successes of SpaceX and Virgin Galactic.

We are blessed to be located in the Los Angeles-Las Vegas area with the leading film production and aerospace businesses, technologies, and professionals. It is exciting and vital to have both realms engaged in dialogues to discuss and answer questions that would be instrumental to Sci-Fi and Sci-Tech, and human space exploration. It is also important to learn more about the boundaries between imagination and current state-of-the-art science / technology.

Please join us on July 14, 2018, when we will immerse ourselves in the great moments of the Apollo 11/Vikings successes, and the great Sci-Fi films, while learning the Sci-Tech behind those wonderful successes, and also:

- Celebrate the 49th Anniversary of the Apollo 11 Moon Landing, and the 42nd Anniversary of the Vikings on Mars, warming up for the 50th Apollo 11 Anniversary next year in 2019
- Remember the great American experiences and keep the spirit alive for future human space exploration
- Remember the excitement of sci-fi films and their fascinating technology
- Learn from the experts and professionals in sci-fi film production about the excitement and live sto ries in creating and producing successful sci-fi films, and how science fiction can benefit science fact
- Learn from Sci-Tech / Aerospace experts & professionals about the current state of the art, joy, frustration, and live stories in science & engineering development, the reality, and how Sci-Tech can benefit Sci-Fi production
- Learn from the dialogue between those two great realms and see how human space exploration can benefit from both and speed up the process, including the ongoing efforts of "Back to the Moon, onto Mars," and possibly "Going Interstellar"
- Network with professionals and experts in film production and aerospace, science, engineering, and business, along with educators, students, and enthusiasts

*If you / your organization would like to host an exhibition table in this mini-conference, please contact us for details and arrangement:
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events.aiaalalv@gmail.com

Complex System Sustainment Community of Interest (COI)

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into an overall integrated deployment schedule that husbands resources. Which brings us back to: "An effective sustainment organization will always find ways to affordably detect threats to the system in time to correct them before the mission is impacted."

Other differences: The production phase is characterized by a FRACAS program, and the sustainment phase implements this kind of program at their repair depots to catch new, emerging failure modes. FMEAs inform the design phase, while sustainers are on the lookout for new emerging failures to add to the FMEA list. Age surveillance programs are designed before the sustainment phase and refined during the sustainment phase.

In addition, as systems engineering plays a critical role in creating and executing the complex system sustainment management model, we find it very useful to work with our brothers and sisters over at the International Council on Systems Engineering (INCOSE). In fact, the INCOSE Western States are holding a regional conference this September where a major theme is sustainment. (For info on this conference, google "INCOSE Wasatch".)

In Conclusion

Jump into Engage. Check out our COI on Sustainment. Think about starting your own.

International Space Station Microgravity Space Medicine

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sought to understand the relationship of the immune system and lipid/glucose metabolism with stress related to microgravity. Stress can lead to changes in lipid/glucose metabolism as well as immune function, and changes in the numbers of certain types of immune cells have been seen in obese patients developing metabolic syndrome. What would happen in response to space travel-related stress?

The researchers found some surprising results: they didn't observe all of the expected responses to psychological stress. Corticosterone and catecholamines, part of the "fight or flight" response, were measured. While corticosterone increased, catecholamines did not. At the same time, they saw more formation of molecules called "reactive oxygen species." These molecules damage nucleic acids, proteins, and cell membranes, causing changes in gene expression. However, the changes the scientists saw had nothing to do with oxidative or psychological stress, but involved increases in fatty acid and glucose metabolism. The scientists found that in spaceflight conditions, cells were going away from immune functioning and towards processing of fats. The scientists suspected that such changes had to do with energy requirements changing in space. The researchers' results were published in the journal PLoS One: "Spaceflight Activates Lipotoxic Pathways in Mouse Liver." https://bit.ly/2MuDxbQ

Pecaut concluded with the take-home message that spaceflight affects multiple systems in the body.

However, the next two talks focused on specific systems: the eyes and the cardiovascular system.

Xiao Mao, the next speaker, described how spaceflight and radiation damage the eyes. Mao explained that many astronauts exposed to microgravity have visual acuity degradation --more than 30% of astronauts returning from space shuttle missions and 80% who returned from the ISS. However, astronauts thought little of it and didn't report it, so not much has been known until now.

"Visual impairment intracranial pressure syndrome" results from pressure changes caused by weightlessness. Microgravity causes fluid to move away from the extremities and towards the head. The increase in intracranial pressure compresses the optic nerve. Mao showed an image of the flattening of an astronaut's eye. The high intraocular pressure also causes folding of the choroid, a blood vessel-filled layer of the eye next to the retina. These changes can lead to retinal vascular disease, including macular degeneration and retinopathy—conditions that also happen in people with high blood pressure, diabetes, and/or cardiovascular disease.

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Research is under way to assess and minimize the risk of visual impairment in astronauts, and the knowledge will also be applied toward prevention or treatment of these eye diseases on Earth.

However, most of the eye research is being done in mice, on the ground and in space. Ground-based experiments were performed at Loma Linda's proton center to simulate solar particle events. The researchers simulated microgravity conditions by suspending the mice by their hind legs. Mao showed images of damage in the retinas and ocular microvessels of these mice.

In other experiments, mice flown on the STS-135 mission were compared with mice on Earth. More cell death was seen in the eyes of the mice flown on board the shuttle. In another space-based study, in the Japanese (JAXA) facility on the ISS, some of the mice spent 35 days in a centrifuge to simulate gravity. They had less eye damage. Further experiments showed significant changes in protein expression only in the mice exposed to microgravity, but not those at 1g. Another experiment was the 12th SpaceX ISS resupply mission, a 30-day mission. Mice on board showed decreases in the sizes of parts of their eyes, as well as increased intraocular pressure, compared with mice on Earth.

In a still longer experiment, the 20th SpaceX resupply mission will show how mice adapted to flight over 60 days. This experiment will examine long-term retinal degeneration and effects of flight on the ISS, but also assess the effects of readaptation to Earth. The experiment will test the effects of a novel therapy to protect against oxidative damage in the retina.

Some description of the research is available here: https://go.nasa.gov/2I0GZYs

Lastly, Dr. Mary Kearns-Jonker spoke about studies investigating the impact of spaceflight on cardiovascular stem cells, to understand how spaceflight damages the heart and how that damage can be prevented or reversed.

In astronauts on long-term missions, heart function becomes impaired: heart tissue atrophies, or dies, and the heart's rhythm is impaired. One characteristic of heart cells in microgravity is accelerated aging, which means the cells are less capable of growth, repair and regeneration. To understand how this happens, Kearns-Jonker and her group are studying the growth and function of cardiovascular stem cells in space. Stem cells are cells that are capable of developing into cells with more specialized functions, so that tissues and organs can form and be repaired. The group compared stem cells from adults with those of newborns to understand how microgravity's effects vary with age.

In one set of experiments, cells were grown on Earth in a clinostat, or a centrifuge that cancels out the force of gravity. Other experiments were performed on the ISS.

Pecaut and Kearns-Jonker found out that the adult cardiovascular stem cells showed greater signs of developing different functions in microgravity. However, neonatal stem cells did not. In fact, they showed signs of regressing to earlier stages of development. An earlier developmental state is desirable, because faster cell growth is needed to repair tissues. Indeed, the scientists found that cell proliferation increased in both adult and neonate stem cells, but even more so in the neonates.

Migration also increased in both types of cells, which is important because cell migration is important in the formation and organization of tissues.

To understand how this happened, the scientists looked for molecules that control cell regeneration that are influenced by microgravity in neonatal stem cells. The expression of these molecules, or "growth factors," was elevated on the ISS. They also found changes in a large number of certain microRNAs, or molecules associated with earlier stages of stem cell growth. This meant that there was more cell proliferation and DNA repair.

In cells grown in simulated microgravity, the scientists found changes in the expression of a protein called RhoA, which helps to control cell growth, proliferation, and structure changes in response to mechanical stress. In addition, these proteins cause changes in calcium signaling.

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This was an important finding because calcium is required for muscle growth, function, development and repair, cell structure, cell division, and migration to create tissue structures. Jonker-Kearns noted that for example, calcium is needed for cell engraftment following transplantation. In further experiments aboard the ISS, they found that calcium signaling was affected; in particular, signals needed for the early stages of stem cell development.

In a particular population of early-stage cells, found in the sinoatrial node (the pacemaker of the heart), spaceflight activated gene expression both in simulated microgravity and on board the ISS. The scientists then took stem cells in normal Earth gravity and caused them to have similar changes in gene expression. They found that these cells responded similarly to the cells in microgravity. This has important implications: we can manipulate these signals on Earth to promote heart tissue regeneration and repair. This knowledge can be used to maintain the heart health of astronauts as well as restore any loss of heart tissue, and can also be used in regenerative medicine for all cardiovascular patients.

More information on the research on cardiac stem cells in microgravity can be found here:
https://go.nasa.gov/2JLVc0U

Course Offering: Space Mission Engineering: The New SMAD

Microcosm will be offering its "Space Mission Engineering: The New SMAD" course this summer, taught by Dr. James Wertz. The Space Mission Engineering course provides an integrated "big picture" perspective of cost-effective space mission design application to commercial, civil, and military professionals. Consistent with meeting mission demands, the course places a substantial emphasis on low-cost missions and current methodologies for reducing cost. Dr. Wertz's extensive experience and work throughout the space community provides additional and invaluable practical examples to the participants to support their application of the course material.

When: July 23 – 27, 2018
Where: At Microcosm's facility in Torrance, CA
Instructor: Dr. James Wertz
Course Location:
Microcosm, Inc.
3111 Lomita Blvd.
Torrance, CA 90505
Tel: 310-539-2306

PLEASE SEE THE END OF THIS NEWSLETTER FOR REGISTRATION FORM AND LIST OF TOPICS

Class schedule follows:

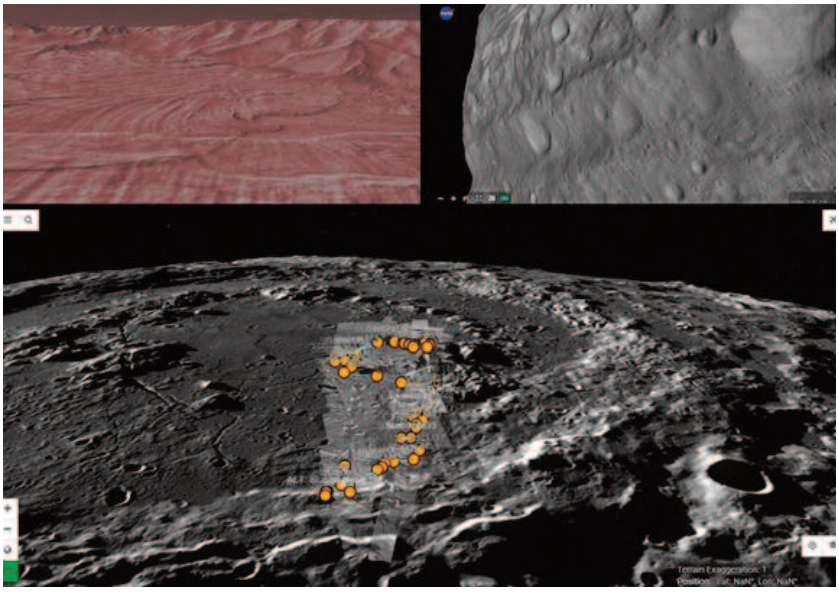
Monday, July 23	8:00 a.m. - 5:00 p.m.
Tuesday, July 24	8:00 a.m. - 5:00 p.m.
Wednesday, July 25	8:00 a.m. - 5:00 p.m.
Thursday, July 26	8:00 a.m. - 5:00 p.m.
Friday, July 27	8:00 a.m. - 3:00 p.m.

Each participant will receive a copy of "Space Mission Engineering: The New SMAD," a copy of the presentation viewgraphs, a complete set of mission engineering equations implemented in Excel for immediate application, and additional supplementary material.

AIAA LA-LV August Dinner Meeting
NASA Solar Systems Imaging / Mapping, Lunar and Planetary Mapping, and Modeling with NASA's Solar System Treks Portals
by Brian H. Day
NASA Solar System Exploration Research Virtual Institute
Lead for Citizen Science, Planetary Mapping, and Outreach
Thursday, August 9, 5:30 pm – 9:30 pm

Click here to register and for more information:
http://events.r20.constantcontact.com/register/event?oeidk=a07efexn45061c703a9&llr=p9tbt6cab
S-Cafe, Northrop Grumman Aerospace Systems
Simon Ramo Drive, Redondo Beach, CA 90278

Contact for more information:
LA Section Events/Programs Chair
AIAA Los Angeles - Las Vegas Section
949-426-8175
events.aiaalalv@gmail.com



Lunar and Planetary Mapping and Modeling with NASA's Solar System Treks Portals comprise a suite of web-based lunar and planetary mapping and modeling portals. They provide interactive visualization and analysis tools that enable mission planners, planetary scientists, students, and the general public to access mapped data products from past and current missions for the Moon, Mars, and Vesta. They include the Moon Trek (https://mooontrek.jpl.nasa.gov), Mars Trek (https://marstrek.jpl.nasa.gov), and Vesta Trek (https://vestatrek.jpl.nasa.gov) portals. New portals for additional planetary bodies are in development. The online Web portals allow anyone with access to a computer to search through and view a vast number of images and other digital products. As a web-based application, the Treks do not require users to purchase or install any software beyond current web browsers. The portals provide the ability to create interactive 3D flyovers of planetary terrain and generate files for 3D printing of user-selected areas. Demonstration of the portals will include a tour of potential landing sites being considered for future missions to the Moon and Mars, as well as an examination of how the giant asteroid Vesta was almost destroyed by cosmic impacts.

Come join us to:

- Learn more about the ongoing efforts to map our Solar System
- Learn more about the importance of Solar System mapping
- Learn more about the techniques involved in this fantastic NASA effort
- Enjoy the exciting and breathtaking images & mapping systems
- Network with the speaker, and other aerospace professionals, scientists, engineers, & business professionals, along with some educators, students, and enthusiasts