



NAVAL POSTGRADUATE SCHOOL

IN REVIEW

MAGAZINE

APRIL 2013

POWER PLAY

No matter what has powered the fleet throughout history, visionary leaders have steered the service through innovation and change. With energy security more critical than ever, the Navy turns to NPS to create the next generation of energy-intelligent officers.

INSIDE:

Chief of Naval Operations Adm. Greenert
Details the Force During All-Hands Call

Operations Research Department Awarded
Prestigious INFORMS Smith Prize

Enlisted Special Forces Student Creates
Inspired Intelligence Innovation



Rear Adm. Jan E. Tighe
Interim President
Naval Postgraduate School

“NPS is an outstanding educational institution like no other, with a devoted world-class faculty providing a one-of-a-kind, advanced education to the wildly motivated students who will matriculate to be the future leaders of the Navy, DOD, state, local and tribal governments and first responders, and to our allied countries around the world.”

It's hard to believe it has been five months since I returned to Monterey. Time has gone by quickly and yet we have come so far. These past months have only re-enforced what I already knew ... NPS is an outstanding educational institution like no other, with a devoted world-class faculty providing a one-of-a-kind, advanced education to the wildly motivated students who will matriculate to be the future leaders of the Navy, DOD, state, local and tribal governments and first responders, and to our allied countries around the world.

With the recent selection of a permanent Provost, Dr. Doug Hensler, stability and long term leadership of the institution is beginning to take form. I am very happy for the campus community and excited for the future of NPS. We still have a great deal of work ahead of us to improve our business processes, but our teams have made great strides through our teams working the Inspector General Recommendations. We have a sense of urgency in continuing our progress as we must continue to build upon our accomplishments to date and not slow down as we transition in the new leadership

In this edition of In Review, we focus on the importance of energy independence and the need to generate a cultural shift in the Navy through education. The vulnerability of energy resources for our operations is a weakness SECNAV has committed to resolving. He has turned to NPS to provide a cohesive critical look and research effort to begin resolving and bolstering our energy security. I encourage you to read about what NPS is doing to create energy-intelligent naval officers.

I'm happy but not surprised to report that the Naval Postgraduate School Department of Operations Research (OR) has been selected by the Institute for Operations Research and the Management Sciences (INFORMS) as the 2013 winner of the UPS George D. Smith Prize competition. One recent example of OR relevant research is the Replenishment at Sea Planner, developed by faculty and former students. The Replenishment at Sea Planner optimizes the refueling and supply replenishment process for our fleet at sea. This optimization is one of the most important aspects of maintaining a persistent forward deployed presence. Our partners at the Military Sealift Command are implementing the planning tool with the U.S. 5th Fleet. While the results are still being analyzed, we are anticipating significant cost savings and efficiencies from this work.

The NPS team is running hard and fast to continue to deliver on our educational mission while improving our business process. We will resolve the IG Recommendations as soon as possible and be better for it. For me, NPS will always be a magical place where opportunity, possibilities and measurable outcomes abound. It is my sincere honor and privilege to serve NPS and the tremendous men and women that compose it.



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On The Cover

The Navy's fleet has been powered by a broad spectrum of sources over the past two centuries, from wind and coal, to diesel and nuclear. The service has set a determined course for energy independence, a true cultural change in how the Navy, Marine Corps view energy, but to achieve that change, they will a new breed of energy-intelligent officer.

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Student Leads Development of Cyber Warriors Professional Association

An NPS doctoral student, U.S. Army Capt. Joseph Billingsley, is building the military's first cyber warfare professionals association.

The Military Cyber Professionals Association (MCPA) will provide a professional home for the burgeoning cyber operations community. The association's Monterey chapter will be both a prototype and the association's flagship as it branches out to build a national organization.

"Monterey is a natural home for the association due to its proximity to NPS, DLI [Defense Language Institute], Silicon Valley, other defense personnel, and the interest in

cyber initiatives," said Billingsley.

"The cyber domain matters because the prosperity and security of our nation depends on it," he added. "It's hard to imagine a single American business or military unit that does not rely on connectivity to accomplish at least some of its core functions. That trend is not expected to change any time soon."

Billingsley, an Army strategist with a background in signal intelligence, was selected by the U.S. Army's Cyber Command to pursue graduate cyber operations studies at NPS. He is currently pursuing a master's degree in cyber systems and operations, and a Ph.D. in information sciences.

Professional military associations, like the one envisioned by



From left, Army Capt. Joseph Billingsley and retired Air Force Lt. Col. Wayne Shaw

Billingsley, provide a venue for military professionals to share lessons learned and recognize each other's achievements. They also serve a social role, offering camaraderie and fellowship to highly-specialized groups that share jargon and experiences often foreign to those outside their communities.

NPS Student Council Takes Active Role in Community Philanthropy

For a number of students on campus, being a part of the NPS community provides an opportunity to make a difference beyond the campus gates, with volunteerism and community outreach one of the major ongoing goals of the university's student-led President's Student Council.

A growing number of students have been pitching in to help the Veterans Transition Center (VTC) through donations of clothes and household goods. The council became involved with the VTC under the direction of Air Force Maj. Ray Erickson, who put out a call for donations to be used in assisting homeless veterans and their families to find housing and services for long-term stability.

"We, as a group, decided that we wanted to step up the student council efforts on philanthropy and giving time to serving the community," he said. "But we need to find out where can we best serve the community as a student body."

Erickson became familiar with the charity after noting a significant number of homeless men and women around town. After some research, he says he learned that as

high as 60 percent of homeless individuals in any given state are veterans. Knowing that, the PSC felt drawn to help their fellow service members.

"We gave them so much stuff that they had nowhere to put it. And they had to ask us to put a time-out on bringing donations for now until they could make space for it all. They even had to give some of the donations away to other organizations in town, so that was good news," Erickson said.

NPS Alumnus Turns Off-Duty Time Into Profitable Business

Marine Corps Maj. Robert Dyer, a former special forces operator and a financial management graduate from NPS, is currently applying his degree teaching economics to future officers at the U.S. Naval Academy.

But he has turned his off-time into developing a liquid nutritional supplement designed with input from U.S. special forces operators called RuckPack. Dyer began developing the product while deployed to Afghanistan as a forward air controller with the Marine Special Operations Command.



Marine Corps Maj. Robert Dyer

"It wasn't so much my forward air controller tour that created RuckPack as it was the men I was proudly serving with ... My life existed to support those ground forces. When they needed something that was a healthy alternative to other energy drinks, I got to work," said Dyer. "If even a couple service members perform better because of something I helped to create, the time was well spent."

Dyer's product has already gar-

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EMBA Program's Latest Class Includes FBI Contingent

Following last year's NASA student cohort, NPS' Executive Master of Business Administration (EMBA) program is again proving the degree applies across a broad spectrum of federal agencies.

When this year's class gathered for on-campus orientation in March, the current group included yet another contingent from outside the DOD, this time from the Federal Bureau of Investigation (FBI).

As a distance-learning effort, the EMBA program's orientation allows the students to develop immediate relationships, to share and exchange career experiences, in preparation for their work in teams.

"Comingling with people from the Department of Defense has shone a different light on problems that I don't necessarily come across working for the Department of Justice," said Rachele Salvo, a budget analyst. "It's interesting to learn about what they experience, and to share the things that we experience, while comparing how those things match up."

Retired Navy Cmdr. William D. Hatch manages the EMBA program, which allows students to carry out their duties at their full-time jobs along with attending class part time.

"After orientation here at NPS, the students return to their site locations where they work four days a week and attend class once a week," Hatch said. "They are taught two back-to-back courses using video teleconferencing (VTC).

"VTC is the next best thing to physically sitting in a classroom," he continued. "As an educator, it's my job to make sure that our methods of



Employees from the Federal Bureau of Investigation

teaching are effective. With VTC, we can ensure that the students walk away with the information that they will need to be successful."

The success of the EMBA program at organizations like NASA, and now the FBI, has NPS looking to work with other federal agencies and other branches of the armed forces as well.

"Working with other federal agencies exposes students and instructors to a culture that we may not have thought about," said Dr. Bill Gates, Dean of the Graduate School of Business and Public Policy. "Bringing in students from NASA, the FBI, the Veteran's Association — military and civilians — enhances the richness of the experience.

"Students of the current class benefit by this, but in addition, future students to come benefit as well because our instructors are exposed to these different experiences," Gates added.

nered considerable attention. He appeared on season four of Shark Tank, a television program where contestants pitch their business ideas to a group of real millionaire and billionaire investors. Dyer was one of the few contestants selected by "sharks" Kevin O'Leary & Robert Herjavec. They not only accepted Dyer's pitch, they doubled the amount of money Dyer asked for.

Student, Faculty Team Explores Littoral Operations, Tactics

Students at NPS have spent several months on a series of exercises designed to test the combat and logistical capabilities of the Navy's newest class of vessels, the Littoral Combat Ship (LCS).

The exercises began with a complex wargame led by operations research Senior Lecturer, retired Army Col. Jeff Appleget, and have progressed into a formal campaign analysis led by NPS Professor of Practice, retired Navy Capt. Jeff Kline.

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Appleget teaches his students the art of building and fighting complex wargames designed to test tactics, strategy and emerging technologies. NPS' recently established Littoral Operations Center (LOC) drew upon Appleget's and his students' operational experi-



Retired Army Col. Jeff Appleget and several of his students hold a map of Gotland Island off the Swedish coast. The island was the focal point of a detailed wargame and campaign analysis exercise examining operations tactics of the new Littoral Combat Ship.

ences to understand how to best utilize the LCS.

"These games are starting to reveal what the future Navy is going to look like," said Appleget, who played a key role in the establishment of

the university's Littoral Operations Center (see *In Review*, Jan '13).

The combination of student experiences, including international students' expertise, and scholarly research makes the recent exercises exceedingly valuable to future naval operations. According to re-

"NPS' Littoral Operations Center is the perfect example of what we do well and nobody else can do ... Our center has a research arm, and a teaching arm," said Hughes. "There is nothing like NPS research, our blend of military students and both civilian and military faculty give us a decisive edge."

"The students that we work with are doing directly-applied research and are making direct contributions in a manner that cannot be done anywhere else," added Kline. "Our counterparts lack the operational experience. If you don't have the expertise that our students bring, you end up with a guy in a white coat asking abstract questions that do not directly impact current operations."

Marine Corps Students Develop Mentoring Program with Local School

The Motivating Others Through Outreach (MOTO) pro-

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NPS Senior Lecturer, retired Navy Lt. Cmdr. Christopher Eagle

NPS Participates in Annual Cyber Defense Exercise

NPS Senior Lecturer, retired Navy Lt. Cmdr. Christopher Eagle, is leading an NPS team in the annual National Security Agency hosted Cyber Defense Exercise, which pits members of U.S. and Canadian service academies against each other in a battle to defend against a cyber threat.

"The object of the game is to keep the adversary out," said Eagle. "The NSA attacks us using all of their network tools."

Exercise participants must establish a working network and then defend it from multiple cyber attacks. While defending their networks, students must also ensure that network confidentiality and integrity are maintained.

"This exercise is a great chance to apply some of the things that we have learned in the classroom to a real-world, time-sensitive environment," said Navy civilian Ryan Craven.

"I look at the exercise from the standpoint of being able to take practical lessons learned and interact with people from different skill levels and backgrounds," added Lt. Billy Brinkmeyer.

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gram, the brainchild of Marine Corps Capt. Kimberly Julka, has a group of Marine students working with nearby Central Coast High School to reach out to local teens.

“Upon arriving in Monterey, I began searching for a way to give back to the people who have, and continue to, show the military and their families unwavering support,” said Julka. “MOTO is only one opportunity that we as students at NPS can use to contribute posi-



Marine Corps Capt. Kimberly Julka, center, and the MOTO team

tively to the lives of local youth.”

NPS Senior Marine Corps Representative Col. Mitchell McCarthy has applauded Julka and her efforts.

“Capt. Julka is a force of nature,” said McCarthy. “Everything she does, she does big, [and] that is our hope for this program. We hope it will start out small and continue to grow and make a lasting impact upon the community.”

Central Coast High School Assistant Principal Manuel Nunez has equally high hopes for the program as well.

“We are excited to partner with a prestigious professional organization like NPS... We appreciate their great efforts to reach out to the community,” said Nunez. “We are excited to see the results of the relationships being built — there’s so much potential.”

Assistant Superintendent for Educational Options Kevin McClelland is also hopeful.

“MOTO has exceeded all expectations... The dedication and enthusiasm shown by the volunteers is reflected positively in the

students attitudes,” said McClelland. “We are establishing a great platform from which we can build on for the next school year.”

Renowned Inventor Talks Alternative Energy with NPS Students

Tesla Motors co-founder Martin Eberhard spent a day on campus to provide a guest lecture through the Defense Energy program’s weekly lecture series.

“Eberhard’s presentation was

well presented and insightful,” said Army Maj. Andrew Johannes, a mechanical engineering doctoral student conducting research into semi-solid flow cell batteries at the university. “His focus on outcome, not a specific technology or chemistry, when coming up with solutions to energy-related problems, was my biggest take away.”



Tesla Motors co-founder Martin Eberhard, right

“We need to think about our fossil fuels as precious resources, and not just throw them away... The energy density of liquid fuels is very high and we should conserve their use for moving freight and aircraft,” Eberhard added.

Army Civil Affairs Leader Challenges NPS Students

Commanding General of the U.S. Army Civil Affairs and Psychological Operations Command (Airborne), Army Reserve Maj. Gen. Jeffrey A. Jacobs, met with students pursuing studies in Stability, Security and Development in Complex Operations (SSDCO) during a campus visit.

The hybrid graduate certificate program is tailored specifically to meet the needs of both civil affairs and psychological operations professionals, especially reservists.

“This is the first graduate program of its kind... It is a hybrid of traditional and distance learning courses that meets the needs of reserve officers,” said Assistant Professor Karen Guttieri. “Reservists are often at a disadvantage, compared to their active duty counterparts, due to the limitations of time and geography.”

Jacobs discussed the importance of advanced civil affairs education to military operations and its inherent value to combatant commanders.

“What you are doing here is

critically important, this is about education over training,” said Jacobs. “You have to figure out how to get the knowledge that you are learning here, injected into your commander’s planning cycle... It is our job to get them to think about civil affairs.”

Jacobs called upon SSDCO students to apply the advanced concepts that they are studying and to become agents of change within their own organizations. “You are the agents of change for civil affairs in the Army,” said Jacobs.

CYBERCOM Deputy Commander Reviews CSO Program

Deputy Commander of the U.S. Cyber Command, Marine Corps Lt. Gen. Jon M. Davis, was briefed by faculty and select students from the cyber systems and operations (CSO) program in the Information Dominance Center for Excellence, Feb. 27. Davis received an update on network-hacking countermeasures that have yielded promising results in preliminary testing.

Davis, an NPS alumnus, spoke of the importance of the university’s cyber warfare research, and the need to build a cadre of professional cyber experts to protect U.S. interests.

“This school has strategic value to our nation,” said Davis. “This is a critical time... We are going to need 6,000 people in the next three years to build a cyber force.”



Marine Corps Lt. Gen. Jon M. Davis

The U.S. Cyber Command is responsible for synchronizing warfighting efforts to defend the information security environment. Davis has served as deputy commander since July 2012. **IR**

NPS Announces the Appointment of New Provost

Dr. Douglas A. Hensler has been selected to serve as the 14th provost of the Naval Postgraduate School the university announced April 11.

“Serving as Chief Academic Officer at NPS is a true honor and Janie and I are looking forward to our move and the challenges to come,” said Hensler. “NPS is a very unique graduate institution and the opportunity to serve in a role supporting our national security is one that we cherish.”

Hensler is an accomplished academic and industry leader with deep ties to both education and the global business community. He served on the Board of Directors of the Wichita Business Coalition for Health Care, the UK-based GSE Research advisory board, and several editorial boards. He also has a lengthy background with the Navy, and notes the experience should prove valuable in joining NPS.

“While in industry, I was involved with Navy nuclear programs supporting aircraft carriers, destroyers and submarines as well as a defense satellite launch vehicle,” said Hensler. “This preparation provides not only a familiarity with the Navy, but a deep-seated understanding of the importance of excellence in what we do at NPS.”

Secretary of the Navy Ray Mabus welcomed Hensler to the prestigious institution, and added that he looked forward to his leadership for NPS.

“For more than a century, the Naval Postgraduate School has provided high-quality, relevant and unique advanced education and research opportunities that increase the combat effectiveness of the Naval Services, other Armed Forces of the U.S. and our partners, and enhance our national security,” said Mabus. “I appreciate Admiral Tighe’s leadership during this time of transition and welcome Dr. Hensler as we begin the next chapter in this storied institution’s history.”

Hensler holds a Ph.D. in finance from the University of Washington, an MBA from the University of Portland and a BSE in Aerospace and Mechanical Sciences from Princeton University. He comes to NPS from Wichita State University where he has served for the past five years as dean of the W. Frank Barton School of Business.

While at Wichita State, Hensler led a corrective action to secure reaccreditation from



NPS Provost Dr. Douglas A. Hensler

the Association to Advance Collegiate Schools of Business. He also successfully led an effort to secure increased funding for the business school and led a cultural transition laced with confidence and optimism. Despite his many accomplishments, Hensler views his upcoming NPS assignment as a major career milestone.

“The NPS family includes some of the greatest minds in the world that are being applied to keeping our nation safe and secure. The opportunity to work with these colleagues is not just an honor, it is also one that brings to bear the totality of my career,” said Hensler.

“Our national security is heavily reliant on well-educated military officers and on our ability as a nation to innovate. These are key areas where NPS, a category-of-one institution, excels,” continued Hensler.

NPS Interim President Rear Adm. Jan E. Tighe expressed her appreciation to the members of the Provost Search Committee for their diligence and dedication in finding the right person to serve NPS and the Navy.

“The campus community’s sustained involvement throughout the search has been a crucial ingredient in the successful effort to recruit a new provost. Dr. Hensler’s background and management experience will no doubt contribute significantly to enhancing a NPS’ effectiveness as, together, we continue to pursue our educational mission,” she added.

NPS Faculty, Staff Participate in Local Middle School Science Fair

Defense Resources Management Institute Associate Professor Natalie Webb helped recruit NPS military staff to participate in the nearby International School of Monterey’s 7th and 8th grade science fair, Feb. 21.

Marine Corps Staff Deputy for Research, Capt. Anthony Pollman, was one such participant, serving as a guest judge at the event to the applause of fair organizers.

“Our students are using the ISM fair to prepare themselves for the Monterey County Science Fair, March 8–10,” said ISM Administrator Alex Hofsteen. “Parent judges from NPS were a great help.”

The ISM routinely reaches out to parents with science backgrounds for assistance, and Webb, a parent at the school, answered the call.

“Natalie knew that we were coming up short on the needed number of science fair judges and put out the word to her colleagues,” said Hofsteen. “NPS volunteerism is a welcome development.”

Faculty-Led CRUSER Initiative Reaches Membership Milestone

NPS’ Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) recently reached a program milestone by signing up its 1,000th member.

CRUSER began just two years ago with seven members, and has since ballooned into a clearinghouse of sorts that provides both a collaborative environment and a community of interest for the advancement of unmanned systems education and research.

“In February 2011, Under Secretary of the Navy Robert Work charged NPS to create a DOD-wide community of interest to exchange research and experimentation results for unmanned systems,” said retired Navy Capt. Carol J. O’Neal, director of CRUSER concept

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generation and innovation.

CRUSER's interests, and those of its members, are far-reaching and intricately detailed. The organization is not just a place for abstract theory, but rather, its research and education are grounded in the Navy's most critical missions and are looking for workable solutions to Navy, Marine Corps, and defense-related problems.

"CRUSER is an inclusive com-



Retired Navy Capt. Jeff Kline

munity ... It encompasses successful research, education and experimentation efforts in unmanned systems currently ongoing at NPS and across the naval enterprise," said retired Navy Capt. and NPS Professor of Practice Jeff Kline, who led the effort for its first two years.

Members of the CRUSER community include researchers, students past and present, faculty, members from across all branches of the military, several government agencies, industry, other academic institutions and beyond.

Business School Sets Up Virtual Thesis Day

Faculty and staff in NPS' Graduate School of Business and Public Policy overcame current travel limitations by setting up the first-ever virtual thesis day, March 11.

A frequent event, Thesis Day

provides an opportunity for select top-performing students to present their research to senior Department of the Navy leaders. But this year, student presentations were held via live video teleconference to Navy leadership, and at multiple locations.

"This smooth and trouble free, first fully-virtual thesis day event may have ensured that this is done for the foreseeable future," said N1 Senior Program Manager Wayne Wagner, who oversees research activities related to the Navy's Office of Manpower, Personnel, Training and Education.

The occasion also marks the presentation of the Chief of Naval Personnel (CNP) Award for Academic Excellence in Manpower, Personnel and Training Analysis.

Cmdr. Gary Lazzaro was honored with the award for his thesis

titled, "Manpower Requirements Estimation for Unmanned Carrier Launched Airborne and Strike Squadrons." The CNP award is presented to a graduating student who has demonstrated academic excellence and leadership potential in the area of Manpower Systems Analysis.

Distinguished Professor Recognized for 25 Years of Service

Distinguished Professor Emeritus Thomas Bruneau of the NPS Department of National Security Affairs (NSA) was recognized for his 25 years of service to the Navy during a short ceremony, March 7.

"We are here to honor a great guy who probably hired most of the people in this room," said acting NSA department chair, Dr. Harold Trinkunas.

Bruneau has a storied career at



Distinguished Professor Emeritus Thomas Bruneau

NPS, serving as Chair of the NSA department and Director of the Center for Civil-Military Relations during his career. He is a noted expert on Latin American politics, particularly Brazilian politics, and he has written extensively on issues related to civil-military relations and democracies.

He also counseled countless students, and served as thesis adviser for quite a few throughout his tenure on campus, including Commander of the U.S. Special Operations Command, Adm. William McRaven.

Having officially retired in late February, Bruneau notes that he will continue to have an active presence at NPS, serving on thesis committees as well as periodically teaching classes.

"I had been a professor for 18 years before joining NPS in 1987," he said. "Retirement for me will probably not be very different from my long employment as a U.S. government employee."

Robotics Expert Wins 2013 Hamming Interdisciplinary Achievement Award

Systems Engineering Assistant Professor Dr. Timothy Chung was honored as the recipient of the 2013 Richard W. Hamming Annual Faculty Award for Interdisciplinary Achievement during the Winter Quarter Awards Ceremony, March 19.

"It's an incredible honor, and a testament to the types of research and opportunities that our stu-

dents provide," said Chung. This is a good reminder that it's not about the departments our students specialize in, but the mission as a whole, he added.

The annual faculty award is named for NPS Distinguished Professor Emeritus Dr. Richard W. Hamming, and highlights a faculty member that demonstrates commitment to interdisciplinary scholarship and exceptional teaching skills. NPS Acting Provost Dr. O. Douglas Moses emphasized Chung's far-reaching and innovative accomplishments in announcing the selection.



Dr. Timothy Chung

"Dr. Chung's commitment to the Naval Postgraduate School's mission is demonstrated by his inspiration for interdisciplinary and collaborative research," said Moses.

NPS' CENETIX Continues Networked Sensor Experiments

NPS researchers are working with local, state, federal and international partners to perfect a series of networked sensors that they hope will help boarding crews detect ship-borne nuclear, biological or chemical (NBC) threats before they reach the shore.

"This is no longer just an experiment, we are implementing sensor technology now," said NPS Associate Professor Alex Bordetsky. "Homeland Security has already purchased networked detection systems."

Bordetsky and his associates are seeking to perfect a network that connects port security and other law enforcement officials with experts that can help them evalu-

ate potential threats. "The spectra [raw data] are difficult to decipher, you need an expert that can interpret the data," said Bordetsky.

The latest CENETIX experimentation was part of an effort to create training materials that will increase the ability of security officials to connect to the network and work with NBC experts to prevent a future attack upon the homeland.



CENETIX Lab

"The environment is highly dynamic, patrol crews need to learn to not just push the button, but to be able to utilize the appropriate network tools as well," said Bordetsky.

NPS Professor Receives Top Civilian Service Award

NPS Interim President Rear Adm. Jan Tighe presented Professor Curtis Collins with the Navy's second highest civilian honor, the Navy Superior Civilian Service Award, during a ceremony celebrating Collins' retirement and 41 years of government service, Feb. 6. Collins spent 25 of his 41 years of federal service as an NPS professor.

"I became affiliated with the Navy in 1958 when I reported to the Merchant Marine Academy," said Collins. "It's been really great working here at NPS. The students are willing and hard working, the faculty really knows what it's doing, and the institution is nationally and internationally recognized."

"I first met him [Collins] when he came to NPS as a professor and chair of the university's oceanography department in 1987," said current NPS Department of Oceanography Chair, Dr. Peter Chu. "He is a great leader, he contributed a lot to the oceanography community and the department ... He really works hard to teach his students, and

mentor fellow faculty members. I benefited greatly from working with him."

Although the ceremony marked the end of Collins' full-time teaching career at NPS, he will return to the university as an emeritus professor to continue his research.

Defense Analysis Professor's Book Opens Windows Into Dark Networks

NPS Department of Defense Analysis Assistant Professor Sean Everton's recently released book, "Disrupting Dark Networks," is the first of its kind to apply his Common Operational Research Environment (CORE) Lab's methodologies into social network site analysis.

"After 9/11, analysts increasingly looked to social network analysis as a way of disrupting dark networks. Unfortunately, they often focused on metrics that help identify key actors without considering ... the various strategies [kinetic and non-kinetic] available to disrupt them," said Everton. "A primary goal of this book is to illustrate how social network analysis can inform the crafting of a wide variety of strategies for disrupting dark networks."



Assistant Professor Sean Everton

Everton is well versed in the lab's techniques which he himself helped develop while serving as the CORE Lab Co-director. He teaches defense analysis (DA) courses on both the tracking and disrupting of dark networks and dynamic network analysis. His work is being used by U.S. and international DA students to reveal criminal and insurgent groups within their respective areas of responsibility. **IR**

Systems Engineering Body of Knowledge Honored with Prestigious INCOSE Award

NPS Professor of Systems Engineering (SE), Dr. Dave Olwell, and his colleague, Stevens Institute of Technology Distinguished Research Professor Dr. Art Pyster, earned Product of the Year honors from the International Council on Systems Engineering (INCOSE) for their Body of Knowledge and Curriculum to Advance Systems Engineering (BKCASE) project.

The Product of the Year Award is given annually to the INCOSE product that provides the most significant value to its stakeholders.

"The [BKCASE] team has done an outstanding job in the development of this SE repository of information and training guidance," said INCOSE President John Thomas. "The world's systems thinkers and engineers are already benefiting from these efforts."

Launched in 2009, the BKCASE project involved the creation of a Systems Engineering Body of Knowledge (SEBoK) as well as the creation of an Advanced Graduate Reference Curriculum for Systems Engineering (GRCSE).

"This project will have a wide-ranging and deep effect on the practice of systems engineering," said Olwell. "It was completed on time, on budget, and exceeded expectations."

SEBoK, published Sept. 2012, is the recognized and authoritative source of information on the systems engineering discipline, consisting of hundreds of articles, glossary terms and links to resources.

"With the SEBoK, we organized the knowledge for systems engineering so it is understandable and has a clear taxonomy and structure," said Pyster. "There are articles about each major topic in the discipline, more articles on how they relate to each other, and information on the primary references for systems engineering."

GRCSE, which was published in Dec. 2012, provides a standardized set of curriculum and content recommendations to align academia with current systems engineering research and to guide the development and improvement of graduate degree programs in systems engineering.

Both projects are published online, with the SEBoK publishing in wiki format, that enables content to be easily updated, constantly kept fresh, and reflective of the latest knowledge and best practices from the systems engineering community.

"The success is due first to the leadership and vision of my colleague Art Pyster," said Olwell. "And also to the tremendous support we received from our partners, sponsors, and most especially, our 70 volunteer authors."



NPS Professor of Systems Engineering, Dr. Dave Olwell, left, Mr. John Thomas, President of INCOSE, center, and Dr. Art Pyster



Students demonstrate a remote-controlled quadrotor aerial vehicle during Joint Interagency Field Experiment (JIFX) 12-2, a broad, interagency test and evaluation program for technologies for possible operational and first responder use.

NPS Continues Collaborative, Interagency Field Experimentation Program

By MC1 Grant P. Ammon

STUDENTS, FACULTY AND STAFF from the Naval Postgraduate School conducted Joint Interagency Field Experiment (JIFX) 12-2 with representatives from the Department of Defense's combatant commands (COCOMs), as well as federal, local and state agencies at Camp Roberts, Calif., Feb. 11-14.

Sponsored by the Office of the Secretary of Defense's Joint Operations Support directorate, and the Department of Homeland Security, JIFX is a collaborative field experimentation

program that allows a broad group of students, researchers, defense industry leaders and military members to test, evaluate and collaboratively develop new technologies, as well as define emerging requirements.

"JIFX is a sponsored research program of the Office of the Secretary of Defense's Joint Operations Support directorate," said NPS Department of Information Sciences Associate Professor, Dr. Ray Buettner, director

of field experimentation at NPS.

"They have funded NPS to provide an environment for the combatant commanders — six geographic and three non-geographic — in which they can rapidly evaluate and refine existing requirements and potential-

ly identify new requirements to their capability challenges to the warfighter," he continued.

NPS coordinated the event where graduate students and faculty were able to execute experi-

ments and demonstrate research projects developed at the university.

"I view JIFX as a terrific opportunity for our students, faculty, COCOM partners and other government agencies to come together in an experimental way," said NPS Interim President Rear Adm. Jan E. Tighe. "It's a chance to test out new ideas and innovations, and for our students to actually see it all come together.

"This is exactly the kind of activity that demonstrates NPS' uniquely relevant military education that you can't get at other universities. This is why the country needs a place like the Naval Postgraduate School."

Dr. Ray Buettner

Department of Information Sciences Associate Professor
Director of Field Experimentation

"Student learning is not just theoretical back in the classroom, or even the lab, but here they actually get to do something practical with the knowledge gained while studying at NPS," continued Tighe.

All participants at JIFX had the potential to benefit from the collaborative nature of the field experiment.

"Our NPS students and faculty benefit from JIFX because we're in the middle between bright technologists from the labs, the defense industry, other universities and the warfighter," said Buettner. "This exercise provides militarily-relevant, unique graduate education opportunities for our students.

"The sponsor also benefits because the COCOMs better understand technologies and the potential of those technologies to solve their problems," added Buettner.

The series of field experiments allowed for an open dialogue on technologies demonstrated, and with participation from California's National Guard units, researchers and industry representatives were provided with direct feedback from the warfighters' perspective on the applicability of the technology demonstrated.

"The companies, industry and lab participants benefit because they better understand what the warfighter challenges actually are, and how their particular products need to be changed to meet that," said Buettner.

Of critical importance to the collaborative and exploratory nature of the program is the end users, direct interaction with developmental technologies.

"This environment is pre-acquisition," said Buettner. "There are no sales involved with this experiment. Because we have academics running the environment, it's about research, and not acquisition. We're able to lower the barriers to collaboration."

For NPS student Navy Lt. Chris Guttierrez, who attended JIFX to demonstrate his thesis work on beyond line-of-sight communication equipment based on netted iridium technology, the ability to take his work outside the classroom and into the field was highly beneficial.

"You can get a lot from the classroom, but to really get out and meet other folks that are looking at the same problems that you're interested in is invaluable," said Guttierrez. "This is especially helpful as a thesis student at NPS. We're here doing research on things that might affect the Navy and the military in the future."

The collaboration between COCOM representatives, the defense industry, warfighters, and the technologists working towards solutions to their challenges provided an excellent opportunity to further student learning while contributing solutions to real-world problems.

"This is why we do this field experiment," said Buettner. "It provides students the opportunity to engage in thesis work that not only meets the bar for a master's degree, but also they get to do something that supports the larger effort by supporting the COCOMs and warfighters."

Representatives of agencies from outside of DOD are also benefiting from the support of COCOM participation at JIFX.

"Each of the COCOMs has a requirement to provide defense support to civil authorities," said Buettner. "Often times, we find that the only time those agencies work with the military is in the middle of a disaster. That's too late. You have to build ties and connections to figure out what works and doesn't work before that event."

Many of the technologies demonstrated during JIFX had crossover implications between the DOD and other federal, state and local agencies.

According to Buettner, NPS-hosted exercises like JIFX enhance the quality of education to graduate students, as well as provide solutions to complex problems the nation is facing.

"In my opinion, this is exactly the kind of activity that demonstrates NPS' uniquely relevant military education that you can't get at other universities," said Buettner. "This is why the country needs a place like the Naval Postgraduate School." 

Robotics Takes Center Stage During Annual Research Fair

Robots of every shape, size and purpose dotted the academic quad as the Naval Postgraduate School's Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) once again hosted their annual Robots in the Roses Research Fair, April 11.

The annual event brings the campus community together to spotlight existing research projects throughout every department, encouraging maximum collaboration across the university.

"Robots in the Roses is wonderful because you get a chance to meet interested students and show them some interesting devices," said Steven Jacobs of the physics department. "It's great exposure to the community ... It helps put our department out there and really helps to showcase what we've been working on."

Researchers displayed robotics platforms large and small — everything from bird-like bots that seek out and ride upon thermals, to small, unmanned watercraft capable of sensing threats in harbors.

"Robots in the Roses is an annual event that allows faculty and students to showcase their research in unmanned systems ... and present them to the broader community," said CRUSER Director, retired Navy Capt. Jeff Kline. "It's on one-hand very useful for the students to come out and see the variety of the things that are going on, but it's also very good for the faculty to see what other faculty members are doing in order to find opportunities for collaboration."

NPS' CRUSER provides a collaborative environment and community of interest for the advancement of unmanned systems education and research endeavors across the Navy, Marine Corps and Department of Defense. Along with Robots in the Roses, the group coordinates several innovation workshops in addition to regular campus meetings and communications.



POWER PLAY

By Dale M. Kuska

The military's dependence on fossil fuels is a weakness that must be resolved. Secretary of the Navy Ray Mabus turns to NPS to help generate service-wide change through educating energy-intelligent Navy and Marine Corps officers.



THE NUMBERS ARE STAGGERING.

The U.S. Department of Defense is the single largest consumer of petroleum fuels on the planet, burning up more than \$17 billion in FY11 on ... gas. While aircraft are by far the thirstiest of DOD's assets, the chain of procuring and delivering that fuel, regardless of what's using it, is ripe for exploitation by the enemy.

It's a tragic lesson that has been forcibly learned on the hot sands of the Middle East, where convoy after convoy, largely consisting of fuel trucks, is targeted for attack. And it is the resulting cost in lives that has truly cast a bright light on this glaring vulnerability.

A 2011 study determined that one out of every eight Soldiers wounded or killed in Iraq between 2003 and 2007 was attacked while guarding fuel's supply chain. Similar studies in Afghanistan note that for every 40–50 resupply convoys, one Marine is going to be wounded

or die. The statistics are undeniably unacceptable, and the services have vehemently claimed an end to the fossil fuel reliance of the past.

"Dependence on fossil fuels also makes the Navy vulnerable to price volatility in the global oil market. Every time the price of a barrel of oil goes up a dollar, it costs the Navy \$30 million in additional fuel costs. It is one of our military's chief vulnerabilities," said Secretary of the Navy Ray Mabus.

"Because we pay for those increases from our Operations and Maintenance accounts, price spikes can result in less steaming, flying and training for our Sailors and Marines," Mabus continued. "We must include alternative means of powering the fleet because energy efficiencies and alternative energy will improve combat effectiveness."

The Navy has never shied away from attacking vulnerability through innovation and determination. When legendary Adm. Hyman G. Rickover, then a captain, led the development of naval nuclear propulsion, it was wrought with criticism from the inner defense circles of the late 1940s and '50s, considered too dangerous and too expensive. But the results of the Navy's determination are undeniable, with 80 Navy vessels now powered by nuclear propulsion including every aircraft carrier since Big E, the *USS Enterprise* (CVN-65), was commissioned on November 25, 1961.

Mabus turned to a seasoned leader in the implementation of large-scale energy efficiency initiatives in Deputy Assistant Secretary of the Navy for Energy, Mr. Thomas Hicks, to

play a lead role in developing an implementation strategy for a series of aggressive efficiency and energy independence goals.

"As we look at energy, we see it as a strategic and national security vulnerability. The energy investments we're making both afloat and ashore are really vital to national security," Hicks stressed. "This effort is really about increasing our combat capability, improving our mission effectiveness, and reducing our dependence on volatile fuel markets and increasingly brittle electric grids."

Both Mabus and Hicks emphasize that their efforts are not about a single solution or technology ... More so, it's about a cultural revolution that completely changes the way their services' view energy in every capacity — every operation, every procurement, every base, every Sailor.

"We view culture change as that untapped gold mine of efficiency, cost savings and resource efficiency that we can really take advantage of through a dedicated effort," said Hicks.

"One of the first important steps is happening right there at the Naval Postgraduate School where you're creating curriculum for the future leaders of the Navy and Marine Corps to become well-versed in energy security, technology, policy, and how they are all intertwined together," he added.

"The Navy's partnership with Naval Postgraduate School (NPS) helps prepare our future leaders to integrate energy efficiencies and alternative energy into strategy and operations, which will strengthen our energy

security," Mabus said.

The educational programs Mabus and Hicks refer to are a collection of four existing NPS degrees — operations analysis, electrical engineering, financial management and mechanical engineering — modified to include a specialized track of energy courses on top of their regular coursework. Cohorts of students have already made their way through the curricula, with the first energy students graduating this past March.

In addition, the university has also developed an energy certificate program that has been well received for students outside of the energy cohort, and an executive education program due to kick off this summer for more senior officers. And for students, faculty and staff across the entire campus, a near-weekly lecture series brings energy innovators onto campus to share their own success stories. Collectively, the components all add up to what the institution has coined the Defense Energy program.

And according to retired Navy Cmdr. Mary Sims, Associate Provost who helped develop the program, the effort provides an opportunity for officers at every level to participate in the educational process — something required for true cultural change.

"The Secretary wants to see culture change at the highest levels of the Navy," Sims said. "There's an ethos that travels throughout any organization that has a certain set of ide-

als, concepts, and priorities. SECNAV's goal, and our goal, is that energy becomes a part of that creed.

"If we are successful in leading that culture change, then energy becomes a part of every consideration the Navy has," she added. "It's not something you'll need to introduce or ensure people are doing, it simply becomes natural."

The message is being delivered loud and clear to students in the program, who actively attend the weekly energy seminars organized by mechanical and aerospace engineering

"The Navy's partnership with Naval Postgraduate School helps prepare our future leaders to integrate energy efficiencies and alternative energy into strategy and operations, which will strengthen our energy security."

SECRETARY OF THE NAVY RAY MABUS

Visiting Professor Joe Farmer. Two of this past February's key speakers are playing top leadership roles within the operational units charged with making the Navy and Marine Corps more energy independent.

Navy Energy Coordination Office Director Capt. James Goudreau, and Marine Corps Expeditionary Energy Office (E2O) Director Col. Bob "Brutus" Charette, delivered very different lectures in late February to the contingent of students in the energy program, in addition to interested faculty and students from across campus. But the core of their dis-

Fire and Lightning: The intense light from the flames of an offshore oil platform reflect off the hazy night sky aboard the *USS Higgins* during a lightning storm in the North Arabian Gulf. The platform supplies Iraq with 80% of its GDP and has required protection by the U.S. fleet since the start of the Iraq war in 2003.

cussions, and their goals, are quite similar.

While Goudreau waxed intelligently on energy conservation and innovation, he was also quite emphatic that his passions for conservation were driven not by environmental or political concerns, but rather by a desire to maintain the Navy's ability to accomplish its most critical wartime missions.

"As a military we must prevail in combat, there is no other reason we put on a uniform each day," he said. "Energy translates into warfighting capability now and it translates in the future ... We are having this discussion now, putting scarce resources into this endeavor, because we want to win the fight."

"We're seeding the future out here. The seeds we plant here are going to be the plants that grow in the future, and we want them to grow with energy in mind," added Charette. "That's why we have

this thesis support program ... With students here at NPS, we can get not only a great thesis product, we get the product and the person."

The "product" Charette notes is an integral component to any graduate education program — research. Student, faculty studies into energy-related topics have flourished on campus for decades. One of the school's more notable projects — steaming on convex hulls, a fuel-optimization planner that has achieved significant savings — was initially developed by retired Navy Capt. Jeff Kline and some of

POWER PLAY CONTINUED ON P. 16 >>

ENERGY EFFICIENT = COMBAT EFFECTIVE

The message is loud and clear ... The reliance of the U.S. military on fossil fuels from tumultuous regions of the world is a fundamental weakness that must be resolved. For the Navy and Marine Corps, Secretary Ray Mabus outlined five core energy security goals that would lead his services to mission readiness.

From finding alternative energy sources to seeking smarter acquisition processes, NPS' Defense Energy program, its educational deliverables and innovative research efforts, provide a full force attack on all fronts, playing a lead in role in creating the cultural change needed for the Navy of tomorrow.

SECNAV ENERGY SECURITY GOALS

1. INCREASE ALTERNATIVE ENERGY DEPARTMENT-WIDE

By 2020, 50% of total department energy consumption will come from alternative sources

2. INCREASE ALTERNATIVE ENERGY SOURCES ASHORE

By 2020, at least 50% of shore-based energy requirements will be met by alternative sources; 50% of department installations will be net-zero

3. REDUCE NON-TACTICAL PETROLEUM USE

By 2015, department will reduce petroleum use in vehicles by 50%

4. SAIL THE "GREAT GREEN FLEET"

Department will demonstrate a green strike group in local operations by 2012 and sail it by 2016

5. ENERGY EFFICIENT ACQUISITION

Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings

ENERGY SECURITY IS NATIONAL SECURITY



OF CONVOYS IN AFGHANISTAN ARE DEVOTED TO FUEL TRANSPORTATION

40 MILLION GALLONS IN 2010 PER MONTH FUEL MOVED INTO AFGHANISTAN BY DEFENSE LOGISTICS AGENCY-ENERGY



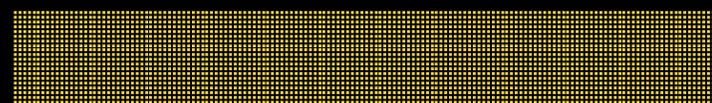
ARMY ESTIMATE OF CASUALTIES IN IRAQ AND AFGHANISTAN RELATED TO GROUND RESUPPLY OPERATIONS

1 IN 24 2003-2007 U.S. ARMY CASUALTY RATE FOR FUEL CONVOYS IN AFGHANISTAN

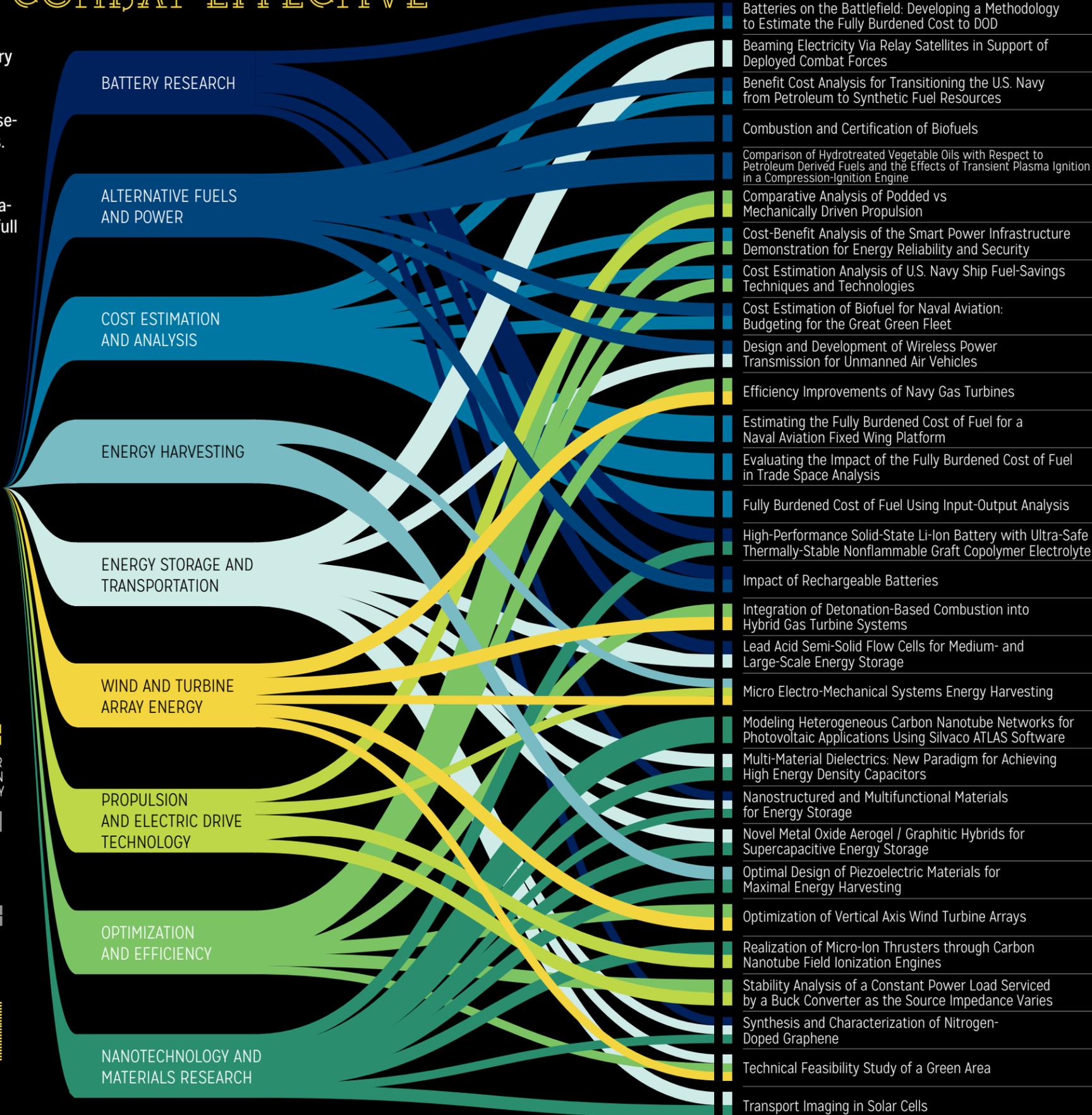


USMC ESTIMATE OF BATTLEFIELD CASUALTIES IN IRAQ AND AFGHANISTAN RELATED TO CONVOY OPERATIONS

1 IN 50 2010 U.S. MARINE CORPS CASUALTY RATE FOR FUEL AND WATER CONVOYS IN AFGHANISTAN



U.S. TROOP AND CONTRACTOR DEATHS OR INJURIES IN IRAQ AND AFGHANISTAN FROM ATTACKS ON FUEL SUPPLY CONVOYS FROM 2003-2007



ENERGY-RELEVANT STUDENT RESEARCH

- Batteries on the Battlefield: Developing a Methodology to Estimate the Fully Burdened Cost to DOD
- Beaming Electricity Via Relay Satellites in Support of Deployed Combat Forces
- Benefit Cost Analysis for Transitioning the U.S. Navy from Petroleum to Synthetic Fuel Resources
- Combustion and Certification of Biofuels
- Comparison of Hydrotreated Vegetable Oils with Respect to Petroleum Derived Fuels and the Effects of Transient Plasma Ignition in a Compression-Ignition Engine
- Comparative Analysis of Podded vs Mechanically Driven Propulsion
- Cost-Benefit Analysis of the Smart Power Infrastructure Demonstration for Energy Reliability and Security
- Cost Estimation Analysis of U.S. Navy Ship Fuel-Savings Techniques and Technologies
- Cost Estimation of Biofuel for Naval Aviation: Budgeting for the Great Green Fleet
- Design and Development of Wireless Power Transmission for Unmanned Air Vehicles
- Efficiency Improvements of Navy Gas Turbines
- Estimating the Fully Burdened Cost of Fuel for a Naval Aviation Fixed Wing Platform
- Evaluating the Impact of the Fully Burdened Cost of Fuel in Trade Space Analysis
- Fully Burdened Cost of Fuel Using Input-Output Analysis
- High-Performance Solid-State Li-Ion Battery with Ultra-Safe Thermally-Stable Nonflammable Graft Copolymer Electrolyte
- Impact of Rechargeable Batteries
- Integration of Detonation-Based Combustion into Hybrid Gas Turbine Systems
- Lead Acid Semi-Solid Flow Cells for Medium- and Large-Scale Energy Storage
- Micro Electro-Mechanical Systems Energy Harvesting
- Modeling Heterogeneous Carbon Nanotube Networks for Photovoltaic Applications Using Silvaco ATLAS Software
- Multi-Material Dielectrics: New Paradigm for Achieving High Energy Density Capacitors
- Nanostructured and Multifunctional Materials for Energy Storage
- Novel Metal Oxide Aerogel / Graphitic Hybrids for Supercapacitive Energy Storage
- Optimal Design of Piezoelectric Materials for Maximal Energy Harvesting
- Optimization of Vertical Axis Wind Turbine Arrays
- Realization of Micro-Ion Thrusters through Carbon Nanotube Field Ionization Engines
- Stability Analysis of a Constant Power Load Serviced by a Buck Converter as the Source Impedance Varies
- Synthesis and Characterization of Nitrogen-Doped Graphene
- Technical Feasibility Study of a Green Area
- Transport Imaging in Solar Cells

NPS' DEFENSE ENERGY PROGRAM

DEGREE PROGRAMS Four graduate degree programs currently offer energy specialty tracks – Operations Analysis, Naval and Mechanical Engineering, Electronic Systems Engineering, and Financial Management. These defense-focused energy tracks, embedded within existing degree programs and built around a common set of core courses and electives, are designed to provide officers and DOD civilians with advanced education in interdisciplinary approaches to problem-solving, analysis and technical expertise within the energy realm.

ACADEMIC CERTIFICATES The Academic Certificate Program in Energy is uniquely tailored for each resident degree or distance learning student to provide the basics of energy technology and expose a wider range of DOD energy issues. The certificate requires successful completion of a minimum of three graduate courses including "Fundamentals of Energy" and electives in one of three focus areas – general energy education, energy science and technology, or energy policy and analysis.

EXECUTIVE EDUCATION To accelerate energy literacy and the efficient adoption of DON energy goals, NPS offers executive-level education to key influencers in the DOD and partner industries. The goal is to catalyze new policies, programs and practices across the DON in two resident two-week courses at NPS.

DEFENSE ENERGY SPEAKERS SEMINAR

NPS' academic programs in defense energy are supplemented by the seminar series which provides a forum for leading voices within the field, practitioners and other defense energy influencers. These professionals give presentations, engage in brown bag discussions and facilitate informal gatherings that encourage faculty and student discussion over current defense energy issues. The Defense Energy Speakers' Seminars are a permanent part of NPS' Defense Energy program, and a key to its real-world relevance.

« POWER PLAY CONTINUED FROM P. 13

his professors while he was a operations research student at NPS in the early '90s.

And the same level of impact is expected to be seen in a more current project, the Replenishment at Sea Planner (RASP), that is poised to save the Navy millions by optimizing when and where ships undergo replenishment. NPS research partners at the Military Sealift Command and U.S. 5th Fleet are currently implementing RASP, and officials are expecting strong results.

Both projects, and countless in between, are indicative of a long-standing priority at the university, notes NPS Department of Operations Research (OR) Chair, Dr. Rob Dell, whose department includes the operations analysis (OA), and the OA energy variant curricula.

"In the OR department, I don't see us doing anything dramatically different. We do have a new program of study, but are essentially revamping existing courses," explained Dell. "The reality is, we've always been inter-

science have led to a tremendous payoff in the university's ability to support a rapidly expanding portfolio of student-driven, energy-related research. From highly-efficient, semi-solid flow cell batteries, to the evaluation of biofuels for drop-in Navy replacements, to sci-fi

"The energy investments we're making both afloat and ashore are really vital to national security. This effort is really about increasing our combat capability, improving our mission effectiveness, and reducing our dependence on volatile fuel markets and increasingly brittle electric grids."

DEPUTY ASST. SEC. OF THE NAVY FOR ENERGY **THOMAS HICKS**

inspired carbon nanotubes for ion propulsion systems, the university's cutting-edge research program in energy-related topics is very active.

And it is growing... Millsaps adds that cross-campus collaboration on several research efforts is helping bring additional

effort, which is largely enabled by faculty collaboration. Ensuring that partnering continues, campus leaders are poised to announce the creation of the Energy Academic Group, chaired by Nussbaum, to create a consistent vehicle for campus partnerships.

"I see three primary pillars, or functions, for the Energy Academic Group," Nussbaum said... focusing on continued development of the educational program, on research, and on outreach. He stressed that the educational programs must remain true to their native curricula, but added that the energy

component must also be highly valued.

"There's a lot of relevant research going on across campus, and we want to be sure we have a good hand on what we're exploring in total," Nussbaum said. "I think we have an opportunity to continue expanding this



NPS Energy Warriors: Energy-relevant research at NPS hits on all fronts... from expert analyses to futuristic discovery to smarter acquisition. Pictured left are Coast Guard Lt. j.g. Adam Paz and NOAA Lt. j.g. John Petersen with beakers of biofuel blends they are analyzing for possible naval applications. Shown center is Lt. Paul Camp, whose ionization test chamber will aid in propulsion research using carbon nanotubes. And pictured right, Marine Corps Capt. Darrell H. Brown holds a rechargeable battery similar to the units he used in his life cycle cost analysis of using rechargeable batteries vs. disposable batteries.



ested in the efficient use of resources; we've always had logisticians who care about that."

Dr. Knox Millsaps, Chairman of the NPS Department of Mechanical and Aerospace Engineering, agrees that energy is fundamentally grounded within his department's core disciplines as well.

"Energy is kind of heart and soul to mechanical engineering. In some sense, there isn't much we needed to do to ramp up education and research in this area because we've been doing it all along," he noted.

But Millsaps is quick to add that recent investments in modern functional materials

projects to the institution. ESTEP, the Energy Systems Technology Evaluation Program, is a multi-year effort funded by the Office of Naval Research to evaluate alternative energy tech-

"While I have seen a quantum change in the Navy's prioritization of energy, what we provide to our students is awareness, tools to use, measurement techniques, and the ability to analyze. Ultimately, our most important product will always be our students."

CHAIRMAN OF THE DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING **DR. KNOX MILLSAPS**

nologies for both operational and facility use.

Millsaps and operations research Professor Dan Nussbaum are leading the ESTEP

program... Within the spectrum of human capital, while we're educating the Navy and Marine Corps, we're missing the other services from the mix."

In the immediate, it's the impact on the Navy and Marine Corps human capital that is most responsive to the Secretary's cultural change challenge, and thus, is NPS' most critical contribution.

"While I have seen a quantum change in the Navy's prioritization of energy, what we provide to our students is awareness, tools to use, measurement techniques, and the ability to analyze," said Millsaps. "Ultimately, our most important product will always be our students. They are the ones who are going to go out and be the leaders of the future Navy, who will manage the change. And they are what we should be most proud of." **IR**



Members of the NPS Department of Operations Research accept the INFORMS 2013 UPS George D. Smith Prize, April 8. Pictured, from left to right, are NPS Military Faculty Cmdr. Walt DeGrange, UPS Global Vice President for Engineering Randy Stashick, NPS OR Chairman Dr. Rob Dell, Office of the CNO Resource Management Branch Head Cmdr. Cory Dixon, and INFORMS Chair of Practice and Smith Prize judge Russell P. Labe.

NPS OR Department Wins Prestigious INFORMS Award

By Amanda D. Stein

THE NAVAL POSTGRADUATE SCHOOL'S Department of Operations Research (OR) was awarded the 2013 UPS George D. Smith Prize by the Institute for Operations Research and the Management Sciences (INFORMS) in a nod to the first OR degree program in the United States.

The distinguished award is presented by INFORMS to an institution that demonstrates the "effective and innovative preparation of students to be good practitioners of operations research, management science or analytics." NPS' selection was announced at the INFORMS 2013 Franz Edelman Awards Gala on April 8 in San Antonio, Texas.

"It's an honor to be recognized as an exceptional program. Certainly what we strive to do is produce exceptional practitioners of operations research who graduate from our program and go on to make a difference in their militaries, both in the U.S. as well as around the world," explained NPS OR department Chairman Dr. Rob Dell.

As part of the nomination packet, the OR department highlighted some of the best practices that make the university's program successful. Among them, Dell noted, are the exceptional people who make up the NPS community.

"We have a wonderful military faculty who come to us after having served a couple of tours outside, as practitioners, and they get to come back as faculty and make an impact on our students in a very direct way," said Dell. "We also have our OR civilian faculty who obtain a significant portion of their salaries through reimbursable research. That keeps us woven into the fabric of what the DOD needs to have solved. We, the military and civilian faculty, get to bring those problems back to our classrooms."

While the faculty are critical to the success of the program, there is a strong consensus among the OR faculty that the caliber of students who

come through the program sets it apart from other academic institutions.

"By far, the students make the department. They are smart, mature and hard-working," said OR Assistant Professor Michael Atkinson. "Most of all they bring operational insight and experience that students of other institutions cannot match. Often, they are the ones proposing research topics to us based on their own experience, rather than the other way around."

NPS OR military faculty member Cmdr. Walt DeGrange has had the dual perspective of time as both a student and faculty member at NPS. He graduated from the OR department in 2005, and returned in 2011 to teach in the department. He sees every day the fresh ideas and perspectives that students bring to the classroom.

"One of the things that sets us apart is the leadership aspect," said DeGrange. "Other programs have to address questions of how to teach leadership... Our students have leadership skills before they get here."

The students who enter the OR department already have an idea of some of the challenges facing Soldiers, Sailors, Airmen and Marines around the world. This understanding often translates into applicable research through their thesis work.

"The thesis is an essential part of producing a good practitioner," explained Dell. "It's really about making sure that students are working on those projects that are relevant to the military. And by the nature of our students, it's hard not to do that. They really do work on problems that are going to have an impact."

The Smith Prize, now in its second year and awarded by INFORMS, is named in honor of the late Chief Executive Officer for UPS, a strong supporter of operations research. The award is intended to support the collaboration between industry and academia to further OR practices. **IR**



Chief of Naval Operations Adm. Jonathan Greenert outlines the future force to students, faculty and staff during an all-hands call in King Auditorium, Feb. 1.

Chief of Naval Operations Delivers All-Hands Message at NPS

By Amanda D. Stein

THE CHIEF OF Naval Operations visited the Naval Postgraduate School for an all-hands call, Feb. 1.

Adm. Jonathan W. Greenert met with NPS students, faculty and staff to discuss where the Navy is presently, and where leadership hopes to focus efforts in the future. He took questions from attendees, addressing a range of issues that matter to the Navy community — from budget and resources to the role of training and education for the fleet.

“I want to tell you right off the bat, this institution is a very big part of where I want to take this Navy, and where whoever relieves me has to take this Navy. The Naval Postgraduate School is one of our big three institutions,” began Greenert. “We grow kids up to be officers at the Naval Academy, we do our educating for warfare at the Naval War College, but here is where we make Jedis in a lot of areas that are very unique to our Navy — acoustics, cyber, financial management and a whole host of things.

“That balance of postgraduate education and the research you do here is very important,” he continued. “We are fortunate to have the students that we attract, the world-renowned faculty that we have here, and

the administration that makes it all come together.”

In addressing the current concerns of the Navy, Greenert pointed to his four main areas of focus — sexual assault, suicide, operations tempo and manning. He noted that sexual assault and suicide rates in the Navy are unacceptably high, and steps are being taken to ensure those numbers are reduced.

With operations tempo and manning issues, he emphasized the need to have the maintenance and manpower to successfully operate forward. Greenert spoke about the importance of establishing or maintaining a Navy presence at the major maritime crossroads — such as the Strait of Hormuz and the

Strait of Malacca. He reinforced that strategic operations are critical for the Navy to fulfill the mission of ensuring national and international security in the maritime domain.

He provided an overview of current deployments and operations around the world, highlighting the focus on strategically positioning the fleet. He pointed to specific areas — including Djibouti, Singapore and Australia — where U.S. Navy and Marine manpower has been increased

“This institution is a very big part of where I want to take this Navy, and where whoever relieves me has to take this Navy ... this is where we make Jedis”

Adm. Jonathan W. Greenert
Chief of Naval Operations

for readiness.

“We need to continue to develop places around the strategic maritime crossroads. This is where the stuff of the world, that makes the world economy tick, goes through,” Greenert explained. “We have to have access to these places where we can repair, restore, relax and refurbish. These will be a big part of our future as we operate forward. Warfighting first, and be ready if you have to operate forward. You have to have the things to support it.”

In addressing the future of the Navy, he looked at capabilities such as the Unmanned Combat Air Systems, new Littoral Combat Ships, Mobile Landing Platform and Joint High Speed Vessels that the Navy is expecting to deploy in the future. The goal, he explained, is to swap out the new additions to the fleet to operations such as humanitarian assistance and disaster relief and counter-piracy, freeing up the counter-terrorism ships for operations where their capabilities would be needed most.

Student questions varied, with a number revolving around the difficult choices that fiscal uncertainty demands. Greenert addressed the unknown surrounding the continuing resolution and sequestration, and was quick to point out that having capable warfighters with reliable equipment is the priority.

“Warfighting has been first,” he said. “That’s how we have to think of things. How does whatever you are going to decide on affect the warfighter?”

In closing his presentation to the audience, the CNO expressed his appreciation for the students’ candid questions, and in their ability to lead the future fleet.

“It’s really invigorating to get the questions that I’m getting. You guys are thinking about things, and my time is limited. And knowing that when I go, people like you will come in and take care of the Navy makes me feel good and I appreciate it very much.”

Greenert assumed his current position as the 30th Chief of Naval Operations on September 23, 2011. He previously served in various fleet command and support assignments, including Commander of U.S. 7th Fleet and Vice Chief of Naval Operations. ■



Chief of Naval Operations Adm. Jonathan Greenert fields a student question during his all-hands call in campus. Student questions varied, with many focusing on the difficult choices of fiscal uncertainty.

NORAD, USNORTHCOM Commander Visits NPS, CHDS

Army Gen. Charles H. Jacoby Jr., Commander of the North American Aerospace Defense Command (NORAD) and U.S. Northern Command (USNORTHCOM), visited the Naval Postgraduate School, Jan. 31. He spent much of his visit with students and faculty in the university’s Center for Homeland Defense and Security, and expressed his initial impressions of the students, and on education as a whole, during a gathering with the group near the end of his visit.

“This is a great group to have sitting together as a team,” Jacoby said. “I am a big believer that if we are down to our last dollar, we should spend it on education.”

Jacoby’s visit to NPS was more directly connected to his role with USNORTHCOM, which was established in 2002 to provide command and control of Department of Defense homeland defense efforts and to coordinate defense support of civil authorities.

CHDS’ diverse student population of professionals and first responders at local, state and federal levels left Jacoby impressed by the many perspectives addressing homeland security’s challenges. He continued, “I am very happy that we have this talented group from their respective agencies thinking, collaborating and working together here on homeland security.”

“We are like a petri dish where different stakeholders can conduct research and grow solutions to our nation’s most pressing homeland security issues,” added CHDS Executive Director Dr. Ted Lewis.

CHDS has been working with USNORTHCOM to provide advanced education to civilian and active-duty officers from the command for the last 11 years. Over that span, 29 USNORTHCOM students have graduated from NPS with advanced degrees.

The command, however, has been challenged in recent years to dedicate personnel to the program, one of the reasons Jacoby himself wanted to explore the center. By the end of his visit, he expressed a recommitment to filling his available seats.

In addition to meeting with students and faculty at CHDS, Jacoby met with NPS leadership and received briefings on cutting-edge research and technology programs at the university. He also toured NPS’ Common Operational Research Environment Laboratory where he met with students and faculty working together to illuminate criminal and insurgent networks.

In closing, Jacoby expressed a positive review of his time spent on campus, and was committed to continuing the dialogue. “I hope we will continue to work together,” said Jacoby. “Everything that you are doing here is important to us. I have about a million questions for you, and I look forward to continuing this dialogue.”



Army Special Forces Sgt. 1st Class Christopher Linnel demonstrates the Lighthouse Sensitive Site Exploitation application he developed through his studies in the NPS defense analysis program. The app provides a platform for the collection and rapid analysis of intelligence data, and is currently in pilot field-testing.

NPS Enlisted Special Forces Student Creates Inspired Intelligence Innovation

By Kenneth A. Stewart

A **CH-47 CHINOOK** helicopter lands at a remote compound in Southern Afghanistan. Dust flies, Soldiers dismount, the tension is almost palpable. Before the team looms a series of seemingly medieval walled compounds — there are no house numbers, streets are more wishful thinking than reality, and each building may conceal rogue, extremist forces committed to acts of unimaginable violence.

These rows of mud and brick structures were once designed to protect Afghan families from rival clans, but today, they can also be used by anti-Afghan forces to launch attacks upon coalition troops and Afghan Security Forces.

U.S. Army Special Forces Sgt. 1st Class Christopher Linnel of Phoenix, Ariz. is no stranger to the walled compounds of Afghanistan, he re-

cently led a team of special forces operators trained in the art of Sensitive Site Exploitation (SSE) in Regional Command South. Now he is a student in the NPS Department of Defense Analysis (DA), and is working on a mobile device application that promises to make the scenario described above safer and more efficient.

U.S. Army Special Forces Col. Greg Wilson
CORE Lab Co-Director

Linnel and his team have developed an application that they call Lighthouse SSE. As its name implies, the app utilizes the Lighthouse intelligence analysis methodology developed in the DA department's Common Operational Research Environment (CORE) Lab.

The inspiration for the project was born right out of Linnel's operational background, when he says he became increasingly frustrated after

“This is about enabling analysts to rapidly connect the dots and better inform decision makers ... to rapidly exploit this type of information can enable us to get inside the enemy's decision cycle.”

watching hard-won intelligence get filed away and forgotten.

“The idea first came to me back in 2009, when I was deployed to Kandahar and partnered with the 3rd Commando Kandak in Regional Command South ... One of my responsibilities was to manage SSE after a village had been cleared,” said Linnel.

“After the mission, I would spend about three hours consolidating all of the pictures, reports and information gathered off the objective,” he continued. “After I'd present the information, I'd get a, 'great job,' and the information would go nowhere.”

Special operations teams are commonly given the secondary task of moving through a maze of compounds after their primary task of clearing has been completed. Their mandate is to gather the myriad clues that help ground commanders make sense of their areas of operations.

Linnel's application attempts to simplify the process of site exploitation by giving context to the plethora of pictures, faces, documents and reports born of complex operations.

“This is about enabling analysts to rapidly connect the dots and better inform decision makers,” said CORE Lab Co-Director Army Special Forces Col. Greg Wilson. “The ability to rapidly exploit this type of information can enable us to get inside the enemy's decision cycle.”

“A visual Rolodex for Afghanistan is one of the many by-products Lighthouse SSE produces,” added Linnel. “I take a photo, it is geo-referenced, and metadata is stamped on it with relevant information about the search and the organization that produced the report.”

The application is run on an Android OS-based mobile device and connected to a tactical network via a wave relay radio system.

“By using the wave relay radio, you are able to update on the move and share information in real-time, lending context to people moving around on the ground as well as the command and control element back at the Forward Operating Base,” said Linnel. “This application allows analysts to see things through the operator's eyes.”

“Terrorist networks are quick to adapt after strike operations with the evidence found on targets often fleeing in nature,” said Wilson. “Sgt. 1st Class Linnel's work promises to have a significant impact on our ability to rapidly gather, fuse and exploit the right information.”

By capturing data in real time, analysts are able to not only receive, but to push information forward to operators in the field. This sort of two-way sharing of information may help prevent the misidentification of suspects and reduce the need for subsequent missions.

The methodology that Lighthouse SSE employs was tailored to provide uniformity to the data, helping analysts disrupt clandestine organizations and reveal dark networks.

“I kept it under the Lighthouse umbrella so that you can do things like link and social network analysis, which is made possible by the structured data captured on the Lighthouse SSE platform,” said Linnel. “When you begin to apply advanced analytical methodology to the exploited intelligence from the objective, you begin to see networks and their vulnerabilities.”

The first version of Linnel's application transitioned to pilot field-testing in early March. Subsequent versions will exploit advances in 3-D modeling with the goal of creating a device that is capable of molding individual photographs together to develop a complete model of the structure inside.

“In the future we will be able to stand up photos within the application to create a 3-D model that will enable our teams to plan operations, and will help us detect anomalies within the structure of buildings, like hidden rooms and caches,” said Linnel.

If successful, Lighthouse SSE will permit analysts to see through the fog of war and define the human terrain in a manner that ultimately saves lives and removes bad actors from the field. **IR**

Students Test QR Codes for Tactical Communications

NPS students, Lt. Cmdr. Andy Lucas and Lt. Phil Richter, are pictured in front of a nearly 121-square meter Quick Response (QR) code on the roof of NPS' King Auditorium. They painted the code as part of their thesis project examining the use of QR codes as communication tools in tactical environments.

“What we're going for is the ability to communicate between tactical units in an emissions-controlled environment,” said Lucas. “Essentially, we could use this technology to ensure stealth communication that will not pinpoint our location to an adversary.”

QR codes are machine-readable matrix labels that contain encoded information; airborne assets will fly over the painted code to test the ability to glean encoded information from various altitudes. Lucas and Richter also hope to test the ability of orbiting satellites to read information from the auditorium rooftop.

“This QR code essentially points to a link that is associated with the CRUSER lab,” said Lucas. “What we're trying to test is whether or not airborne assets, whether they are aircraft or satellites, are able to get a successful image of the [QR code] that we are able to decode. Hopefully we'll get a QR message sent to space.”

Lucas and Richter are enrolled in NPS' Joint Command, Control, Communications, Computers and Intelligence (C4I) curriculum.



NPS Students' Thesis Addresses the Threat of Active Shooters

By Amanda D. Stein

EVERY DAY, THE men and women of the armed forces put themselves in harm's way. Recent NPS graduates, U.S. Army Majors Charles Ergenbright and Sean Hubbard, are no different — and they commit to countless hours of training for just those situations when their skills mean the difference between life and death.

Hubbard and Ergenbright are Special Forces officers, and they accept the risks to themselves for the service they have committed to on behalf of their country. What they don't accept, however, is the extraordinary tragedy of mass shootings that take innocent lives in schools, public spaces and even military bases far too often across the United States and abroad.

Upon entering the NPS Department of Defense Analysis program, Ergenbright and Hubbard wanted to apply their own special operations expertise and background to this devastating problem. The result was a detailed thesis outlining proposed upgrades to high-occupancy facilities (HOF) and institutions of higher education (IHE) to minimize the loss of life from active shooters.

At the time they completed their thesis, the tragedy that would strike Sandy Hook Elementary School in late 2012 was a distant nightmare that

had not yet occurred. But following that tragic loss of life, the two officers, and their faculty advisors, knew this work was critical, and it could have saved lives.

The two officers' final thesis offered a detailed proposal for what they call a Victim Initiated Mitigation (VIM) system for IHEs and HOFs, which would apply modern technologies to neutralize an active shooter as much as possible while also providing communication with responding law enforcement.

As they dove into their research, they quickly realized that one of the most critical factors in limiting the loss of life is time.

"The rate of kill is tied to incident duration ... As we were

"The rate of kill is tied to incident duration ... As we were thinking about the problem, we determined if you can affect either incident duration or response time, you can effectively mitigate the effects of an active shooter and reduce the rate of kill."

U.S. Army Maj. Charles Ergenbright
Defense Analysis '12

thinking about the problem, we determined if you can affect either incident duration or response time, you can effectively mitigate the effects of an active shooter and reduce the rate of kill," explained Ergenbright. "When we started going through every document we could find on the subject, we found that the thought really separated into two main focuses: prevention or preemption, and tactical response," he added.

"And really what we found as a missing variable was the lack of a victim initiated mitigation system, which we liken to a fire alarm. The



NPS defense analysis alumni Maj. Sean Hubbard, second from left, and Maj. Chuck Ergenbright, far right, stand alongside members of Norway's DELTA Assault Team on Utøya Island in Norway, the site of a horrific mass shooting that claimed 69 lives on July 22, 2011. Hubbard and Ergenbright visited Norway following the incident to gather information for their thesis research on how to mitigate active shooter incidents.

fire alarm has a standardized operation, and there is a standardized understanding of what is coming," he continued.

The VIM system includes several components beyond an alarm. It's a system of emergency call boxes in all public areas of the campus; electromagnetic door locks linked to the call boxes; a mobile situational awareness device capable of linking directly to the call boxes; key fob and proxy access for first responders to all buildings on campus; and a remotely-located manned Incident Command Center (ICC) from which the full system and appropriate safety protocols can be managed.

The goal of the VIM system is many-fold. It would allow two-way communication for victims, ICC personnel and emergency responders to provide more specific and timely tactical information. The system can also promptly lockdown the campus in specific zones, or as a whole, based on

tactical information, improving the chances of isolating the shooter and improving law enforcement response time. The system would also notify students, staff and faculty of an emergency with pre-programmed notifications via "any networked media device" such as a cell, tablet or computer.

Recent tragedies have sparked searing national debate on gun control measures and the mental health treatment system, but this highly-charged debate is independent from the students' research, said NPS Department of Defense Analysis Professor Doowan Lee, thesis advisor for Ergenbright and Hubbard.

"I think this is where their research is exceedingly unique, because instead of being politically driven, their research is really about the nature of active shooter scenarios and finding a systematic solution to mitigate [the resulting] violence," he said. ■

Students Complete JPME in Joint NPS, Naval War College Program

By Amanda D. Stein

IN 1986, AFTER a series of snafus in joint military operations, the Goldwater-Nichols Department of Defense Reorganization Act implemented sweeping changes across the defense department. Among them was a greater emphasis on preparing Soldiers, Sailors, Airmen and Marines to operate side-by-side, seamlessly, in times of peace and war.

Today, joint operations are commonplace, and the men and women of the armed forces are well prepared to work alongside one another, in part because of joint operations education like the Navy's Command and Staff program which includes Joint Professional Military Education (JPME) Phase I credit.

Courses with JPME credit are just one way in which the DOD prepares officers for joint assignments by exposing students to operational and decision-making processes that will make them effective working with other services. The two-phase program traditionally requires students to attend courses at the Naval War College (NWC) in Newport, R.I., or fulfill them through distance learning outside of their day-to-day duty assignments.

But a long-standing partnership between NPS and NWC allows stu-

dents to complete their JPME Phase I certification right on the NPS campus. And many students agree that getting the courses done in Monterey has its benefits.

"The opportunity to take NWC courses in conjunction with my degree requirements proved to be ideal for me," said Lt. Cmdr. Angela Lefler, a meteorology student scheduled to graduate in March. "It makes sense to knock it out while we, as students, have some control over our schedule and can actually get several things accomplished simultaneously. I'm glad I did it while I was at NPS, and that's the advice I give to all incoming students in my program."

Since 1999, the Naval Postgraduate School has partnered with the NWC's Monterey office, located on the NPS campus, to allow students to complete the four courses that comprise the NWC Command and Staff (C&S) program in conjunction with students' degree programs. NWC Monterey Chairman Fred Drake explains that in addition to saving students the time they would normally set aside exclusively for JPME studies, doing the program during their time at NPS gives real-world context to their studies.

"One real advantage for the officers who complete their JPME Phase I here is that while they are going through our War College courses, they are going through their NPS degree program, which really ties the relevance of their NPS degree into the DOD environment," said Drake.

"We try to work with the other departments to provide the least amount of interference, and give both organizations a chance to optimize their resources here on the Monterey campus," said Drake. "We try to function, from the student standpoint, as much as like any other NPS department as possible, while fulfilling Naval War College requirements here on the West Coast."

All U.S. military officers and senior DOD civilian employees are eligible to take the NWC courses at NPS. Navy, Marine Corps and Army officers can use their NWC C&S diploma to fulfill their services' intermediate level service college PME requirements. Since the program's inception in 1999, more than 3,000 officers have completed Joint Professional Military Education Phase I certification through the partnership while concurrently completing their NPS degrees. ■



The latest group of Naval War College Monterey honor graduates stands for a photo on the front steps of Halligan Hall. Since the inception of the program, more than 3,000 students have earned Joint Professional Military Education Phase I certification.

NPS, NATO Partner to Build Transparency, Efficiency in Defense Institutions

By Kenneth A. Stewart

AS THE U.S. Partnership for Peace Training and Education Center (USPTC), the Naval Postgraduate School and its Defense Resources Management Institute, are playing a pivotal role in partnering with NATO on the Building Integrity (BI) program. The BI effort, established in 2007, seeks to empower developing nations across the world with the skills, knowledge and tools to build efficient, corruption-free defense institutions.

The latest major development in the BI effort brought an international contingent of diplomats and senior government officials from nations across the globe for the “Building Integrity” conference in NPS’ hometown of Monterey, Calif., Feb. 25–28.

Opening the conference was NPS Interim President Rear Adm. Jan E. Tighe, welcoming the 180 representatives from 35 NATO member and allied nations.

“The guiding principles of the Building Integrity initiative are critical to developing worldwide global security, and I am very proud to have our own institution partnering with you in standing up to these challenges,” she said. “Throughout our institution, some of the brightest minds in their respective fields dedicate their professional careers to teaching military officers about these very values.”



Gen. Jean-Paul Paloméros, NATO Supreme Allied Commander Transformation, delivers keynote remarks during the Building Integrity (BI) 2013 conference. BI 2013 is collaborative effort between NATO and NPS to promote transparent, efficient defense and security organizations.

NATO Supreme Allied Commander Transformation Gen. Jean-Paul Paloméros served as the opening keynote speaker, encouraging conference attendees to take advantage of the critical opportunity the BI conference provides.

He spoke at length about the initiative’s role in encouraging sound institutions, particularly in places like Afghanistan where NATO representatives have been working for more than a decade to encourage good governance in both civilian and military sectors.

Paloméros stressed NATO’s contributions to anti-corruption measures historically, and specifically pointed out efforts to combat corruption in the Afghan National Security Forces (ANSF). This year’s conference had an entire program tailored to reducing the risk of corruption in the ANSF, and he graciously acknowledged the Afghan representative to the conference, H.E. Ambassador Homayoun Tandar, of the Embassy and Mission of Afghanistan in Brussels, as well as NATO’s enduring commitment to the nation and its dedication to rooting out corruption as it transitions toward democracy after 30 years of conflict.

The Building Integrity program was initiated to increase transparency, improve accountability and enhance integrity in the defense and security communities. The focus of the effort is perfectly tailored to the intellectual capital in NPS’ Defense Resources Management Institute, or DRMI.

Dr. Francois Melese, DRMI Director, has been instrumental in bringing the conference to the Monterey Peninsula, and notes the institute is well positioned to impact the program.

“This is the U.S. contribution to NATO’s Building Integrity program,” said Melese. “(DRMI) encourages transparency, fiscal management and decision making ... The idea is to increase transparency through financial management and fiscal tools. If you invest in increasing transparency, you increase detection which increases the probability of deterrence.”

“Our own Defense Resources Management Institute was created with the mission of developing efficient and effective resource management practices in defense organizations,” added Tighe. “After nearly 50 years, the institute has touched every corner of the globe, providing sound robust techniques built upon traditional management theory and economic reasoning that are the modern day building blocks of complex decision theory.”

Conference organizers stress that investments made in transparency, integrity building and accountability can lead to greater public confidence in military institutions and reduced corruption.

“The Building Integrity program is part of NATO’s commitment to strengthening good governance in the defense and security sectors,” said Ambassador Dirk Brengelmann, NATO Assistant Secretary General for Political Affairs and Security Policy. “Making effective use of resources in the defense and security sector is a challenge faced by all nations.”

This is the second Building Integrity Conference to be hosted in Monterey. The conference is conducted biannually and is open to military and civilian officials from NATO nations, allies and partners including Partnership for Peace, Mediterranean Dialogue and the Istanbul Cooperation Initiative. ■



The infrastructure tower, which ties the ocean and surface sensors together, is assembled by the NPS research team. During a two-month trip to the remote Antarctic glacier, NPS researchers set up custom instrumentation to analyze ocean-ice interactions below the ice shelf.

NPS Research Team Sees Success in Return to Pine Island Glacier

By Amanda D. Stein

FOR MOST, SETTING foot on a desolate Antarctic glacier would be a once-in-a-lifetime opportunity. And with its bone-chilling winds and uncomfortably low temperatures, once in a lifetime might be just enough.

But for a team of NPS researchers, a second chance to spend two months on a desolate ice sheet was a welcomed adventure. And this year, unlike the last, is yielding previously unseen data on one of the Western Antarctic Ice Shelf’s (WAIS) most rapidly melting glaciers. The NPS group included Research Professor of Oceanography Tim Stanton, Research Assistant Professor of Oceanography Bill Shaw and Oceanographer Jim Stockel.

“There are three unique things about the Western Antarctic Ice Shelf” explained Stanton. “We know from satellite observations that the WAIS is moving and thinning very rapidly compared with other ice sheets. A huge amount of fresh water is being lost from that system every year. That ice goes into the ocean, and is constrained by this narrow portal at the top part of Pine Island Ice Shelf, which is a choke point for the ice streams up on the continent.

“Because a lot more ocean heat is getting in under the ice shelf and melting it more rapidly, it is lifting up the ice shelf, letting that water go in even further, resulting in the grounding line lifting up even more,” he continued. “So that’s an unstable process. And as you lift it up, you reduce the drag on the ice shelf. The ice is melting more rapidly, making it more buoyant and less sticky to the seabed. That’s allowing the ice to flow more quickly down from the ice sheet.”

NPS’ researchers have been preparing for the opportunity to deploy a series of specially-designed instruments on the Pine Island Glacier (PIG), which will monitor temperature and salinity, among other data.

After severe weather last year gave the team only two days on PIG to frantically do what research they could, this year’s trip proved to be much more successful, with six full weeks on the ground to deploy instruments and gather data.

“Once our boots were on the ground, our whole team of 12 people knew exactly what to do. And we made great time. We actually got all of the work done,” explained Stanton.

Each group had a specific goal for measuring the PIG ice shelf structure and melting rates, with the NPS team using gear they designed based on decades of combined experience and field research. After drilling two holes into the 500-meter thick ice shelf at three separate sites, two different instruments were deployed — the Ocean Flux Profiler and the Fixed-Depth Ocean Flux Package. Each will continue to gather and transmit data on ocean salinity, temperature and currents back to researchers at NPS.

The parameters for data collection can be changed remotely as needed, to respond to changing environmental conditions and system power limitations. If all goes well with the support structures positioned above the ice, the team expects the sensor packages will continue to transmit data for the next year or two.

The team hopes that the research will help open doors for further understanding of glacial systems and the impact of climate change upon them.

“Hopefully, new insights into the physics of ocean-glacier interaction will lead to a better overall understanding of how the Earth’s ice sheets are responding to climate change,” said Shaw. “This will then allow the science community to make better predictions on important issues such as how fast sea level will rise is the coming decades.” ■



Winter Quarter graduates stand for the national anthem during the Winter quarter commencement ceremony, March 29, keynoted by retired Adm. Henry Mauz, pictured below center. NPS honored 366 students earning 367 advanced graduate degrees during the ceremony.

University Says Farewell to Winter Quarter Graduates

By Kenneth A. Stewart

THE NAVAL POSTGRADUATE SCHOOL honored 366 students earning 367 advanced graduate degrees during NPS' Winter Graduation Ceremony in King Auditorium, March 29.

Presiding over the ceremony was NPS alumna and Interim President, Rear Adm. Jan E. Tighe. Tighe welcomed graduates and their families and acknowledged the recent work of faculty and staff.

"This institution serves the national security community through advanced graduate education and real-world research — you make that mission a success," said Tighe. "These last four months with you have only reinforced my belief that NPS will remain a vital element in the success of our Navy, our sister services, and our national and international security partners."

Tighe also recognized the assembled graduates and their families. "You should be justly proud of what you have accomplished here. We are proud of you," she said. "Your experiences and education have prepared you to become leaders who are at the forefront of resolving the security challenges of your service, nation and the global community."

Tighe's remarks were followed by those of former U.S. Atlantic Fleet Commander, retired Adm. Henry H. Mauz Jr., who also recognized the contribution made by NPS' world-class faculty.

"This faculty has taken years to build ... The depth and breath of our faculty is absolutely outstanding and nationally recognized," said Mauz.

Mauz spoke of the commitment shared by faculty members who often work long hours with little pay and without the benefit of teaching assistants.

"Why do they do it?" asked Mauz. "They do it because they are dedicated and patriotic and because of these students. It's a joy to work with our students."

Mauz also thanked the graduating class for their commitment to a "heroic profession." He encouraged graduates to continue to seek self-improvement, to take care of their subordinates, and to be bold as they executed their duties.

"Go forth and slay dragons!" he stated emphatically as he closed his address to the graduating class. **IR**



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The Red Cherry

Distinguished Professor Emeritus Dr. Allen Fuhs is not an astronaut. But in some sense, he has reached the stars.

On May 8, at the American Institute of Aeronautics and Astronautics (AIAA) Spotlight Awards Gala in Washington, D.C., Fuhs will officially become an AIAA Honorary Fellow, joining the likes of Neil Armstrong, Orville Wright, and many other pioneers of the profession. He is the first AIAA Honorary Fellow from the NPS faculty ranks.

Fuhs proudly admits he was always fascinated with aeronautics, in spite of his advisers encouraging him to focus his engineering prowess elsewhere (he joined the profession before even NASA was created).

Fortunately for NPS, he followed his heart and would go on to leave a remarkable legacy at the university after more than 20 years on campus. Following stints as chairman of both the aeronautics and mechanical engineering departments, Fuhs created the Space Systems Academic Group (SSAG) in 1981, designing a curriculum tailor-made to the unique needs of the Navy's operations in space.

Thirty years later, today's SSAG serves as a hub for defense-focused space studies, bringing together faculty from across disciplines to provide students in the Space Systems Engineering and Space Systems Operations curricula with a one-of-a-kind, relevant education and research experience.

His many accolades include being a past president of AIAA, an inductee into the International Space Hall of Fame, and so many others. But ultimately Fuhs is a teacher at heart, supervising more than 100 master and doctoral theses over his career at NPS with a knack for explaining the complex in understandable terms.

So how would such an accomplished professional describe becoming an AIAA Honorary Fellow, the latest in a career of prestigious honors? He notes, it is simply "the red cherry on top of the whipped cream of a hot fudge sundae."

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