



NAVAL POSTGRADUATE SCHOOL

# IN REVIEW

MAGAZINE

NOVEMBER 2015



## SUCCESS

NPS' TEAM ARSENL FLIES  
ITS 50 UAV SWARM!



### INSIDE:

A Warrior's Legacy – McChrystal Shares His Story During Unique SGL

Deputy Secretary of Defense Visits NPS, Honors Spring Graduates

Intern Develops Small, Inexpensive Star Tracker





**Ronald A. Route**  
Vice Adm., U.S. Navy (Ret.)  
President, Naval Postgraduate School

*“While we boast academic programs with a rigor and quality that rival the nation’s most prestigious institutions, NPS studies are firmly grounded in the operational forces.”*

Welcome to our return to “In Review,” the Naval Postgraduate School’s flagship magazine. Following a brief hiatus in production, we are excited to present our most recent work in our mission to provide truly exceptional graduate education experiences, and place a spotlight on the outstanding work our students, faculty and staff do every day.

This mission sets us apart, for there is no other institution in the world that mirrors NPS’ dedication to relevant student research. While we boast academic programs with a rigor and quality that rival the nation’s most prestigious institutions, NPS studies are firmly grounded in the operational forces. Even among top defense research establishments, NPS is unique in its broad portfolio of academic programs, from national security studies to business, applied sciences to information science.

This issue of “In Review” features several examples of just what makes NPS the one-of-a-kind institution that it is. Our Defense Resources Management Institute (DRMI), part of the Graduate School of Business and Public Policy, celebrates 50 years of advanced education this year. DRMI provides U.S. and international officers with highly esteemed, unique instruction in defense resource management and analytical decision-making.

In this edition, we focus on the continuing partnership between the Naval Postgraduate School and the U.S. Marine Corps Expeditionary Energy Office (E2O). The Marine Corps has been on the front lines of the fight to strengthen our capabilities by diversifying our energy sources. Some time ago, E2O leaders engaged with NPS and we have become a true enabling partner in the success of their mission, providing expert graduates to the E2O team, and an array of the most recent research dedicated to supporting their efforts.

We also highlight the establishment of our new Surface Warfare Chair, an effort spearheaded by Commander, Naval Surface Forces Vice Adm. Thomas S. Rowden. The SWO Chair will serve as a direct link between NPS research and the Surface Warfighting Development Center. He will also be an on-campus mentor to our many SWO students, and will be representing NPS to the SWO community in the fleet. Our SWO Chair will serve as an outstanding resource in ensuring our programs remain grounded in the needs of our warfighters.

Like many universities, the value of NPS is reflected in the accomplishments of our graduates, and our alumni are making a difference at all levels of the defense spectrum. Deputy Defense Secretary Bob Work is one such alumnus, and he returned to campus this past summer to engage with NPS on a number of initiatives. Retired Vice Adm. Michael Vitale, a respected leader in innovation, also revisited Monterey to share his views on this critical subject with our students. We also share the story of an NPS graduate from the Republic of Georgia, Col. Giorgi Jachvadze, who applied his NPS master’s degree in personnel management to implement a number of critical reforms to the Georgian Ministry of Defense.

Finally, a team of faculty, students and research staff in the university’s Advanced Robotic Systems Engineering Laboratory (ARSENL) recently set a world record – launching and flying autonomously a swarm of 50 unmanned aerial vehicles all at the same time. The effort opens the doors to a broad spectrum of research into the advanced studies of large swarms of small, capable UAVs.

Like countless other programs at NPS, this impressive research will provide a foundation for many students in the quarters to come, while providing senior Navy/DOD leaders with an innovative approach to one of national security’s current challenges.

*Ronald A. Route*



**10 Defense Resources Management Institute Turns 50**

NPS’ hub of advanced education in analytical decision-making and effective resource management celebrates a half-century.



**12 A Warrior’s Legacy – McChrystal Shares His Story**

Retired Army Gen. Stanley McChrystal shares his perspectives on modern conflict in a candid discussion with university students.



**14 Fifty & Counting**

NPS ARSENL researchers achieve their ultimate goal of successfully flying 50 unmanned aerial vehicles autonomously. What’s next?



**16 NPS, USMC Partnership Advances Readiness Through Education**

NPS and the Marine Corps’ Expeditionary Energy Office advance warfighting through innovative energy solutions.



**20 Deputy Secretary of Defense Work Visits Campus**

Space systems operations graduate and Deputy Secretary of Defense the Honorable Bob Work tours campus during a visit to the West Coast.



**22 Naval Surface Forces Establishes SWO Chair**

Commander, Naval Surface Forces Vice Adm. Thomas Rowden partners with NPS to establish the Surface Warfare Chair.

**4 University News**

**7 Faculty Showcase**

**18 Alumnus Leads Major Personnel Reforms in Georgian Ministry of Defense**

**21 Alumnus Talks Innovation During SGL**

**24 Intern Develops Small, Inexpensive Star Tracker**

**26 Summer Graduation**

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**On The Cover**

NPS’ Advanced Robotic Systems Engineering Laboratory (ARSENL) has made history, simultaneously flying 50 autonomous unmanned aerial vehicles (UAVs) and setting what is believed to be a world record for UAVs controlled by a single operator. In this issue, we examine the craft, tactics and innovations that made this historical achievement possible.

For more information about NPS, visit the new NPS NewsCenter at [www.nps.edu/news](http://www.nps.edu/news). For free subscription information or to submit your comments or suggestions on In Review magazine, contact [dmkuska@nps.edu](mailto:dmkuska@nps.edu).

## New Chief of Staff Takes the Helm

NPS welcomed incoming Chief of Staff, Navy Capt. Anthony Parisi to the university, July 17. And while Parisi is new to the chief of staff position, he is not new to NPS, graduating from the university's Department of National Security Affairs in the 90s.

"I have to admit that when I was here as a student, I thought this was the most wonderful place in the world," said Parisi. "I had just come off four and a half years of arduous sea duty and they told me that my job here was to learn, just to learn."

The son of a first-generation Sicilian fisherman from the hamlet of Gloucester, Mass., Parisi grew up in and around the sea. "I basically grew up on a fishing boat, and I liked it," said Parisi.

Throughout his naval career, Parisi has spent a lot of time at sea. He completed several deployments to the Mediterranean, Black, Adriatic



Capt. Anthony Parisi officially took the helm as NPS' Chief of Staff, July 17.

and North Red Seas. He also participated in several shorter deployments to Northern Europe, the Eastern Pacific, Arabian Gulf and South America. But he is perhaps most proud of the time he spent commanding Afloat Training Group Mayport, the USS The Sullivans (DDG 68) and the USS Zephyr (PC 8).

Parisi relished his time at sea, but it was his numerous trips ashore as a "quasi-diplomat" that inspired him to pursue an interest that coincided directly with his NPS education in national security affairs.

"I decided to go into the defense attaché business, which brought me to Rome, Italy where I was the senior defense official and naval attaché for three years ... It was an incredibly eye-opening job where I can say that I directly used my NPS education and put it to practical use in the field," said Parisi.

### MORS Tisdale Competition Recognizes Outstanding OR Thesis

The Military Operations Research Society (MORS) Stephen A. Tisdale Graduate Research Award competition was held in Glasgow Hall, Aug. 27, recognizing the student whose thesis offers the most immediate or near-term value to the U.S. or its allies.

Retired Navy Capt. and NPS Professor of Practice Wayne Hughes served as a judge on the award panel.

"The MORS Tisdale award is one of our most prestigious awards for thesis accomplish-



Lt. Cmdr. John Sprague receives the MORS Tisdale Award, Sept. 15.

ment and student participation in operations research [OR]," said Hughes. "[This year's competi-

tors] were a very talented group. They were the hardest group we have ever had to judge."

Lt. Cmdr. John Sprague walked away victorious for his thesis, "Optimal Scheduling of Time-Shiftable Electric Loads in Expeditionary Power Grids." OR Program Officer Lt. Cmdr. Connor McLemore discussed Sprague's selection.

"In a nutshell, the DOD spends lots of money on fuel for generators that power environmental control units [ECU]," said McLemore. "Fuel costs for ECU generators in Iraq alone cost well over \$1 billion dollars per year. Lt. Cmdr. Sprague's thesis described a way to centrally manage such generators resulting in fuel cost savings of several hundred million dollars per year to the DOD."

### Apache Engineer Takes Top DOD Student Award for Summer 2015

James B. "Brent" Logan, a production engineer with the Army's Apache production and fielding group, received the Outstanding Academic Achievement Award for

DOD Students for the 2015 summer quarter.

Logan completed his studies for a master in program management (MSPM) in NPS' Graduate



James B. "Brent" Logan is the latest recipient of the Outstanding Academic Achievement Award for DOD students.

School of Business and Public Policy. The Office of the Army Director for Acquisition Career Management, or Army DACM Office, located within the U.S. Army Acquisition Support Center, sponsored his studies.

Logan, who works with the Apache, the backbone of the Army's attack helicopter fleet, collaborated with a three-person team to write the thesis that impressed the award committee:

"Analysis of the Army's Apache Key Reliability Issues and Recommended Methodology for Improvement."

"The study involved analyzing logbook records from Apache users, and reviewing improvement plans within the project office to see if the issues raised in the logbook data are being addressed," he explained.

Logan recommends the MSPM "to anyone who wants to learn more about program management and is willing to work hard." He credits the "outstanding" experience with "already help[ing] me be more effective as an acquisition professional."

### Student Joins Expert Panel to Discuss ISIS, Options

The Naval Postgraduate School's Department of Defense Analysis, the Naval War College (NWC) Monterey, and the Global Education Community Collaboration Online (GlobalECCO) counter terrorism program hosted a panel discussion titled, "The Islamic State: Remaining and Ex-

panding?" in Ingersoll Hall.

U.S. Army Capt. John Baker, a student in NPS' defense analysis program, joined a distinguished



NPS student U.S. Army Capt. John Baker, left, participates in a panel discussion, Aug. 20.

group of experts to discuss, and at time debate, ISIS information operations (IO) and networks as well as U.S. interests in the region and Western policy options.

Baker contributed with a discussion on the success of ISIS IO campaigns in spite of the air campaign against ISIS militants. He and other panel members expressed frustration with the current air campaign noting that bombing alone cannot defeat the militant organization.

"The terrorist acts of the 90s

and 2000s were a product of Iraqi jihadists being raised under extremist ideology. If we continue to allow this generation of young

Iraqis and Syrians to grow up under that ideology, what fruit will it bare?" asked Baker. "It's amazing that after 14 years of counterinsurgency operations that we think that a war of attrition will work."

### Defense Energy Seminar Details the Challenge of Culture Change

Retired Marine Corps Col. Michael Boyd, Deputy Head of the USMC Engineer and Explosive Ordnance Disposal Advocacy Branch, was just one of several

speakers featured during the Defense Energy Seminar Series this past quarter.

Boyd acts as a liaison between U.S. Marine Corps headquarters and NPS on educational programs involving the efficient use of energy on the battlefield. During his presentation, he spoke on the negative effect of wasting resources during combat operations.

"If we're not efficient with our energy, or usage of energy, we will not be able to rapidly deploy and sustain our forces," said Boyd. "We don't have the money, and we don't have the strategic lift anymore to have huge armies. We need to minimize and optimize our logistics footprint on the battlefield, because the logistics is far more vulnerable to interdictions and threats than the actual operating forces."

Boyd's team is charged with researching ways to change the culture of consumption by conserving fossil fuels and necessary consumables.

"We have to change our ethos of believing it's an inexhaustible asset," said Boyd. "We have to

understand that the movement of fuel is something we need to prevent. We have to be efficient in terms of our acquisition of equipment and equipment items so they are far more efficient than their predecessors."



Retired Marine Corps Col. Michael Boyd talks culture change during one of several Defense Energy Seminars this quarter.

And Boyd emphasizes that implementing energy effectiveness, like many things, starts with education.

"I appreciate that this university has embraced the energy conservation subject," said Boyd. "[This] is something that would not be possible if the Naval Post-

>>> continued on page 6

## CNO Strategic Studies Group Director Fellows Announced

A select group of seven Naval Postgraduate School students will soon be working directly for the Chief of Naval Operations (CNO) on some of the biggest issues facing the Navy thanks to their selection to this year's CNO Strategic Studies Group.

Retired Vice Adm. James Wisecup is the CNO SSG Director, and traveled to NPS to interview several candidates. Wisecup, a former CNO Fellow himself, describes the "spark" that he was looking for in SSG candidates.

"For me as the Director of the SSG, I want people who aren't afraid to stick their nose into a problem," explained Wisecup. "It would be hard for me to lay out a laundry list of qualities, which is part of the reason that I travel out here to meet these people myself."

One of the selectees for this year's SSG is Lt. Andres Otero, studying in

NPS' Department of Systems Engineering. He described the impact he is hoping to have on the Navy and how being a Director Fellow will have an impact on his career.



CNO SSG Director retired Vice Adm. James P. Wisecup, center, and the recently-selected CNO SSG Director Fellows from NPS.

"I think it's a great opportunity to be able to apply real time engineering in a process where the military generally lags," said Otero. "This experience will replace every elevator conversation for the rest of my career. No one is going to ask me about what I did on the Enterprise as a nuke, they are going to ask me about CNO SSG."

This year's SSG35 Director Fellows, and alternates, from NPS are U.S. Navy officers Lt. Luis Aybar, Lt.

Owen Brooks, Lt. James Carbaugh, Lt. Cmdr. Drew Hall, Lt. j.g. Allison Hogarth, Lt. Kyle Kendall, Lt. Karl Kiono, Lt. Andres Otero, and Lt. Cmdr. Nate Robbins.

« continued from page 5

graduate School hadn't taken this on and embraced it in such a meaningful way ... It's enlightening."

**U.S. Border Patrol Chief Guest Lectures at CHDS**

Education and collaboration are important components to keeping the nation's border secure, Chief of the U.S. Border Patrol (CBP) Michael J. Fisher told students in NPS' Center for Homeland Defense and Security (CHDS) Executive Leaders Program (ELP), Aug. 12.

During his 90-minute presentation Fisher discussed the challenges facing the agency as well as its risk-based approach to border security. The agency employs technology and collaboration in its mission to guard the nation's boundaries.

"The Border Patrol and DHS [Department of Homeland Security] does not have the market cornered for getting us to a secure border," Fisher said prior to his presentation. "We are heavily dependent on a whole of government approach. We are really dependent on our state, local and tribal partners. It's not taking a back seat and saying 'when are you guys going to fix this?' The environment is too complex for one component within one agency within one de-



U.S. Border Patrol Chief Michael Fisher speaks at NPS CHDS, Aug. 12.

partment to take on."

Speaking at educational programs offers Fisher an opportunity to communicate CBP's mission and approach while also learning from the diverse professions comprising the ELP student

composition.

"I think the academic community is in a good position to contribute because they are inquisitive by nature and are creative in thinking about the challenges we face," he said. "I learn a lot from these kinds of discussions."

**CCMR Helps Mediterranean Partners Address Crisis in Illegal Migration**

Maritime security experts from some 19 littoral and associated Mediterranean nations, international and regional law enforcement and security organizations, U.S. Combatant Commands and think tanks recently gathered in Athens, Greece to ad-



NPS CCMR gathers maritime security experts from several Mediterranean nations to address the illegal human migration crisis.

dress the growing crisis created by illegal human migration through the Mediterranean Sea.

"What has been going on in Europe since 2014 is not only an unprecedented surge in the number of illegal migrants and asylum seekers," says retired Italian Rear Adm. Alberto Cervone. "Migrants have died in their attempt to cross the Mediterranean, in numbers never seen before, and the European Union has been held responsible for their fate."

"Between January and April of 2015, some 1,600 fatalities were reported in the Mediterranean. People are really desperate. They're willing to take the risk," added retired Navy Capt. and Lecturer Timothy Doorey with NPS' Center for Civil Military Relations (CCMR).

According to Frontières Ex-

térieures (Frontex), a European Union (EU) agency that facilitates cooperation between national border guards throughout the EU, illegal passage by sea through the Mediterranean saw a 300 percent increase in 2015 compared to 2014.

The CCMR-coordinated workshop addressed this problem in conjunction with the Marshall Center and the Hellenic Coast Guard with funding from the Counter Terrorism Fellowship program. U.S. European Command (EUCOM), particularly its J9 Interagency Partnering Directorate, was an important workshop participant. The EUCOM J9 office leads EUCOM's efforts

to integrate agencies, academics, NGOs, and private sector partners with a "Whole of Society" approach to illegal migration and other issues.

"This conference was another important step in our efforts to build interagency consensus among allies and partners for a collaborative approach to addressing maritime transnational security threats in the Mediterranean," said J9 Liaison to NATO and the EU, ret. U.S. Army Lt. Col. Chris Kremidas.

**Ensigns Continue Advanced Education at NPS Through Bowman Scholar Program**

The summer quarter brought a crop of fresh-faced Ensigns directly from the U.S. Naval Academy, all participating in an ac-

celerated, one-year mechanical engineering program as part of a select group of 2015 Bowman Scholars. These officers earn special appointments to the Navy's



Two of NPS Bowman Scholars, Ensigns Stephen Arceneaux, left, and Eric Bermudez.

nuclear power training pipeline through the prestigious Adm. Frank Bowman Scholars Program.

"When I was appointed a Bowman Scholar, I was most excited about the expanded opportunities to further the Navy's goals through research and continued education," said Ensign Stephen Arceneaux.

Ensign Eric Bermudez echoed this sentiment, noting he looks forward to expanding his knowledge in cutting-edge fields, especially unmanned systems design and controls.

"The study of robotics and control systems has always fascinated me, and I'm looking forward to learning the science behind the technology and working with the vast amount of tools here at NPS to accomplish my degree and thesis," said Bermudez.

Selected during their junior year at the Naval Academy, Bowman Scholars perform an advanced research internship and a special research-based learning opportunity prior to graduating from the academy. Most Bowman Scholars then attend the accelerated program here at NPS. Following graduation, Arceneaux and Bermudez will attend Nuclear Power School in Goose Creek, S.C., for further training and early selection into the Nuclear Navy.

**IR**

**NPS Provost Honored With Navy Distinguished Civilian Service Award**

University Provost Dr. Douglas A. Hensler received the Navy Distinguished Civilian Service Award during a brief ceremony in Herrmann Hall, Sept. 28. Hensler retired from the institution to spend more time with his wife Janie and the rest of his family in their home state of Oregon.

"As many of you have noticed I have moved around quite a bit in my career and I wouldn't be standing here without all the support from my wife, Janie. She has been my rock. This award really is a tribute to her," said Hensler, with NPS President retired Vice Adm. Ronald A. Route also recognizing Janie Hensler with a Certificate of Appreciation.

"Our product at NPS is intellectual capital knowledge. We create a special product for our students, and many people won't understand the nature of that product," continued Hensler. "We need to educate those that don't understand this, and how valuable our product truly is."

Hensler's academic achievements include a

BSE in Aerospace and Mechanical Sciences from Princeton University, an MBA from the University of Portland, and a Ph.D. in Finance from the University of Washington. He is also a licensed professional engineer in Quality Engineering in the State of California. Hensler became the Naval Postgraduate School Provost in June 2013.



Provost Dr. Douglas Hensler accepts the Navy Distinguished Civilian Service Award.

**Latest Warfare Innovation Workshop Focused on Asymmetric Warfare**

NPS' Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) held the latest edition of its popular Warfare Innovation Workshop (WIW) in Glasgow Hall, Sept. 21-24. NPS Warfare Innovation Chair Navy Capt. Jeff Hyink discussed how past workshops have inspired student research and contributed to the quality of the NPS experience.

"We have many things that come to NPS in the form of questions, challenges, money and expertise," said Hyink. "Innovation workshops bring your focus to bare on a handful of these inputs."

According to CRUSER Director Dr. Ray Beuttner, the WIW intends to create real-world, real-time changes in the Department of Defense.

"Our job is to not do what everyone else does in the Navy," said



Capt. Jeff Hyink presents at the 2015 Warfare Innovation Workshop.

Beuttner. "We are looking for different ideas and we're trying to create environments where new things can happen."

"Engineers and scientists working for the government created the predecessor to the Internet and then industry took off with it. Robotics and unmanned systems will do the same thing," he added.

As directed by the Secretary of the Navy, CRUSER supports the Navy's mission through education and research in the fields of unmanned systems and robotics

and is funded through the Office of Naval Research.

**Professor Aruna Apte Honored With Hamming Award**

Graduate School of Business and Public Policy (GSBPP) Associate Professor Aruna Apte has been awarded the 2015 Richard W. Hamming Award for Achievement in Teaching.

"I'm very thrilled to receive this award," said Apte. "I have received more than 50 e-mails, some of them from my students,

congratulating me, which makes me feel very good."

The Hamming Award recognizes NPS faculty members for outstanding teaching, excellence in thesis supervision, and for the strength of their contributions to



Dr. Aruna Apte

NPS students beyond the classroom.

"Dr. Apte is by far one of the best professors I have had," said U.S. Marine Corps Maj. Joshua Gregory. "On multiple occasions, she has taken time out of her own schedule to get to know her stu-

dents and their families. She is a teacher, a mentor, and a true role model to her students."

Apte's research interests in HADR operations led her to develop and teach an acclaimed course on the subject. She has advised nearly 100 students completing 46 theses, eight of which were recognized as outstanding by GSBPP, and two of which earned the Surface Navy Association Award for Academic Excellence in Surface Warfare.

**Faculty Experience the Navy Firsthand Through Scientists at Sea Program**

NPS Department of Information Sciences Research Associate Professor Ying Zhao and Lecturer Tony Kendall joined fellow scientists on board USS Howard (DDG 83) for an embarkation of the Scientists to Sea program. The effort provides academics and scientists who work on advanced defense

## Space Systems Professor Assumes Position of Acting Provost

Space Systems Academic Group (SSAG) Professor James H. Newman officially assumed the position of Acting Provost, Oct. 5. As he steps into his new role on campus, he noted his first order of business is to continue the efforts of former university Provost Dr. Douglas A. Hensler, who retired from the institution in early October to spend more time with his family.

“My first responsibility is to continue Provost Hensler’s work as Provost and Academic Dean, in particular, to maintain the academic standards and accreditation at NPS,” Newman said. “There is much the Provost is expected to do, but at the core of this responsibility is supporting the education of our Navy and Marine Corps officers, and their joint service and international colleagues, especially in our

current times of fairly stringent fiscal and budgetary constraints.”

Newman has been an enthusiastic teacher and researcher on campus in his role as Professor and Associate Chair of the SSAG especially in the fields of small satellites and orbital mechanics. While his new responsibilities of Acting Provost will dominate his time, he does still intend to continue some teaching and research in space systems.

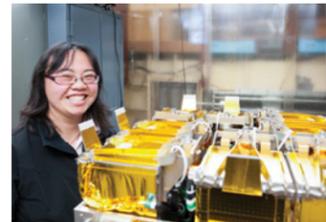


Acting Provost Dr. James Newman

“While Acting Provost, I intend to keep up with the Space Systems program here at NPS,”

Newman said. “My teaching and applied research in the fields of very small satellites is important to me and valuable for the Navy, and I will continue to work with thesis students and the research in the lab whenever possible.”

recognition during the 29th Annual AIAA SmallSat Conference in Logan, Utah, Aug. 13. NPS collaborated with California Poly-



Space systems research assistant Wenschel Lan

technic State University, San Luis Obispo, the Georgia Institute of Technology in Atlanta, and both government and industry representatives on the project.

SSAG has had a hand in putting 33 small satellites into space. This was its first launch from Cape Canaveral, Florida.

### Physics Professors Honored With Prestigious Electronic Warfare Award

NPS, Directed Energy Physics Group (DEPG), Research Associate Professor Joseph Blau, Research Assistant Professor Keith Cohn and Distinguished Professor Emeritus William Colson, has been honored with the Association of Old Crows Technology Development Award in the directed energy category.

“It’s meaningful to us that our accomplishments are being recognized by an organization whose scope is much broader than the DE [directed energy] field that we work in,” said Cohn. “It could enable us to establish relationships with others who work in related EW [electronic warfare] fields, potentially leading to new collaborations that would enhance our research and benefit our students, NPS and the Navy.”

The DEPG has been studying directed energy at NPS for the last 25 years. Nearly 100 students have received advanced degrees under the group’s guidance.

“Many of these students have

gone on to hold high-ranking positions in the Navy’s various directed energy programs,” said Cohn. “This award recognizes the totality of this body of work and influence.”

Past DEPG students include a number of notable leaders in the DE and EW fields, such as retired Navy Capt. Roger McGinnis, former director of the NAVSEA Directed Energy office; retired Navy Capt. Dave Kiel, former program manager for the Laser Weapon System (LaWS); and recent graduates like Cmdr. Ricardo Vigil, who is working on a next generation laser weapon that will eventually replace the LaWS.

“The recognition of our group illustrates NPS’ value to the Navy, especially with respect to cutting edge technologies like directed



Department of Physics faculty Drs. Joseph Blau, Keith Cohn, and William Colson, from left

energy,” said Blau.

The Association of Old Crows is an organization of individuals with common interests in electronic warfare, information operations, and other information-related capabilities. With members in 47 countries, AOC’s membership includes executives, scientists, engineers, managers, operators, educators and military personnel.

### NPS Physics Professor Named Fellow by American Physical Society

NPS Department of Physics Professor Gamani Karunasiri has been named a Fellow of the American Physical Society (APS). Karunasiri has become well known in his field for efforts in the development of quantum detectors and

micro-sensors.

“I was not expecting this,” said Karunasiri, who was named Fellow after his first nomination to the APS. Only one-half of one



Dr. Gamani Karunasiri

percent of all APS members are named fellows.

“I’m an experimentalist working primarily on sensors in three different areas, one of which is THz [tetrahertz] imaging,” said Karunasiri. “I think we have created a very good sensor. Now we need to package it for field use.”

Karunasiri has mentored five PhD students, supervised more than 40 master students, and co-supervised many others.

“They are the next generation. I need to train them to do research properly. That is why I always go down to the lab to participate with them,” said Karunasiri. “It is important for them to think independently. I guide them in the beginning and then let them carry [the work] forward.”

### Distinguished Professor Honors Conferred at Graduation Ceremony

NPS Department of National Security Affairs Professor David Yost was formerly conferred the title of Distinguished Professor during the university’s Summer Quarter Commencement ceremony in King Auditorium, Sept. 25. Yost was recognized for his scholarly contributions to NPS, the Department of Defense, NATO and academic institutions around the world.

“I feel profoundly grateful and honored to have been awarded

this title,” said Yost. “After many years as a professor, my responsibilities remain the same. I teach and conduct research about European politics and security issues.”

Those issues include matters of strategic import like military deterrence, missile defense, and the organizational structures of allied forces. Yost has found a receptive audience in the students who rely upon him to make sense of organizations like NATO and the European Union.

“NPS students are preparing to work with U.S. allies and partners around the world,” said Yost. “They are highly motivated to learn about ongoing and emerging security issues, and about the challenges of working with allies and partners in various types of operations.”

Since joining NPS in 1979, Yost has served as the lead advisor or co-advisor on 171 master’s theses and received the Outstanding Research Achievement Recogni-



Dr. David Yost

tion four times. He is the author of over 200 publications and has held fellowships from Fulbright, NATO, the Council on Foreign Relations, the Woodrow Wilson International Center for Scholars, and the United States Institute of Peace.

### Long-Time Faculty Member Appointed to SES

NPS Department of Mechanical and Aerospace Engineering (MAE) Professor and past Chair Dr. Knox Millsaps was presented with the Navy Superior Civilian Service Award in front of Her-

rmann Hall, Sept. 11. Millsaps bids farewell to NPS after 23 years on campus to serve in the Senior Executive Service.

“While I am happy to be moving on to face new challenges and opportunities, I will miss many aspects of NPS,” said Millsaps. “NPS has a unique mission and a really special faculty and staff that serves that mission.”

Millsaps has served in various



Dr. Knox Millsaps

academic, directorship and chairman positions at NPS from 1992 to the present. He has advised nearly 100 students over that span, and says it’s one of the aspects of his tenure at NPS that he will greatly miss.

“I will miss the officer students the most,” Millsaps noted. “Teaching in the classroom was always very enjoyable, but the one-on-one interactions with my thesis students were really special.

“I’ve had the tremendous opportunity to have about 100 master, mechanical engineer, and doctoral students during my 23 years on the faculty,” he continued. “Probably second to that is the young faculty I hired as department Chairman, who will carry the torch for decades to come and make NPS even better.”

Millsaps’ appointment to the Senior Executive Service was announced in the July issue of “Executive Anchors.” He will serve as the director of the Office of Naval Research Aerospace Science Research Division. **IR**

« continued from page 7

technology with a first-hand view of naval vessels and systems in action.

“We were able to see what exactly is needed on a Navy destroyer, as well as the current



Faculty see the Navy first-hand through Scientists at Sea program.

state-of-the-art with the Aegis combat system,” said Zhao. “We were particularly interested in the process of combat ID decision making, and how big data and deep learning might improve

the process.”

“I think researchers need to be more out in the fleet as a sanity check,” added Kendall. “We were not unwelcomed visitors, rather we were part of the Plan of the Day and we could see anyone and go anywhere we wanted. Even the captain made himself available for questions and later even came by and discussed our follow on questions.”

The scientists’ host on the ship was plenty familiar with NPS, USS Howard Commanding Officer Capt. John Fay graduated from the Department of Information Sciences in 2004, and shared great memories of his time on campus with the visiting professors.

“[Capt. Fay] is a proud alumnus of NPS, and he represents the best of our school and community,” said Zhao. “He has many fond memories of NPS, and his adviser, Dr. Alex Bordetsky. He is

very professional, and very knowledgeable about the ship and its combat systems aboard.”

### SSAG Gets Lift in Small Satellite Mission of the Year Competition

Space Systems Academic Group Research Assistant Wenschel Lan was part of a team of researchers in the LightSail Spacecraft Test Mission recently named Mission of the Year by the American Institute of Aeronautics and Astronautics (AIAA).

“We redesigned the [satellite’s] splitter auxiliary device for this mission,” said Lan. “NPS plays an integral part in pushing the limits of existing [small satellite] technology and the knowledge base in the aerospace industry.”

The Planetary Society’s citizen-funded LightSail Spacecraft Test Mission was one of 11 small satellite projects nominated for



Faculty from the Naval Postgraduate School's Defense Resources Management Institute (DRMI) gather for a group photo in front of the institute's spaces in Halligan Hall. DRMI celebrates its 50th anniversary in 2015, established in 1965 by then Secretary of Defense Robert McNamara.

## NPS' Defense Resources Management Institute Turns 50

By Kenneth A. Stewart

After 50 years, and more than 50,000 students, DRMI continues providing U.S. and international partners with a one-of-a-kind professional education program in analytical decision making and resources management.

The Defense Resources Management Institute (DRMI) at the Naval Postgraduate School (NPS) in Monterey, Calif., is celebrating 50 years of educating defense leaders with an eye toward creating sound fiscal policy and the efficient allocation of precious defense resources.

DRMI's mission can perhaps be best summed up in the words of former British Prime Minister Winston Churchill

who said, "Gentlemen, we have run out of money. Now we have to think."

Since its first course in 1965, DRMI has educated 34,841 U.S. students and 20,258 international students from 171 different nations.

*"Our goal is to develop a broad-based analytical framework for defense decision makers emphasizing the economic and efficient allocation of defense resources, and to provide an environment for the comparative exchange of ideas related to the management of national security."*

Dr. Natalie Webb  
Executive Director, DRMI

DRMI graduates include prominent world leaders like His Majesty King Abdullah of Jordan, ministers of defense, ambassadors, and other dignitaries from around the globe.

"Our goal is to develop a broad-based analytical framework for defense decision makers emphasizing the economic and efficient allocation of defense resources, and to provide an environment for the comparative exchange of ideas related to the management of national security," said DRMI Director Dr. Natalie Webb.

Under Secretary of Defense (Comptroller) and Chief Financial Officer, the Honorable Mike McCord recently weighed in on

DRMI's continued contributions toward the education of DOD policy makers during a celebration honoring DRMI's 50th anniversary.

"Many things have changed over the last 50 years, from the Cold War to a man walking on the moon and the fall of the Berlin Wall. For

DRMI to stay relevant over this period of incredible change is a remarkable testament," he said.

The Navy Management Systems Center, which eventually became DRMI, was established in 1963 by then Secretary of Defense Robert McNamara. Before he became the leader of DOD, McNamara was the CEO of the Ford Motor Company, and he attempted to apply some of the private sector economic principles that led to his successes at Ford to the DOD.

"McNamara installed the Planning, Programming and Budgeting System [PPBS], which is still in use today. It requires good economic analysis, because the main problem in defense economics is the allocation of scarce resources among many competing interests under conditions of uncertainty," explained NPS Professor Emeritus Dr. James Blandin.

Blandin, whose father was one of DRMI's founders, taught at NPS for 34 years. He notes that McNamara's push to implement the PPBS system was frustrated by a lack of people qualified to use it. As a result, McNamara directed the founding of a center that could be used to develop people with the skills necessary to realize his vision. The decision to stand-up that center at NPS was driven by recognition of the NPS faculty's experience in defense-focused graduate education.

Later, during President Lyndon Johnson's administration, a PPBS system similar to the one used by the DOD was enacted throughout the federal government, and civilians began to join DOD professionals at NPS to receive the education necessary to ensure its success.

DRMI rose to McNamara's challenge and remains true to its core mission.

Like the university itself, however, DRMI has also extended its faculty expertise to our international partners by providing resource management courses to allied defense professionals from around the world.

"[DRMI's] international participation has been invaluable to the U.S. It creates a linkage between the U.S. and other nations, and we have had some illustrious people come through and go on to do some pretty amazing things ... Over the years, we have received a tremendous value for the dollar that we spend [at DRMI]," said McCord.

In 1970, NPS offered its first Senior International Defense Management Course, or SIDMC. SIDMCs are comprised of senior defense leaders from around the world who gather to listen to a variety of subject matter experts, NPS faculty, and each other for four weeks at NPS. SIDMC students also participate in an exercise designed to test their ability to allocate resources amongst competing interests.

"If we're successful, the participants will think about their national security at a strategic level, and gain a new perspective and additional tools for managing their organization's resources to respond to contemporary security challenges," said Associate Professor Eva Regnier.

Assistant Minister for Plans, Policy and Operations Victoria K. Sawyer with the Liberian Ministry of Defense is a SIDMC graduate.

"This sort of international cooperation helps to change minds and creates greater understanding," said Sawyer. "Strategic planning, value for cost thinking, decision making, and most importantly, accountability and transparency ... That is what my country needs most."

SIDMC successes at DRMI led to the creation of the International Defense Management Course (IDMC) in 1971. Like the SIDMC, the IDMC aims to arm students from allied nations with resource management and other fiscal planning tools, but it is geared toward mid-level officers and defense civilians.

When the Soviet Union fell in 1991, demand for DRMI expertise increased further. Former Soviet republics began to turn to the U.S. for assistance as they developed new economic policies within their re-

spective defense ministries and departments.

"Countries that had previously been in the orbit of the Soviet Union became new democratic states. When countries in the Balkans, Poland, Hungary and Slovakia gained independence they looked to the U.S. to help them with their educational programs, and DRMI was called upon," said Blandin.

And while DRMI has been offering courses to international students from nearly day one, on the heels of its successes among the former Soviet Republics, it increased its mobile course offerings, bringing DRMI and NPS expertise to more than 70 different nations worldwide. DRMI International Programs Coordinator Al Polley believes there are several benefits to bringing DRMI courses to allied nations.

"Teaching abroad is efficient. We can teach 30-40 people for what it would cost to teach only three people attending a resident course at NPS. When teaching overseas, we also benefit from our ability to use local interpreters to overcome language barriers and are able to tailor our courses to issues relevant to our host nation," said Polley.

As McCord, and other defense leaders spanning five decades, can attest, DRMI has made a lasting contribution to the DOD's ability to allocate and manage defense resources and has helped to shape the defense departments and ministries of allied nations around the world. ■■

### In Review – NPS' Defense Resources Management Institute



The Defense Resources Management Institute (DRMI) conducts professional education programs in analytical decision making and resources management for military officers of all services, and senior civilian officials of the United States and abroad. DRMI was established in 1965 as an educational institution by the Secretary of Defense.

#### DRMI Goal

Enhance the effective allocation and use of resources in modern defense organizations.

#### DRMI Principal Focus

Develop an understanding and appreciation of the concepts, techniques, and analytical decision making skills related to defense resources management.

#### Courses Offered

Defense Resources Management • International Defense Management • Senior International Defense Management Course • Multiple Criteria Decision Making Course • Risk Management Course • Performance Management and Budgeting Course • Human Capital Resources Management Course

#### Notable Graduates

King of Jordan • President of Albania • President of Lebanon • Colombian Ambassador to South Korea • Lithuanian Minister of Defense • Malawi Minister of Defense • Several Chiefs/Deputy Chiefs of the General Staff



NPS Professor John Arquilla, left, and retired U.S. Army Gen. Stanley A. McChrystal, right, discuss McChrystal's famed military career and his call for greater citizenship during a Secretary of the Navy Guest Lecture at King Auditorium, July 15. Arquilla likened the occasion to a meeting with Gens. Patton, Bradley or Eisenhower 70 years ago.

▶ WATCH THE INTERVIEW: [YOUTUBE.COM/NPSVIDEO](https://www.youtube.com/npsvideo)

## A Warrior's Legacy – McChrystal Shares His Story

By Kenneth A. Stewart

Former Secretary of Defense Robert Gates referred to him as “perhaps the finest leader of men in combat I have ever met.”

Retired U.S. Army Gen. Stanley McChrystal's military resume speaks for itself. He led a coalition of 45 nations as the commander of U.S. and International Security Assistance Forces (ISAF) in Afghanistan, ran the Joint Special Operations Command, and chased SCUD launchers during the Gulf War, just to name a few highlights.

Since retiring from the Army, McChrystal has been writing books, teaching leadership at Yale University, and calling for greater citizen engagement through the Franklin Project. He sat down with Naval Postgraduate School (NPS) Department of Defense Analysis (DA) Professor Dr. John Arquilla, July 14, in the university's King Auditorium to share his perspective with students, and to articulate his vision for the future.

“This is a really special occasion,” said Arquilla. “If this were 70 years ago, it would be like being able to get together with Omar Bradley, George Patton or Dwight Eisenhower.”

In these last nearly 14 years of conflict, Arquilla continued, Gen. McChrystal has been at the heart of U.S. campaigns and his presence on campus offers an incredible opportunity to NPS students. During the candid, and at times humorous discussion, McChrystal presented a series of snapshots from his past, sharing what Arquilla called his “origin story.”

Retired Army Gen. Stanley McChrystal  
Former Commander, International Security Assistance Force Afghanistan

The son and grandson of career military men and the oldest of six brothers, who all served in the military, and a sister who married a Soldier, McChrystal's was the poster family of military families. “I [even] married a girl whose father was a Soldier and her brothers were Soldiers. You get the picture,” he quipped.

But to surmise from his upbringing that McChrystal was your

typical, straight-laced, toe-the-line military man would be to dismiss much of what would ultimately lead to his success as a military leader. McChrystal's career, from his oft-in-trouble days at the U.S. Military Academy at West Point to his penchant for challenging the status quo in Iraq and Afghanistan, reveals a man who was anything but typical.

He learned early on to think independently, and throughout his career, the advantages of doing so were re-enforced. In Western Iraq, McChrystal was charged with defeating Sadaam Hussein's SCUD missiles, something that “proved to be unbelievably difficult,” he said.

“We studied the system and tried to go after the SCUDs. We weren't hugely successful, we suppressed more than we destroyed, but it was very instructional for me,” McChrystal explained, because it was a strategic level operation with tactical complexity. The SCUD operation would lead McChrystal to adopt a systems approach to military tactics that would surface again at later dates in both Afghanistan and Iraq.

After 9/11, McChrystal led forces during Operations Iraqi Freedom and Enduring Freedom, conflicts that Arquilla called “campaigns in the world's first great war between nations and networks.”

“I was put in command of Joint Special Operations Command (JSOC) in October of 2003 and went over to Iraq. [But] there was a group of people who said the war is over, JSOC should come home,” McChrystal said, but he disagreed with that sentiment.

“I toured all of the bases and was literally floored ... We were just not organized to accomplish the scope of what we were trying to do,” he continued. “We were not focused. We were doing these short tours with good people and good intentions, but not the right people, at the right time, with the right level of seriousness.”

“I said, ‘this is going to get ugly and it's going to be a long fight.’ I felt that I could see where this was going ... I came to the conclusion that we were going to have to take a very different approach.”

McChrystal again found himself following a systemic approach to strategy. “We were doing the best we could, going out at night and hitting targets, but the war kept getting worse,” he said. “The first thing that we had to do to was to create a consensus amongst the leaders to change and to galvanize ourselves to understand that we as a group had to figure out what we were going to do.”

Change would come ... He and members of his leadership team were able to get units, operating largely independently due to technological shortcomings and isolation, to come together forming a single network that could face an enemy as a unified force.

McChrystal eventually came to the conclusion that he was not fighting a hierarchy, but rather a largely flat network that shared information, propaganda and other sources of information immediately over commercial networks. He witnessed this agile enemy react to what their peers were doing on an immediate scale, leveraging the expertise of others outside Iraq.

Once that realization was made, McChrystal said, he and his forces were able to counter it, and he would later draw upon those lessons learned while leading a 45-nation coalition in Afghanistan.

In Afghanistan, as in Iraq, McChrystal faced a local population that was frustrated and had lost confidence in both the coalition and in its own government. To complicate matters further, coalition allies became restless upon realizing that they had committed to something far more volatile than peacekeeping.

“We had a crisis in confidence ... When people are unconfident they hedge their bets,” he said.

In McChrystal's estimation, that same “crisis in confidence” is a large part of the calculus that affects the ability of regional and Western powers to counter the so-called Islamic State.

“It's starting to be a lack of American credibility,” McChrystal ex-

plained. “I am not blaming this on anybody, but if your enemy does not fear you and thinks that you are not going to stay the course, then they are willing to put up with things for a long, long time.”

“American credibility, sense of resolve and sense of ability are not what they once were. They're going to have to be rebuilt, not by a speech or a paper ... but by patient long-term action,” McChrystal continued.

McChrystal discusses many of his ideas in his latest book, “Team of Teams: New Rules of Engagement for a Complex World” in which he calls for a radical redesign of organizations.

“You cannot just empower people to go down and execute unless you empower them with an unprecedented level of information, what we call ‘shared consciousness.’ It's transparency at a level that gives people a contextual understanding,” explained McChrystal.

Before answering questions directly from the NPS student audience, McChrystal touched on the importance of human capital and empathy, arguing that it is critically important to know people and to understand the background and information that they are relying upon to make decisions.

“The moment you think ‘they just don't get it,’ you are really in trouble,” he said. ■

## NPS Legacies Exhibit in Development at Dudley Knox Library

Naval Postgraduate School Professor of Practice retired Navy Capt. Wayne Hughes donated an extensive collection of his personal journals, research notebooks and correspondence, encompassing six decades of his own development as a naval officer and strategist to the university's Dudley Knox Library (DKL) for an upcoming exhibit entitled, “NPS Legacies.”

DKL staff say the treasure trove of documentation illustrates Hughes' transition from junior officer to renowned strategist.

“As I leaf through Capt. Hughes' diaries, school notebooks, other notations and the reams of correspondence that he wrote over 60 years, I can witness his transformation from being a young naval officer ... to a man who is refining his intellect and becoming a supreme naval strategist,” said Jason Leyk.

In Hughes' own words, his development as an officer was born of pushing boundaries and thinking deeply about naval challenges.

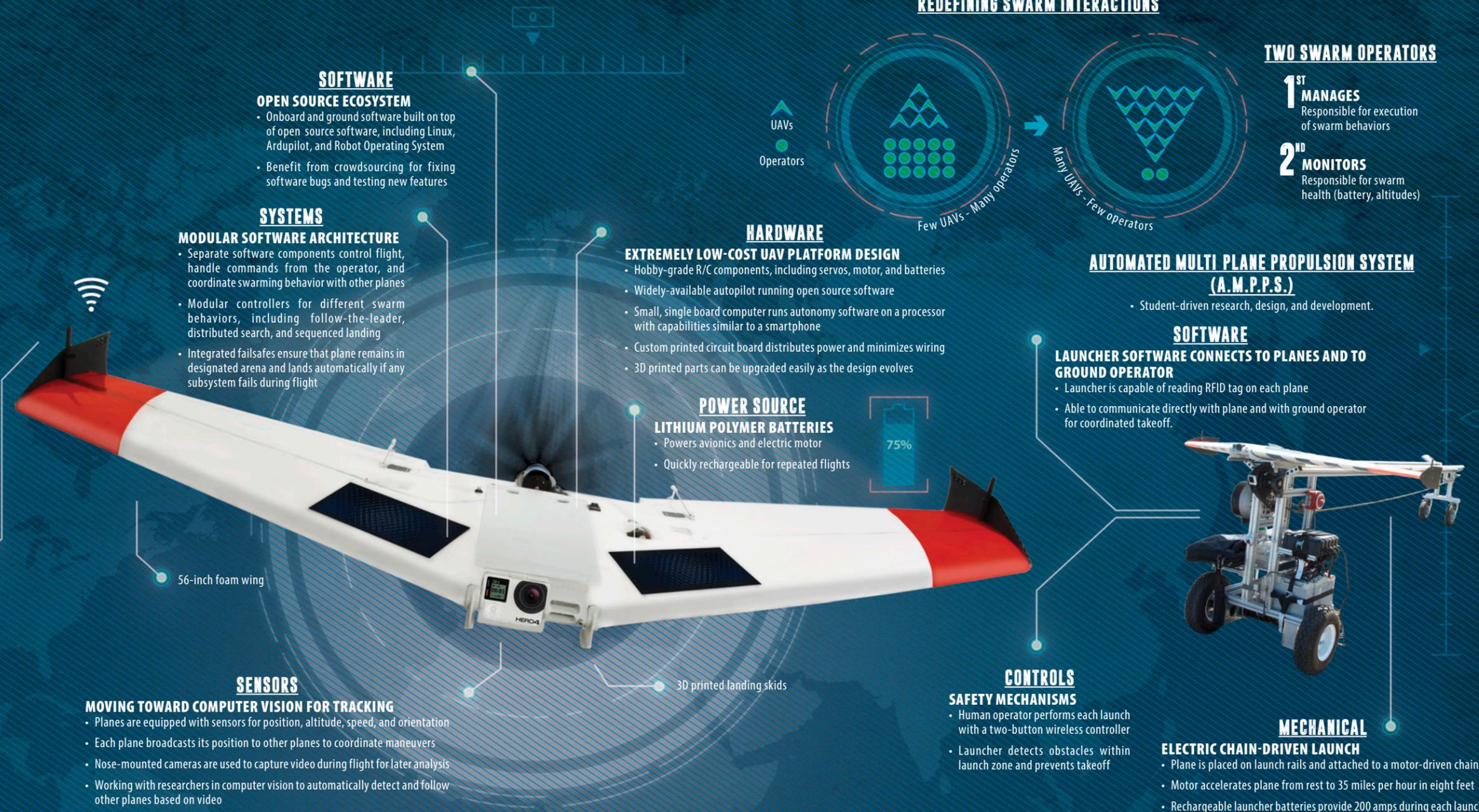
“I believe the development and maturity of an officer won't come with sunbathing thoughts, but with challenging oneself, with thinking of far-reaching operational and tactical matters,” Hughes said.

Leyk, a seasoned researcher who came to NPS from the National Archives, is working with NPS Special Collections Manager John Sanders on the Hughes collection and the “NPS Legacies” exhibit. They hope to open the exhibit by early 2016.

# FIFTY & COUNTING

NPS' Advanced Robotic Systems Engineering Laboratory (ARSENL) successfully flew 50 autonomous unmanned aerial vehicles (UAV) simultaneously, Aug. 27, setting what is believed to be a world record for UAVs controlled by a single operator. The 50 UAVs were launched and flown autonomously in two 25-unit sub-swarms, and guided using ARSENL-developed operator interfaces. The UAVs performed basic leader-follower cooperative behaviors and exchanged information amongst themselves via wireless links.

Up next, ARSENL Director Dr. Timothy Chung hopes to advance control algorithms for his swarming UAVs. Ultimately, the ARSENL team is leading toward a swarm vs. swarm, 50 vs. 50 UAV challenge next summer.



## REDEFINING SWARM INTERACTIONS

### TWO SWARM OPERATORS

- 1<sup>ST</sup> **MANAGES**  
Responsible for execution of swarm behaviors
- 2<sup>ND</sup> **MONITORS**  
Responsible for swarm health (battery, altitudes)

### AUTOMATED MULTI PLANE PROPULSION SYSTEM (A.M.P.P.S.)

- Student-driven research, design, and development.

#### SOFTWARE

##### LAUNCHER SOFTWARE CONNECTS TO PLANES AND TO GROUND OPERATOR

- Launcher is capable of reading RFID tag on each plane
- Able to communicate directly with plane and with ground operator for coordinated takeoff.



#### MECHANICAL

##### ELECTRIC CHAIN-DRIVEN LAUNCH

- Plane is placed on launch rails and attached to a motor-driven chain
- Motor accelerates plane from rest to 35 miles per hour in eight feet
- Rechargeable launcher batteries provide 200 amps during each launch
- Launcher is drivable, can be turned into favorable winds for takeoff

#### SOFTWARE

##### OPEN SOURCE ECOSYSTEM

- Onboard and ground software built on top of open source software, including Linux, Ardupilot, and Robot Operating System
- Benefit from crowdsourcing for fixing software bugs and testing new features

#### SYSTEMS

##### MODULAR SOFTWARE ARCHITECTURE

- Separate software components control flight, handle commands from the operator, and coordinate swarming behavior with other planes
- Modular controllers for different swarm behaviors, including follow-the-leader, distributed search, and sequenced landing
- Integrated failsafes ensure that plane remains in designated arena and lands automatically if any subsystem fails during flight

#### HARDWARE

##### EXTREMELY LOW-COST UAV PLATFORM DESIGN

- Hobby-grade R/C components, including servos, motor, and batteries
- Widely-available autopilot running open source software
- Small, single board computer runs autonomy software on a processor with capabilities similar to a smartphone
- Custom printed circuit board distributes power and minimizes wiring
- 3D printed parts can be upgraded easily as the design evolves

#### POWER SOURCE

##### LITHIUM POLYMER BATTERIES

- Powers avionics and electric motor
- Quickly rechargeable for repeated flights



#### COMMUNICATIONS

##### PEER-TO-PEER NETWORKING FOR DISTRIBUTED SWARMS

- WiFi-based communications allows planes to broadcast their position and flight status, and to receive commands from the ground operator
- Once commanded, planes can coordinate swarm behavior among themselves
- Communications are designed to function in the face of lost messages
- Backup link allows communication directly between ground and individual planes
- R/C receiver allows pilot to take manual control of any plane if it experiences a problem in flight

#### SENSORS

##### MOVING TOWARD COMPUTER VISION FOR TRACKING

- Planes are equipped with sensors for position, altitude, speed, and orientation
- Each plane broadcasts its position to other planes to coordinate maneuvers
- Nose-mounted cameras are used to capture video during flight for later analysis
- Working with researchers in computer vision to automatically detect and follow other planes based on video

#### MISSION CHALLENGES

- Aim is to launch and fly 50 planes together in a swarm
- Limited battery life constrains flight time to 45-50 minutes
- Once launched, aircraft will perform two follow-the-leader formations, each consisting of 25 planes
- All aircraft must be launched in less than 30 minutes to successfully swarm and land safely

#### LEADER FOLLOWER BEHAVIOR

- 1 - For each follower UAV:
- 2 1. Get current heading of the leader UAV
- 3 2. Compute leader UAVs' expected position in the future
- 4 3. Determine a fixed distance and relative bearing offset from the leader's future position (e.g. "follow directly behind, 50 meters")
- 5 4. Specific new commanded position for follower UAV

#### EVOLUTION OF SWARM UAV CAPABILITIES



#### SWARM PHASES OF OPERATION





U.S. Marine Corps Capts. Daniel Katzman and Michael Herendeen, front left to right, are working with NPS Associate Professor and ret. U.S. Army Col. Andy Hernandez, center, to apply their diverse respective areas of study to the Expeditionary Energy Office needs. Katzman is looking into different solar cell technologies, while Herendeen is performing an optimization study into fuel efficiency.

## NPS, Marine Corps Partnership Enhances Readiness Through Education

By Kenneth A. Stewart

In 2009, then Commandant of the Marine Corps Gen. James Conway declared energy a top priority. Mere weeks later, the U.S. Marine Corps' Expeditionary Energy Office (E2O) was born and tasked with analyzing, developing and directing the Marine Corps' energy strategy.

"The expeditionary energy office works for the Commandant of the Marine Corps with a mission to innovate and develop the Marine Corps' energy strategy," said current E2O Director Col. Jim Caley.

As head of the program, Caley says the work he does is about directly supporting the Marine Corps' primary mission. While conservation is a priority, he says, his work is not about creating a 'green' Marine Corps.

"We don't do green," said Caley. "The work that we are doing is about getting our Marine units further down the battlefield. If your energy does not get you far enough on the battlefield to get to the enemy, you can't kill them."

Sounds straightforward enough, but to do that, the Marine Corps

required a pool of operationally-savvy academics with the right mix of officer students and researchers with the time and ability to explore the Marine Corps' most demanding energy challenges. The Marine Corps found just that combination at the Naval Postgraduate School (NPS).

"The academic community here at NPS provides outstanding benefit to the Marine Corps and the job of the Expeditionary Energy Office," said Caley. "Those benefits include things like getting students to study in the energy space, and not specifically in engineering, but in areas like operations analysis and in the business school where students are looking at different practices."

Retired Army Col. and NPS Associate Professor Andy Hernandez leads NPS' efforts to support the E2O Office. Along with his own specific research for E2O, his primary objective is to match NPS faculty and students with Marine Corps' energy research needs.

"The research that E2O requires is inherently multidisciplinary and ranges from social and political sciences to engineering and math-

ematical disciplines," explained Hernandez. "E2O provides a venue in which students can apply their newly-acquired technical skills. These opportunities reinforce classroom lessons at NPS and crystallizes them for real problems.

"At the same time, NPS is able to identify its own knowledge gaps," he continued. "It highlights areas that NPS can strengthen in its academic programs to continue to be a relevant education and research arm for the naval community and the Department of Defense."

One of those students is Marine Corps Capt. Michael Herendeen. He is using his thesis in the Graduate School of Business and Public Policy (GSBPP) to look for fuel saving efficiencies by optimizing the manner in which the Marine Corps deploys its premiere combat unit - the Marine Expeditionary Brigade (MEB).

Herendeen's thesis, "Movement of Fuel Ashore: Storage, Capacity, Throughput & Distribution Analysis," explores the manner in which fuel is moved ashore during MEB operations. He notes that in the absence of contracted fuel delivery, the Marine Corps' fuel delivery operations are limited.

"In light of that problem set, I am looking at how we vary utilization rates and how we use our equipment in those operations. I want to understand how a marginal change in how we conduct operations mitigates the issue.

But Herendeen is not just looking at how fuel is brought ashore. He is looking at how it is used once it gets there as well.

"It's less conservation and more operational efficiency," Herendeen explained. For example, when you land a MEB, and move all of

its associated equipment ashore, there are a lot of decisions that have to be made. When do it move ashore? Who goes ashore? What do they do when they get there?

"Conservation is one of way putting it, but it's really about how to efficiently use our forces given our [fuel] capacity issues," added Herendeen.

Herendeen is utilizing the Marine Air-Ground Task Force power and energy model (MAGTF) to conduct his analysis of MEB force composition and deployment options. The MAGTF helps him to analyze fuel outputs down to the gallon per MEB vehicle, and allows him to forecast the demand side of various MEB deployment options.

"Right now we are looking at five different force compositions. What differs between them is when you land certain elements of combat power, specifically different unit types," noted Herendeen. "For example, do we land as many tanks as we can on day one, or do we phase tank deployments out between day one and day 50?"

"We have spread that methodology throughout the whole spectrum of MEB operations with our left and right lateral limits in mind. It's the same process when we look at the tempo of our operations," said Herendeen.

And while Herendeen does not believe that his research is a "golden ticket" that will solve the Marine Corps' energy deployment challenges, he is pleased to have been able to contribute to a conversation that may lead to a long-term solution.

*"The academic community here at NPS provides outstanding benefit to the Marine Corps and the job of the Expeditionary Energy Office. Those benefits include things like getting students to study in the energy space, and not specifically in engineering, but in areas like operations analysis and in the business school where students are looking at different practices."*

Marine Corps Col. Jim Caley  
Director, USMC Expeditionary Energy Office

NPS student Marine Corps Capt. Daniel Katzman has taken a different approach to tackling the Marine Corps' energy challenges. While working on his master's in electrical engineering, he chose to explore the Marine Corps' potential uses of Copper Indium Gallium Selenide (CIGS), which are used in the production of thin-film solar cells.

"CIGS are more robust than traditional solar cells and more difficult for Marines to break," said Katzman. "They are something that has been around for a long time, but they have not been as efficient as typical solar cells."

Katzman's research was born from the realization that forward deployed Marines have become increasingly burdened by power requirements and battery inventories. He believes that solar cells have the capability to simultaneously lessen supply chains and significantly lighten loads for expeditionary units. One novel use of CIGS being explored by Katzman is the concept of a solar-powered blanket.

"The overall efficiency of this new device is expected to exceed 24 percent, which is almost double today's performance, with great potential for further improvements with higher output at a low manufacturing cost and light weight," said Katzman. "I think CIGS hold promise for the future of the Marine Corps as we seek to reduce our reliance on fossil fuels."

Solar blankets and other CIGS-based, solar energy harnessing devices are relatively inexpensive and may offer a practical solution to Marine Corps energy needs. They also appear to show particular utility in the solar energy rich areas in which the Marine

Corps is currently operating.

"When you look at where the Marine Corps has conducted operations in recent years, it has tended to be in areas where there is a ready supply of solar energy that, if harvested, could be used to provide power for Marine operations," said Katzman.

Katzman also believes that CIGS are well suited to the Marine Corps because they are relatively easy to make - they are sprayed on in a process known as chemical vapor deposition - and because of their width and flexibility. CIGS can be sprayed on everything from uniforms, to camouflage netting or the exteriors of tents.

Katzman is using a Technical Computer Aided Design (TCAD) program to improve CIGS efficiency and to determine their optimal usage during Marine Corps operations.

"The program solves all of the underlying, physics-based equations allowing us to adjust parameters to give us an idea of why a cell is operating in a particular way," explained Katzman.

According to Hernandez, it is the combination of student research being conducted by students like Katzman and Herendeen, mixed with engaging classroom discussions and academic development that make NPS such a powerful venue for educating naval officers.

"As a result of this continuing research engagement, NPS is able to develop viable curricula that will serve naval forces while directly supporting the strategic energy objectives of the Marine Corps," said Hernandez. ■



NPS alumnus Georgian Army Col. Giorgi Jachvadze is congratulated by commencement speaker retired Adm. Henry Mauz during the 2013 Winter Quarter Graduation Ceremony. After graduating from NPS, Jachvadze oversaw a series of reforms within the Georgian Ministry of Defense (MOD) that overhauled his nation's military personnel system. (U.S. Navy photo by Javier Chagoya)

## NPS Alumnus Leads Major Changes to Georgian Ministry of Defense

By Kenneth A. Stewart

Naval Postgraduate School (NPS) alumnus Georgian Army Col. Giorgi Jachvadze has managed a series of reforms within the Georgian Ministry of Defense (MOD) that have effectively overhauled the Georgian military personnel system, and directly credits his NPS education for giving him the knowledge to make the aggressive changes.

“The main objective of the military personnel management systems reform was to establish objective, fair and transparent military personnel planning and management systems in accordance with NATO standards and principles,” explained Jachvadze.

“My NPS experience created significant preconditions for all of

these accomplishments, and my NPS classes and thesis played a significant role in the success of these reforms,” he added. “The knowledge and skills that I acquired at NPS introduced me to materials, practices and methods that helped me to decisively elaborate and implement the ideas and projects that led to these successes.”

NPS Senior Lecturer retired Navy Cmdr. Bill Hatch served as Jachvadze's thesis advisor during his time at the university.

“[Jachvadze] led the implementation of many reforms outlined in his thesis, ‘Quantitative Analysis in the Georgian Armed Forces Manpower/Personnel Policy Decision Making Using Markov Models.’ These reforms have been integral to advancing [Georgia] on its path to

*“The knowledge and skills that I acquired at NPS introduced me to materials, practices and methods that helped me to decisively elaborate and implement the ideas and projects that led to these successes.”*

Col. Giorgi Jachvadze  
J1, Head of Manpower, Personnel  
Georgian Armed Forces

NATO membership,” said Hatch.

“This is a huge deal for Georgians, and a strategic imperative for the U.S. given Russia's aggressive expansion in recent years,” he added.

Jachvadze completed NPS' Manpower Systems Analysis curriculum in the university's Graduate School of Business and Public Policy (GSBPP). Upon graduation, he returned to Georgia where he was selected to lead the J1 Personnel Department of the General Staff of the Georgian Armed Forces (GAF).

The Georgian J1 Personnel Department is responsible for manpower and personnel issues, including among other things, pay, allowances, and promotions throughout the GAF. The J1 also works with the Ministry of Defense's Human Resource Management Professional Development Department to implement personnel policies within the GAF.

One of the most successful of the reforms led by Jachvadze was a MOD transition to a pay-by-rank compensation system.

“Before transitioning to a pay-by-rank system, a large portion of GAF military personnel's basic pay, about 95 percent, was defined by the position they held, and only about five percent was related to their actual rank,” explained Jachvadze.

According to Jachvadze, transitioning to a pay-by-rank system was important because the prior practice, which offered compensation based upon position, created an improper set of incentives and hampered the ability of the GAF to implement a Western-style military personnel system.

*“[Jachvadze] led the implementation of many reforms outlined in his thesis, ‘Quantitative Analysis in the Georgian Armed Forces Manpower/Personnel Policy Decision Making Using Markov Models.’ These reforms have been integral to advancing [Georgia] on its path to NATO membership”*

Retired Navy Cmdr. Bill Hatch  
NPS Senior Lecturer

Transitioning to a pay-by-rank system to align with NATO standards has been one of the Georgian MOD's top priorities for the last decade, but formidable resistance to change within the MOD caused previous transition attempts to fail, said Jachvadze.

After years of failed attempts, the Georgian J1, under Jachvadze, and with support from MOD leadership, was able to successfully make the transition.

“Extensive work was done over a one-year-period to implement the change,” said Jachvadze. “After careful analysis, an action plan for transition to a pay-by-rank compensation system was approved and

alternatives, with supporting calculations, were presented to leadership for decision making.”

The plan was followed by a concerted effort to communicate the need for change and to explain the path

forward. Jachvadze led informational briefings throughout the MOD in nearly every command and unit within the GAF in an effort to overcome resistance to the transition and to explain its merits.

“The transition to a pay-by-rank compensation system was a huge success for the MOD and it was recognized and appreciated by NATO partner countries,” said Jachvadze.

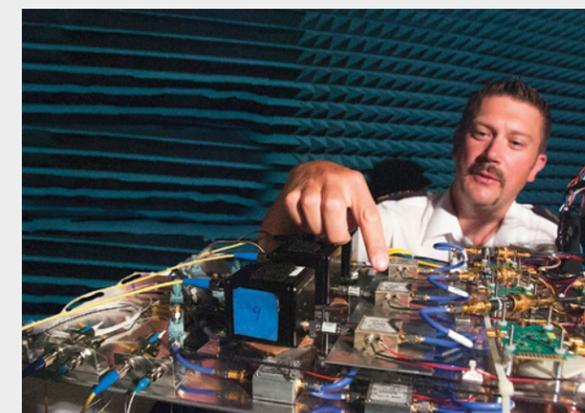
Yet the transition to a pay-by-rank system was just one of many reforms overseen by Jachvadze and his staff. Under his leadership, the MOD has also implemented key reforms in the areas of promotions, selection board processes, recruitment and retention systems, pre-enlistment psychological screenings, and military pay and compensation. ■

## Student's Prototype May Counter EW Threats

Swedish Army Capt. Robert Humeur and German post-doctoral researcher Sascha Pauly are studying the latest advancements in Electronic Warfare (EW) in hopes of improving the ability to counter EW threat emitters.

“It's highly important to detect and identify these types of threat emitters as they create a barrage of noise jamming certain bandwidths that we use in our ground-based air defenses,” said Humeur.

Humeur's thesis, “Experimental Testing of a Photonic Direction Finding Electronic Warfare System,” involved



NPS student Swedish Army Capt. Robert Humeur observes a radar wave on a digital analyzer at Spanagel Hall's 6th floor anechoic chamber. Humeur and post-doc Sascha Pauly are working to advance research into the ability of Electronic Warfare (EW) to counter threat emitters.

the building of a prototype receiver that is capable of detecting the origin of enemy emitters. With Pauly's help, who is detailed to NPS through the Engineer and Scientist Exchange Program, he's been testing it in the Anechoic Chamber Lab in the NPS Department of Physics.

Humeur is a seasoned expert in the art of electronic warfare, serving three tours in Afghanistan as an EW officer specializing in air defense systems. He has worked on a wide variety of EW sensor systems, and has been actively involved in the evolving field of signal detection.



Deputy Secretary of Defense and NPS alumnus the Honorable Bob Work, right, is pictured with the current Acting Provost and Space Systems Academic Group Professor Jim Newman, left, during a campus tour, June 19. Work, a Space Systems Operations graduate, spoke about the importance of space operations during a tour of the campus while visiting to keynote the university's Spring Quarter graduation.

## Deputy Secretary of Defense Visits NPS, Honors Spring Graduates

By Kenneth A. Stewart

The Naval Postgraduate School (NPS) welcomed Deputy Secretary of Defense and NPS alumnus the honorable Bob Work to its Spring Quarter Graduation ceremony, June 19. Work addressed a graduating class comprised of some 290 graduates from every U.S. branch of service, and 19 countries, earning 296 advanced degrees.

Prior to addressing the graduating class, Route and then Provost Dr. Douglas Hensler presented Work with NPS' Distinguished Alumni Award, noting Work's "extraordinary leadership," his contributions to military service, and his "unsurpassed and continued support of graduate education and the Naval Postgraduate School."

For Work, returning to NPS was a homecoming of sorts. He is a

graduate of the university's Space Systems Operations program and started a family here while completing his graduate education.

"I have so much affection for this institution and so much respect for its graduates," he continued. "There is absolutely nothing more

important to the future of our security establishment and the future of our great nation than preparing our future leaders."

During his address, Work offered the assembled student body an assessment of the current state of U.S. military superiority. He discussed the challenges that the U.S. is facing as its "unipolar moment" as the world's sole super-power comes to an end and rival nations begin to assert themselves across the world stage.

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The Honorable Bob Work  
Deputy Secretary of Defense  
Space Systems Operations ('85)

"We are at a pivotal moment in our history. We are coming out of more than 14 years of hard fighting, including the longest war in our nation's history," he said. "We are witnessing a more multipolar world where American leadership is being increasingly challenged, perhaps no more so than in the military realm.

"Such challenging and uncertain times demand that America's best and brightest step forward to serve and to lead," Work said. "Because, to preserve the peace, we must continue to demonstrate our ability to project combat power anywhere in the world, no matter what threats we may face. We do so because that is what our friends and allies expect of us. They expect us to lead."

Work also noted that innovation is at the heart of maintaining U.S. power.

"Since World War II, the United States has enjoyed unrivaled technological superiority," he said. That lead "is eroding at a pace too fast for comfort, and as a result, the margin of battlefield overmatch we have long enjoyed is becoming ever slimmer."

Work challenged the graduating class to be innovative and to seek

new solutions and better business practices. He offered the university's diverse student body a few notes of sage advice in closing his address to students.

"To all of you, BZ, well done, and to our many international students, I hope you had a rewarding stay here at NPS ... You bring an important diversity of views that Americans must have and value in today's global security environment," Work said. "We will not always see eye to eye in every challenge we face around the world ... [but] someday, in some unforeseen way, the relationships and understanding that you forged here today will serve both of our countries well."

"To the American Soldiers, Sailors, Airmen, Marines and DOD civilians here today, I want to thank you for stepping forward and choosing to serve our country during this difficult period in our nation's history," Work concluded.

"You are part of a proud tradition of voluntary service that extends back to the continental Army and Marine Corps. The secretary and I and the entire nation are absolutely grateful everyday for your willingness to serve," he said. IR

## NPS Alumnus, Retired Vice Admiral Talks Innovation

By MC1 Lewis Hunsaker

Naval Postgraduate School (NPS) alumnus and retired U.S. Navy Vice Adm. Michael C. Vitale shared a career of lessons learned in innovation with NPS students during a Secretary of the Navy Guest Lecture (SGL) at King Auditorium, Aug. 11. During the SGL, Vitale received the NPS Distinguished Alumni Award from President retired Vice Adm. Ronald A. Route.

Vitale became interested innovation while serving as the commander of Navy Installations Command.

"I was trying to get my organization motivated. I knew where I wanted the organization to go. I had the vision. I had the ideas. I thought I had motivated the organization, but after two years, I realized I had not.

"All of you officers are going to be leaders, and at some point in time you will take command. In order to command, you have to build a successful team. In order to build a successful team, you have to have good tools in your toolbox. Today, I would like to add innovation to your toolbox," continued Vitale.

Advocating a particular brand of innovation that recognizes the need for hard work and testing, Vitale calls it, "Innovating with intent." Innovating with intent requires innovators to focus on five distinct steps: visualize/imagine, ideate, test/experiment, lead the change, and educate.

"First you have to visualize. Once you have an idea, you have to test it, collect data, and analyze it. That's hard," said Vitale. "Your idea has to be tethered to a problem. That's why I say innovation with intent."

But according to Vitale, no matter how innovative you may be, your ideas will not gain traction unless you are able to sell them to the people that matter.

"If you have a great idea but you can't sell it, it's not worth anything. How do you get your boss, peers or subordinates on board to follow the idea that you have shown will probably work," asked Vitale.

Vitale shared several possible answers to the above question and recommended that potential innovators read Chip and Dan Heath's, "Switch," which promises to help readers to change behavior.

Finally, Vitale challenged the assembled students, faculty and staff to educate themselves, and to become innovation subject matter experts.

"You have to become the expert in innovation. You have to constantly study. This is not something you are going to do tomorrow. When you get back into your commands you are going to try and figure out a better way... don't be afraid of failing.

"At your current level, you are not going to command the culture in your organization. The commanding officer or executive officer may not be into innovation, your challenge is to change that mindset," said Vitale. IR



Retired Navy Vice Adm. Michael C. Vitale, left, receives the NPS Distinguished Alumni Award from NPS President retired Vice Adm. Ronald A. Route during a Secretary of the Navy Guest Lecture at King Auditorium, Aug. 11.



Commander, Naval Surface Forces Vice Adm. Thomas S. Rowden, center, leads a delegation to one of several program briefings just before his Secretary of the Navy Guest Lecture (SGL), Sept. 10. Rowden used the SGL forum to introduce NPS' first-ever Surface Warfare Chair, Capt. Charles Good, right.

## Commander, Naval Surface Forces Establishes Surface Warfare Chair at NPS

By Kenneth A. Stewart

The Naval Postgraduate School (NPS) in conjunction with Commander, Naval Surface Forces, Vice Adm. Thomas S. Rowden recently established the university's first-ever Surface Warfare Officer (SWO) chair. The chair will serve as a mentor and a liaison between the surface Navy community and NPS students, faculty and staff.

"It gives me great pleasure to establish a SWO chair here. I have been dreaming about doing this for a very long time," said Rowden.

"NPS brings three powerful assets to the table that no other single institution can match – human capital in the form of a student body

*NPS brings three powerful assets to the table that no other single institution can match – human capital in the form of a student body composed of mid-career naval, military and defense professionals; intellectual capital in the form of a faculty with deep ties to both academia and the defense establishment; and physical capital in the form of laboratories, centers, facilities and this beautiful and historically significant campus."*

Vice Adm. Thomas S. Rowden  
Commander, Naval Surface Forces

career naval, military and defense professionals; intellectual capital in the form of a faculty with deep ties to both academia and the defense establishment; and physical capital in the form of laboratories, centers, facilities and this beautiful and historically significant campus," said Rowden.

In an effort to leverage those assets, Rowden assigned NPS alumnus Capt. Charles Good to NPS.

"It's Capt. Good's responsibility to take the value of NPS to the fleet so that we can take those young, great intellectual minds

that are serving on our ships and get them properly synced up with the

faculty here in order to provide them the opportunity to achieve all of the greatness they can.

"I think all of us are smarter than one of us and that if we can bring [NPS and the SWO community] together in a meaningful way, the opportunity to really improve not only the richness of the experience here in Monterey, but also the value that experience brings to the fleet, can be increased by orders of magnitude," Rowden continued.

Good is returning to NPS after a nearly two-decade absence. He notes that NPS' outward appearance has changed very little in the last two decades, but that the number and diversity of programs offered by NPS has increased dramatically.

"It feels great to be back on campus, I graduated about 19 years ago with a Master in National Security Affairs with a focus on Europe and Eurasia," said Good.

"We have a great blending of faculty here, some academic powerhouses, as well as some folks who have served in the surface warfare community before getting their academic credentials. We need to do everything that we can to leverage all of that [intellectual capital] to the maximum amount that we can," said Good.

While at NPS, Good intends to focus on matching NPS students with surface warfare research needs and guiding them along career paths that will not only enhance their academic experience at NPS, but will benefit the surface warfare community as well.

"I can serve as a conduit. The fleet can send issues, concerns and initiatives to me and I can tie them to interested students and faculty on campus," said Good. "Having the students do surface warfare related theses is a big step, it ensures that they remain grounded in the community while at the same time getting exposure academically."

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Capt. Charles Good  
NPS Surface Warfare Chair

NPS has been central to officer development and career progression within the SWO community for many years. And according to Good, graduate education at NPS is an integral part of the process by which SWOs are groomed for future leadership positions.

"NPS has been, is, and will continue to be the core of the SWO graduate education delivery into our career path," said Good.

SWOs complete their initial fleet tours relatively early in their careers. Coming to NPS allows them to catch their breath between deployments and allows them to gain skills and education that will serve them well when they return to the fleet as department heads and when they take their knowledge and experience back ashore to the Pentagon and other major staffs, noted Good.

"Nearly every single one of the SWO students on campus is a prospective department head. They are career minded, mid-career professionals. Coming to NPS is a natural fit

in their surface warfare career progression" said Good.

"It is beneficial for junior officers to spend their initial shore tour here in Monterey and get their graduate degree and [Joint Professional Military Education] JPME Phase I complete before heading back to the fleet and their department head tour," explained Good.

For Rowden, placing a SWO chair at NPS is about ensuring that valuable, defense-focused graduate education is not lost and that its benefits are able to be combined effectively with other professional military education venues throughout the Navy.

"I think it's really important that everyone, not only across the surface Navy enterprise, but across the Navy, understands just how critical and just how valuable the Naval Postgraduate School is to the many, many things that we are doing," said Rowden. ■■

## Defense Analysis Students Sweep CJCS Essay Competition

NPS Department of Defense Analysis students, U.S. Army Lt. Cols. Rob Schultz and Pat Duggan, have been awarded first place in the 2015 Chairman of the Joint Chiefs of Staff (CJCS) National Defense and Military Strategy Essay Competition. Schultz and Duggan were honored by the chairman this fall, with their award-winning essays to be published in a future edition of "Joint Forces Quarterly."

Duggan took first place in the strategy research paper category for his essay, "Strategic Development of Special Warfare in Cyber-



Duggan and Schultz, pictured during the Army War College graduation ceremony, May 9, faced stiff competition, with some 60 entries in the final evaluation round in the short essay category, and more than 40 in the longer paper category. Submissions were accepted from senior service colleges as well as the war colleges and specialty institutions throughout the Department of Defense, and from defense fellows attending civilian institutions throughout the country.

space." Schultz took first place in the 1,500-word strategy article category for his piece, "Countering Extremist Groups in Cyberspace."

"A [big] reason we were successful was because of the resources that NPS provided us, from faculty to materials," said Schultz. "All have been very helpful in our ability to earn these awards."

"This is a topic that I am passionate about," added Duggan "[This award] really speaks to the quality of education that is ongoing here at NPS."



Naval Research Enterprise Internship Program (NREIP) student intern Julian Brown holds the star tracker system he developed during a summer in the university's Space Systems Academic Group. The low-cost star tracker is designed to help very small satellites determine their orientation in space.

## Intern Develops Small, Inexpensive Star Tracker

By Kenneth A. Stewart

Naval Postgraduate School (NPS) student intern Julian Brown is just 21 years old, but don't let his young age fool you. He's a serious scientist, and spent a summer at NPS working to build a star tracking system designed to help very small satellites determine their orientation in space.

After graduating from the Massachusetts Institute of Technology (MIT) with a degree in electrical engineering and computer science, and then interning with the Space and Naval Warfare Systems Command (SPAWAR), Brown made his way to NPS, working with Professor and current Acting Provost Jim Newman through the Office of Naval Research's Naval Research Enterprise Internship Program (NREIP).

"As I was reviewing resumes for the summer of 2014, his stood out ... He had shown interest in trying to do some really hard projects," said Newman. "Professor Mathias Kolsch and I had been working part-time with students on developing a low-cost, very small star tracker to challenge the price point that industry currently provides, and I realized this would be a great project for Julian."

"A star tracker is used to take a picture of the sky and identify the patterns of stars in an image," explained Brown. "Based on this, a satellite can tell which direction it is facing. Because stars are little specks of light that don't move, it is very easy to know where you are looking if you know which stars you are looking at."

"It's cool stuff," Brown continued. "I've known what I wanted to do since I was 5 years old. When I learned that the Navy was sponsoring students to come and work in their labs, it was so amazing to me. I couldn't believe that they would give me money to play around with all

of their cool toys!"

Star trackers have been used in various forms since ancient times. The sextants used by ancient mariners are an example of early star tracker technology. And though the star tracker developed by Brown is far more complex than a mariner's sextant, it is similarly designed to tell an operator where his craft is relative to the stars in the sky.

"When taking pictures of the stars for general navigation, there are many systems that provide coarse attitude information offering accuracy down to a tenth of a degree, but if you want accuracy down to arc seconds, 1/3600th of a degree, then you need to use a star tracker," explained Brown. "They offer the highest accuracy pointing that you can get in space. They are very valuable for a lot of different missions and we would like to make them accessible to research groups like the one here at NPS."

Star trackers are currently employed by most large commercial satellites, but they are generally too large and too costly to be employed aboard small satellites.

"They are also really expensive. A good model will cost hundreds of thousands of dollars and installing a single star tracker on a nanosatellite would wipeout a significant portion of your total satellite budget," said Brown. "We want to create much cheaper star trackers and put them on satellites that would not normally be able to afford them due to budgetary constraints."

Brown's work comes on the heels of increased research interest in satellite technology and greater industry and academic reliance on the information gleaned from commercial satellites.

"Because satellites are becoming so popular in research, we would like to develop our own non-private star tracker that we can build ourselves and hopefully pass off to private industry once we have designed the basics," said Brown.

Newman agrees. His goal is to develop a government-owned, government-shared star tracker whose technology can be transferred to industry and spur motivation to improve the existing star trackers on the market. **IR**

## STEM at NPS

In just a few short years, opportunities for STEM internships at the Naval Postgraduate School have blossomed, with nearly 100 high school and college students from across the U.S. on campus this past summer. Interns dot the academic landscape across nearly every department on campus, with a broad range of partnerships at the national and regional levels.

"It's clear to me that this is a special program," said university President, retired Vice Adm. Ronald A. Route. "These are exceptional opportunities, and we are very pleased to be able to offer them to these exceptional young men and women."

NPS student interns come from all walks of life, and they continue on to just as many. Here's an update on just a handful of the hundreds of students that spent time on campus during the summer over the past several years, and a peek at where their efforts have taken them.



### **RIQUI SCHWAMM ('09)**

**PROGRAM:** Community College Catalyst Program

**MENTORS:** Dr. Tony Kendall, Information Sciences and Dr. Arijit Das, Computer Science

**NOW:** Hired as an NPS Research Assistant with the Distributed Information Systems & Experimentation group at NPS. Earned Master of Science in Computer Science from NPS in 2013.



### **SARAH CARLISLE ('10)**

**PROGRAM:** Community College Catalyst Program

**MENTORS:** Dr. Richard Olsen, Physics

**NOW:** NPS Research Associate following internship, earning a Bachelor of Science in Computer Science.



### **CHRIS HALCON ('09, '10)**

**PROGRAM:** Community College Catalyst Program

**MENTOR:** Dr. Jim Newman, Space Systems

**NOW:** Earned Bachelor of Science in Industrial/Mechanical Engineering from Cal Poly-San Luis Obispo in 2014. Currently a Naval Aviator station in Pensacola, Florida.



### **ALEJANDRO HERNANDEZ ('11)**

**PROGRAM:** Community College Catalyst Program

**MENTOR:** Dr. Mark Karpenko, Mechanical and Aerospace Engineering

**NOW:** Earned Bachelor of Arts in Economics from UC Santa Barbara, 2015. Currently a Global Supply Chain Analyst for Oracle Corporation.



### **ROLANDO PEREZ ('12)**

**PROGRAM:** Community College Catalyst Program

**MENTOR:** Dr. Drago Grbovic, Physics

**NOW:** Earned Bachelor of Science in Biomolecular Engineering and Bioinformatics from UC Santa Cruz. Currently enrolled in PhD program in Bioengineering at Stanford.



### **CASANDRA MARTIN ('13)**

**PROGRAM:** Community College Catalyst Program

**MENTOR:** Buddy Baretto, Information Sciences

**NOW:** Enrolled in Master of Science in Information Assurance program at NPS through Scholarship for Service program.



### **NATALIE ORTIZ ('13, '15)**

**PROGRAM:** Science and Engineering Apprenticeship Program ('13), Naval Research Enterprise Internship Program ('15)

**MENTORS:** Sue Higgins, Cebrowski Institute, and Dr. Jim Newman, Space Systems ('15)

**NOW:** Computer science major at UC San Diego.

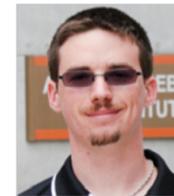


### **AJAY JAIN ('14)**

**PROGRAM:** Science and Engineering Apprenticeship Program

**MENTOR:** Dr. Tim Chung, Systems Engineering

**NOW:** A high school senior, currently applying to MIT, UC Berkeley, Harvard and Stanford to study computer science.



### **BRANDON NAYLOR ('14)**

**PROGRAM:** Naval Research Enterprise Internship Program ('15)

**MENTOR:** Dr. Dan Nussbaum, Energy Academic Group

**NOW:** Employed as a contractor with NPS Energy Academic Group, set to graduate in the fall with a Mechanical Engineering and Robotics degree from the Rose Hulman Institute of Technology.



### **STUTI VISHWABHAN ('15)**

**PROGRAM:** Science and Engineering Apprenticeship Program

**MENTOR:** Dr. Ying Zhao, Information Sciences

**NOW:** A high school junior, launched and runs non-profit "Teach Seniors Technology" organization.



### **DANIEL IBARRA ROJO ('14, '15)**

**PROGRAM:** Community College Catalyst Program

**MENTOR:** Dr. Arijit Das, Computer Science

**NOW:** Volunteered to continue his work with Dr. Das while studying computer science at CSU Monterey Bay.



### **JORDAN RUFF ('15)**

**PROGRAM:** Naval Research Enterprise Internship Program ('15)

**MENTOR:** Dr. Ned Powley, Graduate School of Business and Public Policy

**NOW:** A senior at Marquette University majoring in psychology and Spanish, with a minor in ethics. Plans to enroll in graduate school programs in mental health counseling, specializing in care for military personnel and their families. **IR**



Naval Postgraduate School graduates U.S. Marine Corps Maj. John Dickens, right, and Tom Chhabra, left, bow their heads in prayer during Summer Quarter Commencement Ceremony, Sept. 25. NPS said farewell to 330 students earning 335 degrees at the ceremony.

## NPS Honors Summer Graduates During Quarterly Ceremony

By Kenneth A. Stewart

The Naval Postgraduate School (NPS), along with a packed house of faculty, family, friends and well-wishers, said farewell to 330 graduating students earning 335 degrees during NPS' Summer Quarter Commencement ceremony in the university's King Auditorium, Sept. 25.

"My experience here was humbling," said Sgt. Robert Brady, a supervisor in the New York Police Department's (NYPD) counter-terrorism unit. Brady earned a Master of Arts in Security Studies through NPS' Center for Homeland Defense and Security (CHDS).

"Being put together with such a diverse group of people from so many different disciplines was excellent," added Brady. "We challenged each other and drew out the best in one another to become better homeland security professionals."

Military Officers Association of America (MOAA) President retired Vice Adm. Norbert R. Ryan Jr. was the ceremony's keynote speaker.

"I can't tell you how inspired I was to watch you all file in this morning ... This nation's greatest treasure is the young men and women that serve," he said.

Throughout Ryan's emotional address to the graduating class, he shared moving stories and anecdotes from his military career, drawing

largely upon lessons learned while observing service members overcome incredible odds. He also spoke of leadership, and the commitment to serve that he has witnessed in men and women from all walks of life.

"Leadership is not about words, we all know that," he said. "Leadership is about example."

In closing, Ryan called for the assembled students, faculty and staff to always advocate for their fellow service members and their families.

"All of us collectively ... have to make sure that the 99 percent of the population that have not served keep their commitments to those that have served and those that will serve in the future," said Ryan. "Please speak up to your elected officials about the importance of keeping our commitments to the men and women, and their families, that have kept us free for the last 14 years."

Ryan was recently recognized as one of the 100 most influential and impactful veterans on Capitol Hill. Under his leadership, the MOAA has been named a "Top Lobbyist" by The Hill newspaper for the past eight years. **IR**

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## “NPS Is Everywhere”

During an Iraqi Air Force F-16 dedication ceremony at Balad Air Base earlier this year, three of the U.S. officers in attendance recognized each other. Although they worked for different organizations, some were even members of different services, they knew there was some sort of connection between them. And there was ... the Naval Postgraduate School’s Department of National Security Affairs.

Those three officers are, from left to right, U.S. Air Force Maj. Marc Torosian, Air Force Central Command Iraq Country Desk Officer; U.S. Air Force Lt. Col. Brian McCullough, Air Defense Liaison Officer at the Iraqi Air Defense Command; and, U.S. Navy Cmdr. Ed Sylvester, Deputy Defense Attaché, Iraq.

The chance meeting and subsequent discussion offered an opportunity for the trio to reflect upon their time at NPS, and the role the education has played in their assignments following graduation. McCullough went on “to be the Turkish political/military advisor at [U.S. European Command] EUCOM where the education I received at NPS was used every day,” he said.

“Before I deployed I was at the Under Secretary of the Air Force

for International Affairs (SAF/IA) at the Pentagon. Here I dealt with technology transfer issues for Foreign Military Sales cases. Again, the experience of NPS came in very handy,” McCullough continued.

Sylvester, who has since served as a Director of Theater Security Cooperation, a Senior Naval Advisor, and is slated to be the next Defense Attaché for Saudi Arabia, echoed these sentiments.

“The NPS degree in Security Studies, with a Middle East focus, has given me a great base to fall back on,” he said. “Coupled with language training, I am quite functional interfacing with our foreign partners, and am thankful for the opportunity!”

Given their current assignments, the trio embody the precise value of just one of NPS’ many academic programs in preparing military leaders to be more effective ... Perhaps stated best by McCullough.

“All of these experiences, along with the foundation of my NPS education, have been critical to the day to day dealings with the Iraqi government,” he said. “My awareness of the different cultures and norms of this country were shaped by the experiences of the professors at NPS ... It is an experience which I cannot undervalue.”

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