NAVAL POSTGRADUATE SCHOOL

IN REVIEW MAGAZINE

APRIL 2012

THE PEN AND THE SPEAR

NPS alumnus Adm. William McRaven has made quite an impact on our nation's most critical special operations, but it was his studies at NPS — and his pen — that may have made his mightiest.

INSIDE:

Daniel T. Oliver
Vice Adm., United States Navy (Ret.)
President, Naval Postgraduate School

All of our students will progress to leadership within the Department of Defense and far beyond … not just one or several of them, all of them. They have excelled through their careers, they have already led in various capacities, and they will go on to positions of greater and greater responsibility. Providing these leaders with a graduate education is a powerful, valued obligation.

PRESIDENT'S MESSAGE

When an institution is posed with the question of its value, myriad examples rise to the surface, especially to those on this university's campus who witness that value day in and day out. It is a challenging question, for the value of the Naval Postgraduate School lies deeply embedded within the intricacies of national and global security. Our mission is quite critical, and while we are constantly vigilant in the successful execution of it, we must also actively and consistently demonstrate proof of that value.

There are countless examples of how our institution exerts its value. All of our students will progress to leadership within the Department of Defense and far beyond … not just one or several of them, all of them. They have excelled through their careers, they have already led in various capacities, and they will go on to positions of greater and greater responsibility. Providing these leaders with a graduate education is a powerful, valued obligation.

This university's worth also lies in our faculty, who are some of the world's most respected minds in their fields. They are the purveyors of our educational products, they have the most direct impact on those 1,500 plus leaders who walk our campus daily, and as I have noted many times, are the single most critical resource this university has.

Our research is also of immense value, for it is driven directly in response to the needs of the warfighter, and our national and global security environments. Through every academic department, from applied and operational sciences to business and international studies, thousands of detailed theses are adding to our collective body of knowledge — and they are all firmly entrenched in that one commonality.

In spite of these words, however, we have truly just begun to scratch the surface of our university's place in the world. Last year, the Q-Team, or Question-Team, took advantage of the incredible body of knowledge represented in our faculty, and applied it to the intricacies of one short, but challenging question, "What is the value of NPS?" I am proud to note that one of the many outcomes of this effort, the Naval Postgraduate School Value Book, will be released in just a few short weeks.

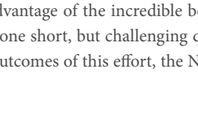
The NPS Value Book is a massive resource of published articles, testimonials, distinguished alumni profiles, and detailed analyses — all with the single and seminal purpose of displaying this university's value to the nation. I encourage you seek out this resource, for it tells a compelling story about our institution, and one that is only beginning.

Within the pages of this issue of "In Review" are also some excellent examples of NPS' institutional value. University students and faculty have completed a custom-designed and built CubeSat launcher that will propel several satellites into orbit in August. And our vast experience in oceanographic and atmospheric research has begun preparing a new asset, an A-10 Thunderbolt, to enhance our already impressive impact in these fields.

The extremely critical role of intelligence, surveillance and reconnaissance in current and future defense strategy is well documented, and our first cohort of students in a dedicated master's program in Remote Sensing Intelligence represents the beginning of a pipeline of well-educated leaders in this field. And our efforts in countering the proliferation of weapons of mass destruction has just led our institution into playing a highly-expanded role in this effort.

One of our most compelling examples of value, however, lies in the stories of our graduates, and we have featured one of our most lauded alumni in Adm. William McRaven in this edition. Adm. McRaven is an outspoken advocate of education for all officers, and has admittedly used his own education from NPS many times in the execution of some of our nation's most critical national security endeavors.

Truthfully, value at the Naval Postgraduate School exists all around us, in every corner of campus and far beyond. One just needs to look to find it.



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NAVAL POSTGRADUATE SCHOOL
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President
Daniel T. Oliver

Executive Vice President and Provost
Dr. Leonard A. Ferrari

Vice President, Information Resources and Chief Information Officer
Dr. Christine Haska

Executive Director, Institutional Planning and Communications
Dr. Fran Horvath

Director of Publications, Web Media
Dale Kuska / dmkuska@nps.edu

Senior Graphic Designer
Gretchen Miller

Contributing Writers / Photographers
Joan Ackerman, MC1 Grant Ammon, Sgt. Jacob N. Bailey, Mike Bottoms, MC1 Leonardo Carrillo, Javier Chagoya, Master Sgt. William Greer, Jennifer Hartwig, Kate Oliver, MC1 Rob Rubio, Amanda D. Stein

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DEPARTMENTS

ON THE COVER
Adm. William McRaven is the quintessential special operator, and he has left quite the mark on national security through the forces and operations he commands. But with McRaven, the old adage of the pen being mightier than the sword, or in this case the spear, may very well apply. The NPS thesis he completed in 1993 has become the de facto handbook for special operations theory, and the curriculum he started has now awarded nearly 900 degrees. In this edition of "In Review," we examine the power of his pen, and its impact on the spear.

Naval Postgraduate School
1 University Circle
Monterey, CA 93943
(831) 656-1068 / pao@nps.edu
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President Oliver Keynotes AFIT's Latest Graduation Ceremony

NPS President Dan Oliver served as the keynote speaker for the Air Force Institute of Technology's (AFIT) latest commencement ceremony held at the National Museum of the United States Air Force, Mar. 22.

Serving as keynote speaker, NPS President Dan Oliver congratulates one of more than 250 graduates from the Air Force Institute of Technology during the institution's commencement ceremony at the National Museum of the United States Air Force, March 22.

"This is a special treat for me … Because of my time at the Naval Postgraduate School, and especially because of the time I have served on the Air University Board, and AFIT subcommittee of that board, that I have developed a very special admiration for the Air Force Institute of Technology," Oliver told the audience of graduating students, family members and guests. "Within the Department of Defense, and even within the federal government, NPS and AFIT provide a unique capability that cannot be duplicated feasibly anywhere else."

AFIT, located at Wright-Patterson Air Force Base, Ohio, is the Air Force's graduate school of engineering and management, as well as its institution for technical professional continuing education. AFIT's mission is to advance air, space and cyberspace power for the nation, its partners, and our armed forces by providing relevant defense-focused technical graduate and continuing education, research and consultation.

Students, Staff Honored During Ceremony at Japanese Consulate

At the invitation of Hiroshi Inomata, Consulate General of Japan, several NPS students and staff officers assigned to the Naval Postgraduate School were honored during a ceremony at the Presidio of San Francisco, Mar. 13. The event commemorated the one-year anniversary of the 2011 earthquake and ensuing tsunami that devastated Japan in 2011.

The 15 NPS officers joined more than 600 members of the Japanese and American community to take part in the ceremony held to remember the victims of the disaster, to thank the people of California and the United States for their support and encouragement, and to provide an update on Japan's recovery. All of the NPS officers in attendance, representing the Navy, Marine Corps and Air Force, took part in Operation Tomodachi relief efforts.

"Operation Tomodachi really exemplifies the possibilities of that partnership between our military and our two great countries spanning the Pacific Ocean," said Lt. John Vokley, an NPS student who delivered formal remarks at the ceremony.

"The U.S. Navy is a global force for good and we are capable of delivering aid when natural disasters strike," added Cmdr. Tim Unrein, a staff officer assigned to NPS' Information Dominance Center for Excellence. "We have resources such as transportation capabilities, and we can go where others can't. It only makes sense that we provide assistance when others are affected by unforeseen natural disasters."

Unrein's sentiment is one that has also been noted by the Navy's most senior leadership, including Chief of Naval Operations Adm. Jonathan Greenert.

"Our forward posture and ready and available capability proved invaluable to our allies in Japan following the Great East Japan Earthquake and Tsunami last March," noted Greenert in his recent testimony before Congress. "Twenty four ships, 140 aircraft and more than 15,000 Sailors and Marines delivered over 280 tons of relief supplies to beleaguered survivors as part of Operation Tomodachi."

Navy's Cyber Commander Participates in NPS' ID Symposium

Vice Adm. Michael Rogers, Commander of U.S. Fleet Cyber Command and the U.S. 10th Fleet, visited the Naval Postgraduate School to present at the university's Information Dominance Senior Leader Symposium (IDSLS), Jan. 29–31. Facilitated by NPS' Center for Executive Education, the IDSLS is designed to create a senior level forum to engage in and enhance core competencies in senior leaders within the Information Dominance (ID) community.

Rogers attended a series of lectures and presentations related to the diverse fields within ID and cyber defense during his visit. He also met with members of NPS' recently established Cyber Academic Group to discuss future programs related to cyber education.

"As the 10th Fleet Commander, clearly cyber is one of our primary missions — and an important element of our success in the cyber arena is going to be the knowledge and the abilities of the workforce," said Rogers. "The Naval Postgraduate School has an important part to play in helping educate the cyber workforce of the Navy of the future."

An essential part of this equation would be the education NPS is providing the Navy's workforce. Rogers emphasized the role of graduate education, and forums like the IDSLS, in developing the Navy's cyber community, particularly in the officer arena, and wanted an introduction to the university's programs first-hand.

Vice Adm. Michael Rogers, Commander of U.S. Fleet Cyber Command and the U.S. 10th Fleet, met with members of NPS' recently established Cyber Academic Group to discuss future programs related to cyber education..

"Since NPS has this critical role to play in helping educate the cyber workforce … I wanted to come out here and see it for myself," said Rogers.

"The Information Dominance Senior Leaders Symposium is designed to develop an executive level perspective that results in a warfare capability integrated in all phases of the joint and naval fight," said retired Rear Adm. Andy Singer, NPS Intelligence Chair Professor and Director of the Information Dominance Center for Excellence.

"During eight very full days, leaders learn about themselves, Information Dominance as a key element with naval and joint war fighting, in concert with applied leadership, management and strategy tools and models," he added.

Individual Rights Leader Offers Thought-Provoking SGL

As President of the Ayn Rand Center for Individual Rights, Dr. Yaron Brook has become a well-known and outspoken leader in individual rights and capitalism. During a recent edition of the Secretary of the Navy Guest Lecture series, Feb. 28, Brook shared his sometimes controversial but thought-provoking insights into what he calls true capitalism, or objectivism.

Dr. Yaron Brook, President of the Ayn Rand Center for Individual Rights, speaks during a recent edition of the Secretary of the Navy Guest Lecture series, Feb. 28.

"I immigrated to this country almost 25 years ago and the reason I immigrated to this country has a lot to do with why a lot of you joined the military," said Brook. "I looked at my life and I said where in the world could I make the most of my life? … It turned out that it was here."

Brook asked the audience what they believe makes America such a great country, and why after so many years, millions of people still endure much hardship to become American citizens. The answer to him, he noted, was freedom.

Brook stated that returning to economic freedom was the key to emerge from the current economic problems the world faces, noting that history demonstrates that more economic freedom leads to more prosperity.

"I thought the presentation was outstanding," said NPS student Navy Lt. Jessie Hallan, who nominated Brook for the SGL. "It was very informative and inspiring.

"I know that some may not have agreed with the point of view Dr. Brook presented but I hope it will inspire some more thought into the issues that are plaguing our country," Hallan continued. "As the future leaders of the Navy, it is important to have knowledge

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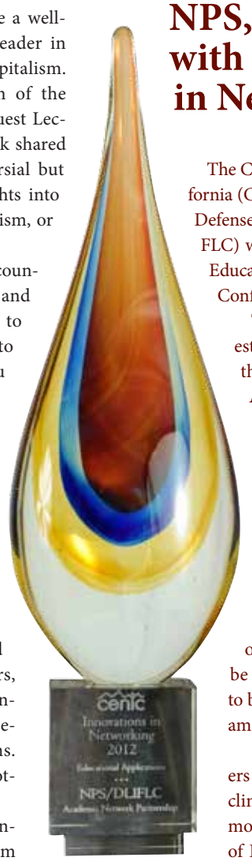
NPS, DLIFLC Honored with CENIC's Innovations in Networking Award



The Corporation for Education Network Initiatives in California (CENIC) presented the Naval Postgraduate School and Defense Language Institute Foreign Language Center (DLIFLC) with the 2012 Innovations in Networking Award for Educational Applications, Mar. 13 during CENIC's Annual Conference in Palo Alto, Calif.

The award recognized the two institutions' efforts to establish a regional academic network, executed with the completion of the NPS-assisted migration of the Army language school off the traditional .MIL military network to a more academic .EDU domain.

"This is a proud and celebratory moment for both NPS and the Defense Language Institute. CENIC has been an invaluable partner for both of our institutions," said NPS Vice President, Information Resources and Chief Information Officer, Dr. Christine Haska. "By supporting our transition to a .EDU network, CENIC has empowered NPS and DLI to be more capable of accomplishing our respective missions in education and research. To be recognized by such a prestigious organization, and to be voted as the Network Innovations 'best' among an amazing group of institutions, is truly an honor."

"I believe this project will serve as a model for others to follow. As we move into a more restrictive budget climate, it is important to find innovative ideas to do more with less," echoed Col. Danial Pick, Commandant of DLIFLC. "Over the next year, a combined team of NPS and DLI technicians and academicians will build a new computing environment that will significantly improve the ability of DLI to fulfill its mission of enhancing the linguistic readiness of our nation," he continued.

NPS President Dan Oliver praised the effort, noting that it is a critical step toward a consistent, active partnership among local DOD institutions, a notion local Congressman Sam Farr (D-17) has emphasized with his Team Monterey concept.

"As the DOD and leadership of our country shift the defense strategy, it is going to become increasingly important to streamline operations at local levels to ensure that we are collectively good stewards of the taxpayer's money," said Oliver. "The Team Monterey Academic Network is a perfect example of how operational efficiencies can be achieved through strategic partnerships."

Approximately 3,800 Soldiers, Sailors, Marines and Airmen are enrolled at DLIFLC, studying 23 languages and two dialects. Both institutions have been working since 2008 on the effort to establish a single academic network to enable students to leverage modern technologies and improve capabilities.

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of the many methods to find solutions. Different points of view help to find these solutions."

Navy Lt. Cmdr. Brad Coleman was one of those students who may not have necessarily agreed with Brook's views, but saw the value in hearing opposing perspectives.

"I thought Dr. Brook's presentation was interesting and very thought provoking," said Coleman. "I think SGLs should be chosen because they challenge the status quo of any organization through logical arguments."

Defense Security Cooperation Agency Director Speaks to DRMI Students

Vice Adm. William E. Landay, III, NPS graduate and Director of Defense Security Cooperation Agency, addressed a collective of Defense Resources Management Institute (DRMI) students about security assistance and cooperation during a campus visit, Apr. 11, part of the International Defense Management course. Landay manages a professional security cooperation workforce of military and civilian personnel located around the world, providing leadership, management and oversight for a diverse portfolio of security cooperation and partner capacity building efforts.

Vice Adm. William E. Landay, III, NPS graduate and Director of Defense Security Cooperation Agency, addresses a collective of Defense Resources Management Institute students during a campus visit, April 11.

During his presentation, Landay noted five key points for assistance and cooperation: contribute to partner security, stabilize the region, enhance military to military cooperation, enable interoperability and building lasting relationships. "We are about the security of our nations," he said. "We know today and in the future that this is a coalition business when we talk about military operations."

He also noted that many of the people that have come through professional international military education courses, such as those at DRMI, go on to be presidents, senior leaders or ministers of their countries, or in senior key positions moving up through their respective organizations. This impacts long-term relationship building, and provides opportunities to collaborate with partner nations on national security policies, defense policies and military strategies, and to share what is known in developing nation capabilities.

Landay is a Systems Technology (Command, Control, Communications, Computers and Intelligence) graduate from NPS.

Physics Faculty, Student Use NPS' Lake Del Monte for Seaweb Research

Ens. Rebecca King, a Space and Naval Warfare Systems Center Pacific (SSC PAC) research fellow, will be looking to establish a Seaweb network during the early phases of her thesis research, and is using NPS' own Lake Del Monte as an initial test bed.

Ens. Rebecca King, left, a Space and Naval Warfare Systems Center Pacific (SSC PAC) research fellow, helps SSC PAC Engineer Chris Fletcher, right, deploy a telesonar modem into Lake Del Monte on the NPS campus, April 16.

Developed by Physics Research Professor Joe Rice, Seaweb is a complex system of underwater network technologies that use acoustic waves to communicate, much in the same way a surface wireless network uses radio waves. Underwater nodes establish a network of communication, while gateway nodes — either a fixed buoy or a mobile unmanned surface vehicle, for example — allow for transmission from Seaweb to an onshore command and control center. Rice has been actively developing Seaweb for more than a decade, and has proven its functionality multiple times in active sea trials.

King is conducting a series of experiments to improve localization performance compared to current inertial navigation. Stealthy submarines and unmanned underwater vehicles must surface periodically to re-establish their position via GPS due to errors inherent in this inertial navigation. With increased accuracy of Seaweb range data and tracking algorithms, submerged vehicles may be able to stay submerged and still effectively navigate, and communicate, thanks to the Seaweb network.

DKL Launches Digital Archive of 'Everything NPS'

NPS' Dudley Knox Library announced the launch of an extensive online institutional archive. The electronic repository, known as Calhoun, was created to bring NPS' academic contributions together, creating an easily searchable collection of scholarly, instructional and institutional publications and research products authored by members of the NPS community.

"Calhoun gives everyone one place to go to find out about the Naval Postgraduate School's scholarly contributions," said University Librarian Eleanor Uhlinger. "Right now you have to browse through many, many web pages, look through faculty websites or look through our library catalog to find theses. This is one central location that says these are the products of NPS."

"Calhoun is part of a movement in the library and in the scholarly world called an institutional repository. It's a cumbersome name for a different way of thinking of how libraries and scholarly institutions acquire the research material that they offer," said Irene Berry, DKL's digital service librarian. "We're doing real-world applicable stuff here at NPS and we want to share, to disseminate, to extend the reach of NPS to the world."

The system went live on Apr. 2. To view and explore the archive, visit http://calhoun.nps.edu/.

CRUSER Welcomes DARPA Manager for Latest Faculty Lecture

Defense Advanced Research Projects Agency (DARPA) Tactical Technology Office Program Manager Scott Littlefield presented the latest Naval Postgraduate School Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) guest lecture in the Mechanical Engineering Auditorium, Feb. 24.

Littlefield's lecture focused on new technologies being explored by DARPA in the field of unmanned vehicles and presented potential areas of collaboration with NPS. He noted during his presentation that the university's mission of graduate level education and research, driven by operational relevance, presents many opportunities to combine efforts.

DARPA Program Manager Scott Littlefield

"I really view NPS as a great resource for developing new ideas," said Littlefield. "The marriage of the technology focus with the operational focus creates a synergy that is very unique about NPS."

Spacecraft Robotics Lab Completes 'Heavy' Acquisition

Professor Marcello Romano of the NPS Spacecraft Robotics Lab and his team of associates and researchers conduct high-precision, spacecraft robotic simulations, and needed a large, extremely accurate platform with near zero tolerances to conduct them — an almost

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A select group of the 15 Cyber Academic Group faculty, representing six different departments, gather in the courtyard of Glasgow Hall on campus.

NPS Establishes Interdisciplinary Cyber Academic Group

In the January 2012 "Priorities for the 21st Century Defense" report, the Department of Defense listed cyberspace operations as one of the 10 primary missions of the armed forces. The growing threats posed by adversaries within the cyber domain have DOD placing a perpetually-increasing focus on advancing the nation's ability to defend its networks and create resilient systems.

To help meet those objectives, a number of faculty at NPS have joined together to form an interdisciplinary Cyber Academic Group (CAG), dedicated to building the school's Cyber Systems and Operations master's degree program, and helping further collaboration in the field. Leading the charge are Professor Cynthia Irvine, Chair of the CAG, and Distinguished Professor Dorothy Denning, Associate Chair.

"Cyber is a domain of warfare that has become increasingly important to all of the services," said Denning. "We need to excel in that domain."

The group started with a blank slate, and based on feedback from the Deputy Chief of Naval Operations for Information Dominance, developed a list of courses — both existing and new — to help the program meet Navy and DOD cyber needs. Irvine explained the CAG's 15 faculty bring with them a wide range of expertise, from defense analysis to computer science.

"The cyber 'question mark' didn't fall directly into one department at NPS. That's why we created the academic group," explained Irvine. "The topic is too broad for any single department."

Irvine noted that in addition to Departments of Computer Science and Electrical and Computer Engineering, which provide the technical foundations that support cyber operations, the Defense Analysis, Operations Research, Mathematics, and Information Sciences departments also have an integral role to play in the CAG.

The interdisciplinary group not only provides a solid foundation for a curriculum meant to support future DOD leaders in the cyber domain, this diverse expertise will also keep the CAG poised to evolve to meet the cyber's rapidly changing issues and technologies.

"This is a technology area where things are not standing still. The way we use cyberspace is changing, new material must be incorporated on an ongoing basis. Ten years ago, we would have never thought that mobile devices would be so popular. You'd be surprised how much changed from 2000 to 2010."

NPS' ability to conduct classified research and education is a critical component of the effort, with military cyber operations generally kept classified. Civilian institutions generally don't have faculty and facilities for classified material.

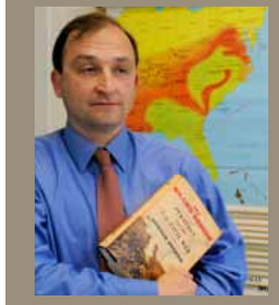
"Right now in the commercial sector, there is a lot of activity in what we call information assurance, which is largely defensive and often plays a cyber supporting role. For the military, conducting cyber operations may go beyond defense and may also require classified work," explained Irvine. "You may target something that's unclassified, but the techniques that are involved in certain cyber operations have to be kept closely held until used.

"It's not like normal bullets where the physical vulnerability of people remains constant," she added. "When the vulnerability is constant, it means that your 'bullets' can be used again even if the adversaries know about them. In contrast, once a 'cyber bullet' is out there, people can figure out what you did and create software and hardware patches to mitigate vulnerabilities. The ability to do this sort of work allows NPS to offer a unique program combining education and research."

Quick Hits

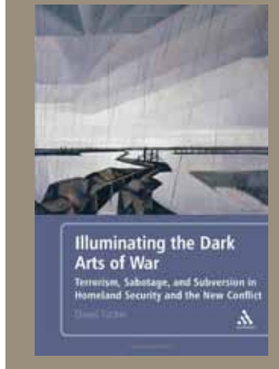
Dr. Alan Nelson

NPS Lecturer of Management **Dr. Alan Nelson** has spent a number of years spearheading a non-profit educational organization that focuses on leadership development and training programs for children, teens and young adults. KidLead is already being used in many schools throughout the U.S., and as Nelson notes, the program is realizing great results.



Dr. Donald Stoker

American History TV featured a lecture by Naval War College Monterey Professor **Dr. Donald Stoker** in March. Part of the strategy and war course in the Joint Professional Military Education curriculum offered at NPS, the lecture focused on North Vietnamese strategy during the Vietnam War.



Associate Professor **Dr. David Tucker** of the Defense Analysis department recently published "Illuminating the Dark Arts of War: Terrorism, Sabotage and Subversion in Homeland Security and the New Conflict." The work is a comprehensive survey of current threats posed by terrorism, sabotage and subversion to the security of the United States. Tucker examines how these threats connect, their limitations, and challenges the belief that the U.S. faces unmanageable dangers to its national security.

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30,000-lb slab of granite.

During experimentation, robotics float on a cushion of compressed air passing through a series of supersonic air thrusters in the precision slab, essentially simulating how a real spacecraft reacts in the vacuum of space. Maneuvers can be accurately calculated and predicted in various movements, allowing for a diverse program of student/faculty research through the lab.

Because of the enormous weight of the granite, to include the large mobile crane required to heft the behemoth stone, a labyrinth of buttressing was fitted into the lower floor of Halligan Hall as a precaution, and the existing lab spaces were expanded to accommodate the upgrade in capability.

Faculty Provide FAOs With Crash Course on Sino-African Relations

Professor Michael Glosny of NPS' Department of National Security Affairs was one of a handful of experts to present on Sino-African relations to a group of Africa Foreign Area Officers (FAO). The officers traveled to NPS from a number of regional commands to attend the Joint Foreign Area Officer Skill Sustainment Pilot Program (JFSSPP) in early February.

Dr. Michael Glosny, Department of National Security Affairs

Sponsored by the Defense Language Office in the Office of the Under Secretary of Defense for Personnel and Readiness, JFSSPP is the first DOD program to meet skill sustainment and professional development goals for all FAOs from all of the uniformed services.

Participating officers took part in discussions and presentations with topics ranging from the African economy and terrorism to security and stability, among many others. Glosny's presentation focused on Chinese intervention in Africa, and provided a brief historic account about the Chinese influence in Africa and its increased interest and investment in the region. He also discussed the effects of these interventions on U.S. interests.

JFSSPP in-residence courses bring select seasoned FAOs to Monterey for advanced seminars on security policy and international politics for the regions in which they operate, taught by NPS faculty and outside experts. The NPS itinerary is followed by a regional program, often overseas, that focuses on a specific region's security affairs.

New Book Compiles the Strategies of CCMR's Combating Terrorism Efforts

The Combating Terrorism Fellowship Program (CTFP) has worked more than 145 countries on sharing strategies to combat terrorism on the national and regional levels since its inception in 2002. And true to that mission, CTFP instructors continue to share — this time in the form of a book — "Fighting Back: What Governments Can Do About Terrorism."

The book, published by Stanford University Press, was edited by CTFP's own Paul Shemella, a retired Navy Captain and current program manager for the Center for Civil-Military Relations' (CCMR) CTFP at NPS. Shemella was also an author, writing six of the chapters for "Fighting Back." He recruited the other contributing authors as well, most of whom are instructors in CTFP.

"The value of the book is having all the important aspects of responding to terrorism in all places," said Shemella. "In the book we don't talk about the U.S. very much — we talk about all governments. We present the basics of combating terrorism strategy along with new theories and practical tools governments can use in a very readable format.

"The specter of terrorism is everywhere and everyone must confront it. CTFP participants represent a group of cooperating governments and collaborating governments fighting a world-wide problem," said Shemella.

Retired Navy Capt. Paul Shemella, program manager with the Center for Civil-Military Relations

"CTFP is about reaching out to partners and hearing their ideas and models of thinking, and sharing with them other international partners' ideas. They can take and use the ideas we bring them or not, although many of them do take them," he added. "This book is one more resource for our friends and partners to use when making decisions about risk assessment, resource allocation, ethics or measures of effectiveness in combating terrorism."

NPS' National Capital Region Welcomes New Leadership

The university welcomed a new director for its NPS National Capital Region (NPS-NCR) outreach office in Washington, D.C., when the institution tapped retired Rear Adm. Moira N. Flanders to head the office. As NPS-NCR director, Flanders will be responsible for assisting the President, Provost and senior administration on special initiatives in developing, managing and coordinating a variety of academic activities and relationships in the nation's capital.

"My primary responsibility is to professionally and positively promote the strategic importance of NPS education and research throughout the Department of the Navy, Department of Defense and U.S. federal government agencies," said Flanders. "I hope to strengthen existing partnerships and create opportunities for new partnerships within the academic, research and international communities."

Because Washington, D.C., is the focal point of the defense community, NPS has maintained an active presence in the region for a number of years, but the institution will look to expand that presence with the addition of Flanders leading NPS-NCR.

As director, she will participate in efforts to broaden NPS research opportunities with sponsors located in the capital region, in addition to building more awareness with potential students from the U.S. and abroad for selection to NPS educational programs.

Retired Rear Adm. Moira N. Flanders, NPS National Capital Region Director

Outreach is an evolving effort at NPS, with similar efforts in fleet concentration areas such as Norfolk, Va., and San Diego, Calif., tailored to meet the exact needs of the military communities they serve. NPS' international impact — as well as its diverse, multiservice student body — make the National Capital Region the perfect location for an active effort in building institutional awareness.

"NPS has an impressive 102-year history of academic achievement, innovative research and successful graduates," said Flanders. "It is important for decision makers throughout DOD and our government to know how active and important a role NPS has today in our defense establishment — here [in D.C.] and in Monterey — and to know that we are available and able to respond to their educational requirements.

"My respect for education and training, and for educators is great," continued Flanders. "I understand the importance of advanced education that keeps pace with technological improvements and constrained time frames and I am enthusiastic about being a member of the NPS team!"

Ceremony Honors Promotion and Tenure Actions for AY2012

Thirteen NPS faculty were recognized during a late April ceremony spotlighting NPS' Promotion and Tenure Actions for Academic Year 2012. Each of the individuals honored have demonstrated areas of accomplishment and leadership in their teaching fields that were significant in their candidacy for promotion, tenure or both.

Associate Professors Joshua Hacker from Meteorology, Nita Lewis Shattuck from Operations Research (OR) and Simson Garfinkel from Computer Science, along with Professors Ronald Giachetti from Systems Engineering and Oleg Yakimenko from both Mechanical and Aerospace Engineering and Systems Engineering each have been awarded tenure.

"Teaching to a broad range of backgrounds, such as those here at NPS, forces you to try to meet the needs of every student," Hacker noted. "If you can succeed, it is very rewarding because you can see that everyone gets something out of the class, regardless of where they came from."

Receiving promotion to Associate Professor and tenure are David Alderson from OR, Jomana Amara from the Defense Resources Management Institute, Aruna Apte from the Graduate School of Business and Public Policy and Michael Freeman from Defense Analysis. Receiving promotion to Professor and awarded tenure is James "Clay" Moltz from National Security Affairs. Matthew Carlyle from OR and Christopher Frenzen from Applied Mathematics will receive promotion to Professor, and Meghan Quinn Kennedy from OR will receive promotion to Senior Lecturer.

Space Systems Engineering student Vidur Kaushish is just one of several NPS students to perform thesis research on the Naval Postgraduate School's custom CubeSat axillary payload platform. NPS and the National Reconnaissance Office teamed up to develop the one-of-a-kind launcher.

NPS CubeSat Prepares to See Space by Way of New Payload Platform

By Amanda D. Stein

IN MANY WAYS, it will be a monumental launch for the Space Systems Academic Group (SSAG) at NPS. After a recent successful test run, two exciting NPS projects are scheduled to head to space in August of this year … One is a CubeSat, a small satellite destined for low-earth orbit, and the other, the NPS CubeSat Launcher or NPSCuL, is the payload platform that will carry it there.

NPS students and faculty, in a project funded by the National Reconnaissance Office (NRO), have designed and built the NPSCuL, pronounced "NPS-cool," axillary payload platform to allow multiple CubeSats to be launched aboard rockets as secondary payload — meaning the rocket would be able to carry satellites in onboard space that would otherwise be unused.

NPS Space Systems Professor Jim Newman noted the value of such an opportunity for NPS and NRO to collaborate on a project that has potential for the future of CubeSat missions.

"A fair number of the NPS Space Systems Engineering (SSE) students go to work at the NRO, ensuring that the Navy's interests in space, in particular, and the DOD's interests, in general, are well represented," explained Newman. "Giving students the opportunity to work on real-world, hands-on space projects, such as CubeSats, helps keep us relevant and exposes students to learning beyond the classroom."

The specially-designed NPSCuL is essentially a box into which the small satellites will be stacked until they reach the desired destination. At that point, spring-loaded doors will release the satellites one-by-one into orbit, where they will gather data for the duration of their one- to two-year lifespans.

"The CubeSat platform provides an opportunity to develop technologies that better serve our current military's needs," explained SSE Ph.D. student Wenschel Lan, one of two civilian graduate students working on the project. "The small size of a CubeSat, compared to a typical large satellite, lends itself to be more responsive and efficient, which are important advantages in the planning and operations of space programs.

"NPSCuL, which can accommodate up to 24 CubeSats in a single ESPA-class [Secondary Payload Adapter] payload volume, enables these technologies to be developed at a much higher rate than any other U.S. launch capability to date," she continued. "This inaugural flight of NPSCuL will provide more launch opportunities for the continually-growing CubeSat community, which is estimated to include over 120 universities, private companies and government organizations."

The August 2012 mission carrying 11 CubeSats is known as the Operationally Unique Technologies Satellite (OUTSat) and will enable NPS researchers to get one of their own CubeSats into space for the first time. That CubeSat is part of a collaborative effort between NPS and the Lawrence Livermore National Laboratory (LLNL), to gather proof-of-concept data that is of significant importance to the space community. Known as STARE, the NPS/LLNL CubeSat will observe other satellites and help determine threats posed by space debris.

Space debris is a costly and dangerous problem for the space community, and one that the Navy and NASA have plenty of reasons to be concerned about. NPS Professor and Chair of the SSAG Rudy Panholzer explained that the Navy relies heavily on satellites for communications at sea. Space debris can be unpredictable and can cause millions of dollars in damage if it collides with operational satellites in orbit. STARE will help researchers look at ways of detecting a potential collision early on so that the satellites operators have time to re-position the satellite out of harm's way.

> *"Although we are an educational institution, and education is our primary function, we are also trying to produce real hardware that will fly in space – that pressure of producing real flight hardware is actually a valuable part of their education. Both military and civilian students are going to leave here as truly experienced space professionals."*
>
> Dr. James H. Newman
> Professor, Space Systems

"The Navy is interested because they have a lot of assets in space which they rely on," explained Panholzer. "And if we find ways of locating the space debris or space objects with a little more accuracy than they are doing now, they can save a lot of money. Also, space debris creates more space debris. And it's getting worse and worse. So unless we do something about it or do something to reduce space debris being generated in the future, it will get to the point where it's very unsafe to go into space."

Getting satellites into space can be costly and time-consuming, which has opened the door for CubeSats to gain momentum in the academic community. The small square satellites fit in the palm of your hand and, in many cases, can be built within the span of a student's academic career.

SSE graduate student Vidur Kaushish has been working on NPSCuL since 2009, and is looking forward to seeing the final product ready for the August launch. He and Lan are proud to have the opportunity for something they worked on to make it into space. The hands-on component of their program is something that both find exciting and unique.

"A lot of the hands on work has been done by us," explained Kaushish. "We've actually built it up, tested it, made sure to incorporate any minor design changes that were required, and basically just pushed it forward to get it to the point where it can go to space.

"In the past two and a half years," he added, "I have been involved with designing, building and testing hardware, managing the budget and interfacing with the various external organizations that are involved in the first flight of NPSCuL."

The NPS SSAG is adamant about student involvement, explained Newman. From concept to launch to on-orbit operations, the objective is educating future aerospace engineers and operators, both military and civilian, with an experience that prepares them for a career in the industry.

"Part of the educational value of working on NPSCuL is that our students have the opportunity to interact with the real space community," explained Newman. "They meet and work with professionals at United Launch Alliance, Boeing, the Space Test Program, the NRO, the National Research Lab, and others."

Another educational opportunity can be found in the pressure of working with expensive equipment. Plenty can go wrong before and after the hardware makes it into space, explained Newman, but the students are highly capable, and the equipment extensively tested to help reduce costly mishaps. He noted that the inevitable failures during ground testing are used as learning opportunities, giving students the freedom to take calculated risks and be innovative thinkers.

"They get the hands on opportunity to work with real flight hardware. These parts are worth millions of dollars and you get to the point where you really can't afford to make mistakes. So they also get to enjoy the stress of the real world.

"Although we are an educational institution, and education is our primary function, we are also trying to produce real hardware that will fly in space," he continued. "And that pressure of producing real flight hardware is actually a valuable part of their education. Both military and civilian students are going to leave here as truly experienced space professionals."

For Kaushish, this project signifies more than just the culmination of years of hard work. He is proud to have the opportunity to have done something that not many people have.

"It's been a lifelong dream to actually work with something that gets to fly in space," explained Kaushish. "To see that come to this point, where we are really close to a launch, is really exciting." IR

An Atlas V rocket, similar to this one in Cape Canaveral, Fla., will propel NPSCuL and its 11 CubeSats into low-earth orbit in August. One of those satellites, a joint effort between NPS and Lawrence Livermore National Laboratory, hopes to advance knowledge of space debris, improving lead time for potential collisions.

THE PEN AND THE SPEAR

By Dale Kuska

While he has been widely applauded for planning the May 2011 raid in Abbotabad that nabbed public enemy #1, NPS graduate and now Commander of the U.S. Special Operations Command Adm. William McRaven's greatest contribution to Special Ops, and to American national security, may have actually been created by his pen nearly 20 years prior.

If Mother Nature set out with a task of creating the perfect Special Operator, she'd likely end up with Admiral William McRaven.

McRaven has reluctantly become a celebrity of sorts, both within and beyond Department of Defense circles. It was his voice on the other end of the line briefing Commander in Chief Barack Obama and a spectrum of U.S. senior leadership when his plan to get Osama bin Laden, Operation Neptune Spear, was carried out by his team of elite commandos. He was runner-up for "TIME" magazine's annual "Person of the Year" bestowment. And were it not for a devastating 2001 parachuting accident, he'd likely still be out in the field, performing all those tactics that captured the public's awe in "Act of Valor."

But for all that he has accomplished in his lengthy Naval career, it was an opportunity to head to Monterey where he would perhaps end up making his most indelible mark on the forces he now commands, and on the nation. "The Boss," as he's widely known around the U.S. Special Operations Command, or USSOCOM, headquarters at MacDill Air Force Base in Tampa, Fla., used no silent helos, no guns, no dead-of-night surprise attacks in this operation.

Rather, it was an exercise of his mind, and his pen, that would result in the single most sought after and utilized handbook on the science of special operations, and it introduced the world to concepts like the "inverted pyramid" and "relative superiority."

"Special Ops: Case Studies in Special Operations Warfare Theory and Practice" as it was aptly titled when finally published, was born from McRaven's voluminous 612-page thesis, completed for his dual degree in 1993 from the Naval Postgraduate School. And it was an opportunity that McRaven freely credits as one of the most effective experiences of his career.

"I think my time at the postgraduate school was invaluable, because it gave me the opportunity to think. The military trains you well, but rarely do you have time as an officer to do that critical thinking … to not be constrained by the pressures of a day-to-day job," he said. "I am a strong believer that we need to teach our officers how to think critically, in a wide range of topics.

"You have to know your profession, and you have to be tactically and operationally sound and proficient," he continued. "But as you get more senior, you have to have an education that teaches you critical thinking. You are going to use those skills more often as an officer than anything else."

With that backdrop, then Cmdr. McRaven arrived on campus in 1991 as one of the more senior officers on campus, and says that he had nearly missed his opportunity to attend NPS.

"I was actually one of the older students at the school at that time as a Navy O-5," McRaven said, who finally got to NPS on his fifth set of orders. He was in the operational pipeline, his first three sets of orders to the university would be canceled by the Navy, and the fourth by himself as he was "out for Operation Desert Storm/Desert Shield," he noted.

"But they set me up again, I came in fairly senior, and I was on my way after this tour to command," he says. "I knew what I wanted to do when I got to PG school. Here was an opportunity to study, which I hadn't had in my career at the time and I was looking forward to it."

"I THINK MY TIME AT THE POSTGRADUATE SCHOOL WAS INVALUABLE, BECAUSE IT GAVE ME THE OPPORTUNITY TO THINK."

"To study," as he puts it, would be something of an understatement for the overachiever that is McRaven, who by many accounts did indeed know exactly what he wanted to do during his two years at NPS, and it was more than study and reflection.

"He definitely knew exactly what he wanted to accomplish while he was here, particularly in regard to his research," said longtime Defense Analysis Professor Gordon McCormick, who served as second reader on McRaven's well-known thesis.

CONTINUED ON PAGE 16 >

In his office at USSOCOM headquarters in Florida, Adm. William McRaven stands next a few keepsakes collected throughout his career, vestiges that have left a lasting mark on his own motivations. A framed photograph pictures McRaven with, from right, President Barack Obama, retired Army General and current Director of the Central Intelligence Agency David Petraeus, and U.S. Army Lt. Gen. Frank Helmick, current Commanding General of the XVIII Airborne Corps and Fort Bragg, and a fellow graduate of NPS. Perched tall over his shoulder stands a statue of General William J."Wild Bill" Donovan. Tapped by President Franklin D. Roosevelt in 1941 to lead what would become the Office of Strategic Services (OSS), Donovan's leadership of this organization would cement his stature as the "Father of American Intelligence." The OSS was the essential precursor to today's Central Intelligence Agency, and set a path for the U.S. military's inclusion of special operations forces. And finally, also on this mantle rests a relic from the South Tower of the World Trade Center, upon which is scribed, "The Deed is all, not the glory."

SPECIAL OPERATIONS

The roles of the United States Special Operations Forces in current conflict have increased dramatically over the past decade. In simple terms, like deployed man-years, current figures are double what they were at the turn of the millennium — in strategic value terms, irregular warfare has truly become the norm.

With 2012 marking the 50th anniversary since President John F. Kennedy officially commissioned the U.S. Navy SEALS, and our focus on USSOCOM Adm. William McRaven, we examine the increasing role of Special Ops, and the subsequent evolution in our Defense Analysis department, the result of what McRaven began nearly two decades prior.

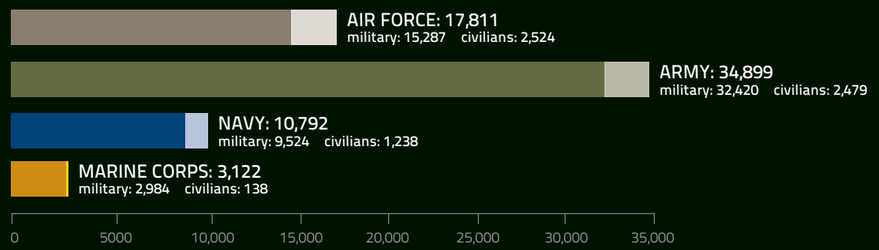
66,594

Total **2013** SOF Military and DOD Civilian Contractors

45,690

Total **2001** SOF Military and DOD Civilian Contractors

2013 USSOCOM FORCE STRUCTURE



11,500

2013 Average Deployed Man-Years

The FY2013 budget request supports an average of 11,500 deployed SOF at any one point in time.

4,900

2001 Average Deployed Man-Years

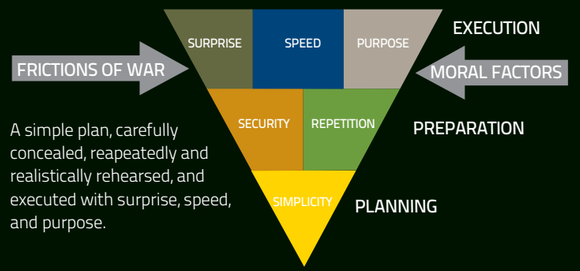
12,000+

Deployed Special Operations Forces

79

Countries of Special Operations Forces Deployment

THE SPEC OPS MODEL — McRaven's "Inverted Pyramid"



A simple plan, carefully concealed, reapeatedly and realistically rehearsed, and executed with surprise, speed, and purpose.

MISSION:

To arm select U.S. and international military professionals and interagency personnel with the critical thinking skills and specialized knowledge that they will need for waging and prevailing in the complex conflicts under way — and those to come.

TRUTHS:

Humans are more important than hardware

Quality is better than quanity

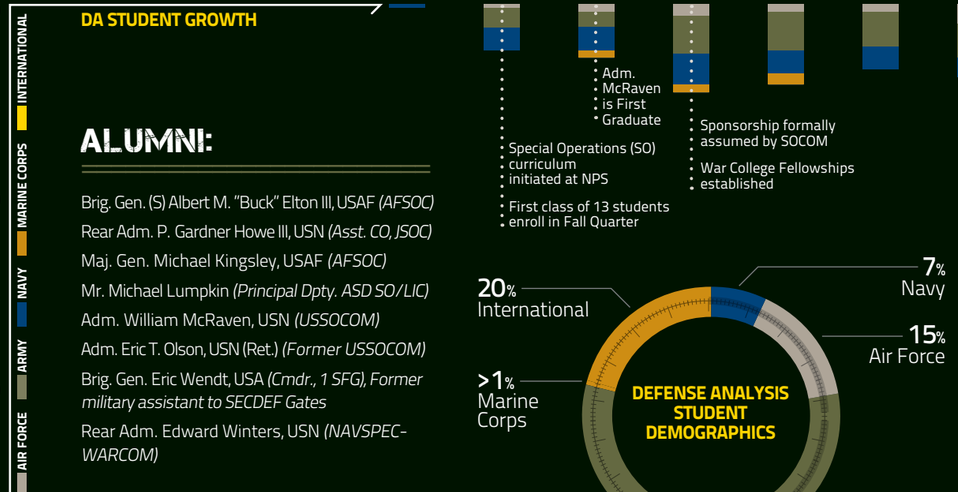
SOF cannot be mass produced

Competent Special Operation Forces cannot be created after emergencies occur

Most SOF operations require non-SOF support

DEFENSE ANALYSIS

DA STUDENT GROWTH



ALUMNI:

Brig. Gen. (S) Albert M. "Buck" Elton III, USAF *(AFSOC)*

Rear Adm. P. Gardner Howe III, USN *(Asst. CO, JSOC)*

Maj. Gen. Michael Kingsley, USAF *(AFSOC)*

Mr. Michael Lumpkin *(Principal Dpty. ASD SO/LIC)*

Adm. William McRaven, USN *(USSOCOM)*

Adm. Eric T. Olson, USN (Ret.) *(Former USSOCOM)*

Brig. Gen. Eric Wendt, USA *(Cmdr., 1 SFG), Former military assistant to SECDEF Gates*

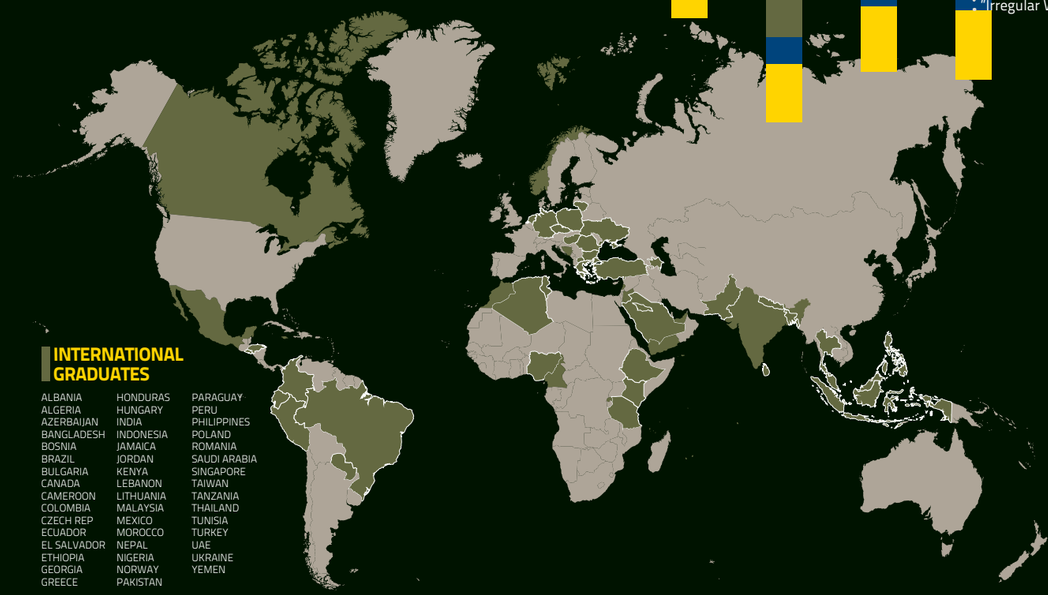
Rear Adm. Edward Winters, USN *(NAVSPECWARCOM)*

SPECIALTIES:

Irregular Warfare
Information Operations
Terrorist Operations and Financing
Operations Analysis
Combat Systems
Financial Management
C4I Systems
National Security Affairs (Stability/Reconstruction)
National Security Affairs (Regional Studies)

FACT:

After two decades of Defense Analysis educational programs, and nearly 900 graduates in irregular warfare and information operations, alumni from the Naval Postgraduate School now operate at every leadership level of the SpecOps community, from team and platoon leaders to the last two Commanders of USSOCOM.



INTERNATIONAL GRADUATES

ALBANIA
ALGERIA
AZERBAIJAN
BANGLADESH
BOSNIA
BRAZIL
BULGARIA
CANADA
CAMEROON
COLOMBIA
CZECH REP
ECUADOR
EL SALVADOR
ETHIOPIA
GEORGIA
GREECE
HONDURAS
HUNGARY
INDIA
INDONESIA
JAMAICA
JORDAN
KENYA
LEBANON
LITHUANIA
MALAYSIA
MEXICO
MOROCCO
NEPAL
NIGERIA
NORWAY
PAKISTAN
PARAGUAY
PERU
PHILIPPINES
POLAND
ROMANIA
SAUDI ARABIA
SINGAPORE
TAIWAN
TANZANIA
THAILAND
TUNISIA
TURKEY
UAE
UKRAINE
YEMEN

880

Defense Analysis Degrees Awarded

133

International Graduate Students

AS OF APR. 11

39

Students who have completed CORE methodologies

SOURCES: DEC. 11 DA DEPART. BRIEF; APR 11 DA DEPART. BRIEF; USSOCOM FY13 BUDGET HIGHLIGHTS; USSOCOM FY12 FACTBOOK; "SPEC OPS"

The reigns of the U.S. Special Operations forces would be passed from one NPS graduate to another when, from left to right, Secretary of Defense Leon E. Panetta, Adm. Eric T. Olson, and Adm. William H. McRaven participated in the official Change of Command Ceremony, Aug. 8, 2011. McRaven is the ninth commander of the U.S. Special Operations Command.

This Bull Frog is an impressive beast, and it rests only on the desks of the select few who have earned it. The current proud owners of this award, of which Adm. William McRaven is one, possess it because they serve as the longest current active duty SEALs in the U.S. Navy. The award was passed on to McRaven, and a training and readiness officer at the Naval Special Warfare Command, by another NPS alumnus, retired Adm. Eric T. Olson.

< CONTINUED FROM PAGE 13

"His thesis essentially challenged two tried and true historical principles of war … one, numbers count; and two, the defense is 'superior' to the offense," he added. "McRaven asked and answered the question, 'If these historic principles of war are true, how can it be that a numerically inferior force, operating offensively, can consistently prevail?' This is the 'commando problem.'"

Those tried and true principles were treated as near untouchable doctrine of war before McRaven, and were first theorized in the 1800s by Carl von Clausewitz, a German military theorist whose "Vom Kriege" — translated as "On War" — has been widely noted as a foundational text in the strategy of warfare. Clausewitzian theories on conventional warfare talk about, among other things, mass of force, and the essential need for a larger offense, simply because defense is easier.

But, as McCormick noted, McRaven noticed some of these concepts were indeed quite counter to what he saw throughout modern warfare in what were very successful operations. And he began to compile examples.

"Special operations are all about how a small force can achieve success, generally, over a large or more entrenched force," he noted. "That's very counter to Clausewitz, who suggested that all the defense has to do is preserve and protect, while the offense has to impose its will upon the enemy."

With that, he set forth his research question … Given 10 examples from recent history, where smaller forces were able to achieve great success over larger ones, "How does that happen?" he would ask.

McRaven examined these examples in great detail. "As I looked at each case study, it required a very detailed examination of the planning, the preparation, and the execution of each mission. As I was writing each one of the chapters, the theories began to manifest themselves in my mind.

"Essentially, what I was trying to determine were the principles of special operations," he continued. "I had felt very strongly going into this that the principles of special operations were different than the principles of war."

"Then Cmdr. McRaven focused on direct action operations very closely and in great detail," noted current Defense Analysis department Chair Dr. John Arquilla. "He discussed how this small force, through acting swiftly and accurately … with speed, surprise, careful organization and planning, can create a relative superiority over an adversary, and he developed theory about this."

"EVERY DAY… FROM THE TIME I LEFT THE SCHOOL, IT DIDN'T TAKE ME LONG TO REALIZE THAT WHAT I HAD BEEN TAUGHT — THE CONCEPTS, THE WAYS OF EXAMINING PROBLEMS — HAS BEEN EXCEEDINGLY VALUABLE TO ME."

McRaven would end up analyzing only eight of those operations in the development of that theory. "I never got to the final two case studies, I just ran out of time. Had I done them, my thesis would have been 800 pages," he noted with a laugh. "But I was doing it really just to educate myself. I wanted to do a good job, and I thought it was a valuable topic. But I just assumed that when I finished my thesis, it would simply sit on a shelf somewhere and collect dust."

Certainly that would not be the case for McRaven's work, not immediately after it was completed, and not for the foreseeable future either. "For many decades to come, his thesis and the book that was born from it, will be the handbook for this type of special operations," added Arquilla. "It's had a profound impact … it's pretty clear, the lessons to be drawn from this work are appreciated around the world."

In spite of the impact of McRaven's thesis, it is not the only mark he would leave on the Naval Postgraduate School. While he realized quickly there was a void in special operations theory, he also recognized a void in the education offered both to and about the craft he devoted his career to.

"I came to NPS in the National Security Affairs (NSA) curriculum, fantastic program … But we really didn't have any classes on special operations," he said. "I had just come off 10 months in Desert Storm/Desert Shield, and I felt very strongly that we should educate our conventional force of officers coming through the Naval Postgraduate School, and our own SOF (Special Operations Forces) officers as well, on what special operations was all about … So I went to Tom Bruneau, and he was interested."

Distinguished Professor Tom Bruneau, still actively teaching in the NSA department at NPS, remembers McRaven well. "When he first got here, he was quite senior, and knew very well how the bureaucracy worked, how to get something done within the system. And he saw a real need for a program tailored to his community," said Bruneau, NSA Chair when McRaven pursued establishing the Special Operation Low Intensity Conflict, or SOLIC, curriculum. "In the end, he created something that would be of great benefit to all special operations forces."

McRaven not only developed the SOLIC course outline required to graduate, he described in detail what the courses should entail, pitched the program to senior Naval leadership to get funding, and recruited top thinkers in the field to help make it happen. "We reached out to the RAND Corporation and Gordon McCormick, a very charismatic, wonderful teacher who was very interested in the same things I was. He agreed to help us," McRaven said. McCormick would go on to Chair the SOLIC curriculum, and the subsequent Defense Analysis department upon its creation in 2001 until Arquilla took over in 2011.

As current defense strategies have placed a concerted emphasis on the role of special operations, it would seem the lasting effects of McRaven's work — the Defense Analysis programs — are well positioned for the future. "We've grown more than ten-fold since the early days of the curriculum," noted Arquilla. "Since then, the demand for our educational product has skyrocketed.

"At the beginning, in the 90s, our program put irregular warfare on the map for the Department of Defense. In the 2000s, we added to that an improved awareness of information operations and how it played not only in irregular warfare, but in military operations in general," Arquilla added. "Now, in this decade, we are going to put network warfare, network analysis and how to fight to the dark networks that are threating our national and global security on the map. But it certainly all began with then Cmdr. McRaven's interest in ensuring there was education in this field."

McRaven's "Spec Ops" sits atop an impressive selection of works by Defense Analysis faculty representing the department's interdisciplinary expertise in irregular warfare and information operations serving today's joint service environment.

Off campus, those same programs are also equally well positioned to have a noted impact on current and future conflict. "Today there are two dozen wars going on around the world, and not a one of them can be characterized by what we would call conventional warfare. They are all irregular," Arquilla continued.

"The 21st century is very clearly one in which what we used to call irregular wars have become the norm. The ideas, theories, practices coming out of special operations are going to become of intense interest to many militaries, including to the more conventional forces," Arquilla said. "What Admiral McRaven began as a small, specialty program is going to become something that diffuses throughout the DOD and hopefully throughout our international allies as well."

The increasingly strategic role of special operations in modern conflict was both welcomed, and perhaps foreshadowed, in the eyes of William McRaven. "The recognition of SOF's role in this war, and frankly how we will engage countries in the future, whether it is a hostile engagement, or a peaceful engagement … I know the President, the Secretary [of Defense] and others appreciate what special operations bring to that."

While McRaven's mark on NPS, and his mark on the theory of special operations, is unquestioned, what about the mark these have made on him? Does he actually use what he had learned some two decades ago? Did he use it to plan and execute that May '11 Operation Neptune Spear over the dimly lit skies of Abbbotabad? Did the act of education have an impact on nature's perfect creation?

"Every day … From the time I left the school, it didn't take me long to realize that what I had been taught — the concepts, the ways of examining problems — has been exceedingly valuable to me," McRaven stated emphatically. "And as we look at the number of tactical operations I have had the good fortune to run, over the last three years in particular, I applied the theory many times, and the theory proved out every single time — most notably in May." IR

Adm. William H. McRaven, commander, U.S. Special Operations Command, shakes the hand of a Ranger from the 1/75 Ranger Regiment, awarded a Silver Star for gallantry during an awards ceremony at Hunter Army Airfield, March 16, 2012. One hundred four medals were presented to 80 Rangers for their bravery and heroism in 908 classified missions.

Adm. William McRaven, right, is pictured with Army Gen. James Thurman, left, and Marine Corps Gen. John Allen, center, during the senior officers' meeting with the Senate Armed Services Committee for approval of their then new appointments, June 28, 2011. McRaven would be appointed Commander of USSOCOM, while Thurman would assume command of U.S. Forces Korea, and Allen would take over for Gen. David Petraeus as Commander of the International Security Assistance Force – Afghanistan.

Vice Chief of Naval Operations Adm. Mark Ferguson delivers a Secretary of the Navy Guest Lecture to students, faculty and staff at his alma mater, the Naval Postgraduate School, Feb. 16.

Vice Chief of Naval Operations Outlines the Future Navy During SGL

By Amanda D. Stein

VICE CHIEF OF Naval Operations Adm. Mark Ferguson visited his alma mater to offer a Secretary of the Navy Guest Lecture (SGL), Feb. 16 to students, faculty and staff at the Naval Postgraduate School. Ferguson addressed defense budget projections for the future and the Defense Department's renewed focus on the Pacific Rim region.

Having himself received a Master of Science Degree in Computer Science from NPS in 1984, Ferguson understands firsthand the value of education for our nation's officers, and encouraged students to take their time here as an opportunity to grow into better leaders for the Navy's future.

"We train people to replicate, we educate to reason," said Ferguson. "You are being educated to reason and to shape our future as we go forward. Your critical thinking and what you learn here will carry forward to the fleet and into your commands, into our laboratories, into the field. It's going to be what shapes our future.

> *"We train people to replicate, we educate to reason. You are being educated to reason and to shape our future as we go forward. Your critical thinking and what you learn here will carry forward to the fleet and into your commands, into our laboratories, into the field. It's going to be what shapes our future."*
>
> Adm. Mark Ferguson
> Vice Chief of Naval Operations
> Computer Science ('84)

"Each of you are empowered," he continued, "and each of you should take it as a charge that your mission is to make that contribution, make that innovation that makes us better as a service. Challenge some of the things that we are doing. Take the things you have learned and go out there and use it for good. For the good of the Navy, the Marine Corps, and your service."

Ferguson spoke about the Navy's acquisition plans for the future, as well as the new defense strategy and planned rebalance of forces to theWestern Pacific. He explained that the shift is supported by the Navy's commitment to maintaining a global presence, and a result of the drawdown in Iraq and Afghanistan. He also noted that the shift in resources follows the guidance of the new Defense Department strategy.

"If you look at the budget decisions that we've made, the underlying force structure remains relatively unchanged for the Navy," Ferguson explained. "We are at 285 ships today, by the time the end of this budget rolls around, we'll have about 285. But the mix will change.

"By 2017 we will be within one percent of what we are right now," he noted regarding personnel. "There are 323,000 active duty in the Navy. Five years from now, our projected end strength is about 320,000."

Ferguson praised today's Sailors, noting that the retention rates and qualifications of the men and women of today's Navy are the best they have ever been. He pointed to a 99 percent high school graduate rate and a 65 to 70 percent retention rate as evidence of the positive steps being taken to create a leaner, more capable force amid budget cuts.

"For you as leaders going forward, this is an important inflection point in your experience as a military officer," explained Ferguson. "And it's important because in the last 10 years, if you were to look at defense spending in both the base budget and supplemental spending, we've been on a steady upward road."

"We've been engaged in two wars, the force is performing magnificently. It is resilient. It is tough. It is well trained. It is probably the most combat-ready force we've had," he continued. "It's under strain in some areas, under intense pressure in other areas, but it's battle hardened, and it's a very ready force. But this inflection that has taken place represents a shift in the trajectory of our budget that many of you in this room have never seen in your career. It will define the future that we come into in the next ten years."

Following the SGL, Ferguson paid a surprise visit to the Trident Room in Herrmann Hall to present NPS Defense Analysis student Lt. Cmdr. Jonathan Fussell his fourth Bronze Star with Valor. Fussell was presented the award for his work as Troop Commander for Naval Special Warfare Development Group, where he led a joint and interagency task force on direct action missions in Afghanistan.

"While Capt. Poindexter and I had originally coordinated a very low profile presentation in the Trident Room, the Admiral's presence was a welcomed addition," said Fussell. "It was an honor to have him present me with the award. Having never before seen me receive an award, my wife Rachael got a real kick out of it."

Ferguson also met with NPS leadership to discuss the school's impact on the Navy, and the programs that can ultimately help prepare students to lead in any number of critical areas of expertise. He noted in his lecture to students the importance of receiving an education in a collaborative environment, where problems solved today will have a lasting impact for the defense community in the years to come.

"The things you are doing now, in research and the laboratory, my prediction is that 15 years from now you will see them come to fruition in the naval profession, and be the centerpiece for what we do," Ferguson said. "My charge to you is to be ready to lead. To go out and impact the finest Navy we've ever had in our history.

"So as you go forward in your career, I encourage you to take opportunities for education outside of your comfort zone," he concluded. "It's a fundamental part of education, seeing how other people think. Checking your own premises and understanding that will make you a better leader. It will make you able to rise to those challenges in the future." IR

Former *Cole* CO Provides Detailed Account of Aden Bombing

Retired Navy Cmdr. Kirk S. Lippold, former Commanding Officer (CO) of the *USS Cole*, opened up to Naval Postgraduate School students, faculty, staff and guests during an NPS Secretary of the Navy Guest Lecture, Apr. 3 in King Auditorium. Lippold was CO of the *Cole* when a suicide bomber attacked the ship on October 12, 2000 while refueling in the port of Aden, Yemen.

Lippold gave a thrilling account of events that Fall morning when a routine refueling stop turned into a fight for survival that claimed the lives of 17 Sailors and injured 39 others.

"At 11:18 in the morning there was a thunderous explosion," said Lippold as he described the moments of the attack. "You could feel all 505 feet and 8,400 tons of guided missile destroyer suddenly bow, flex, and thrust violently up and to the right."

Lippold said that thanks to the training and determination of his crew, their command philosophy, and through crisis management, they were able to save the ship that day.

He said that the war on terror continues today and that it fell upon the officers on duty to prepare for the next challenges.

"I will tell you right now, you're in the thick of it," Lippold told the audience. "We're still in the middle of this war and it's going to go on for a long time … using the brain power and education this place gives you, you're the ones that are going to think through the problems with critical analysis that are going to keep this nation safe. I salute you and thank you for what you do and for giving me the honor of sharing the story of my heroes with you today."

A decommissioned U.S. Air Force A-10 Thunderbolt, similar to this operational aircraft from the 75th Expeditionary Fighter Squadron, is currently undergoing a complete renovation in preparation for its new life as a severe-weather chasing research vessel.

A-10 Transformation Will Lead to Big Research Opportunities for NPS

By Amanda D. Stein

AN OLD 'HOG' is about to receive a new life.

Thanks to a dedicated group of scientists and researchers, including several at NPS' Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS) and the National Science Foundation, new technologies will be combined with an old, tried-and-true military aircraft to create the perfect weather-chasing research vessel.

CIRPAS will soon acquire a decommissioned A-10A Thunderbolt, a beastly-looking military aircraft aptly nicknamed the "Warthog," designed to operate under heavy enemy resistance to deliver missiles and artillery in combat. The heavily-armored plane adeptly maneuvers at low speeds and altitude, and was a critical asset during Operation Desert Storm. Newer versions of the plane have also been used as recently as Operation Iraqi Freedom.

The durability of the craft makes it ideal for flying through dangerous thunderstorms that had previously only been accessible for research using radar equipment on the ground. CIRPAS Director Bob Bluth explained that NPS' past successes with using a Twin Otter for data collection, paired with the school's military ties, made the university the top contender for obtaining the plane with funding from the National Science Foundation.

"We've done really well with the Twin Otter. We've done 15 years worth of missions with it. We've got good expertise, and we're part of the DOD, so we can go into the military inventory and get these kinds of things … the A-10 is just another example of that," Bluth explained. "We got the A-10 from the Air Force through a concurrent agreement with Naval Air Systems Command and the Air Force. So it will still be an Air Force plane when we operate it, but it will be operated by the Naval Postgraduate School."

CIRPAS already uses smaller aircraft for weather research, including the Twin Otter used by the center for measurements in the lower troposphere. The advantage of using an aircraft to gather data rather than using a radar system that is most commonly used, Bluth explained, is like the difference between holding a thermometer in the air in your backyard, or sending one up 25,000 ft. into a thunderstorm.

"With the radar down here, everything is remote sensing. So you are basically interpreting what you are seeing. You shoot radio waves out, and then they come back and you interpret the signal that you are receiving," explained Bluth. "With the A-10, you are making direct in situ measurements. You are going into the weather, with probes on the wings and the nose of the airplane, gathering data."

Other research institutions also use aircraft — such as the T–28 storm penetrating aircraft operated by the South Dakota School of Mines and Technology and retired in 2004 — for getting in situ data, but none are as equipped as the A-10 to handle severe weather conditions.

"When the science community lost the T–28 storm penetrating aircraft, they identified the Fairchild A-10 as an ideal replacement for it. It extends the range of operation both in terms of distance to reachable storms and in terms of reachable altitude," explained Research Professor and Principal Investigator for the A-10 project Haflidi Jonsson."It also is heavily armored and therefore requires minimal additional armoring for hazard protection in storms. And it has much larger capacity for payload both in terms of available power and in terms of weight."

> *"It's a niche field. There are not a lot of people who get into atmospheric science. But for the people that do, everybody will know that this is the place to come."*
>
> Bob Bluth, Director
> Center for Interdisciplinary Remotely-Piloted Aircraft Studies

Bluth echoed Jonsson's comments, noting that the T–28 was able to carry 250 lbs. of payload, while the A-10 will allow researchers to carry several thousand pounds worth of equipment, meaning more instrumentation and gear that will not only collect data, but help keep the A-10 protected in extreme conditions.

The craft allows researchers to get closer than ever to the heart of the storm, providing data from an entirely new perspective. The A-10 will be equipped with numerous sensors, from nose to tail, all running autonomously while the pilot navigates through storms. It will also have de-icing systems to prevent ice build-up on the airframe, and a copper-wire mesh strung out over vulnerable parts of the airplane to protect it and the equipment from lightning strikes.

"Since 2004, meteorologists have been lacking capability to obtain in situ measurements inside cumulonimbus clouds and thunderstorms. The only storm-penetrating aircraft available to them was retired then," said Jonsson. "Much progress has taken place in the development of remote sensors and models that are used to observe and predict storm development. Both, however, need the in situ data for tuning retrievals and validate results.

"Additionally, atmospheric chemists need to measure quantities of chemical species that are generated by lightning inside storms, or modified by the cloud chemistry," he continued. "They also want to study the transport of chemicals through the heights of the troposphere and into the stratosphere. Atmospheric physicists are still working on the causes of cloud electrification and lightning."

The A-10 being loaned to NPS will undergo extensive renovations and regeneration to make it fit for its new duties. The craft will first be completely renovated to like-new condition in one of two A-10 maintenance centers in the country. It will be extensively refurbished, including new engines and wings, corrosion mediation, even a new paint job. From there, the A-10 will make its way to Oklahoma for testing and 'weather-proofing.'

One of the biggest challenges that the aircraft will face is the danger that large hailstones pose to vulnerable areas on the plane itself, and the delicate sensors that will be attached to it. While the exterior of the plane is very durable, designed to take hits from 20 mm shells and remain airborne, certain components of the plane, such as the leading edges of the wings, are not as heavily armored. Thicker metal will have to be added to ensure they can withstand a beating in severe thunderstorms, and it will have to be tested as well.

"We are going to build a hail cannon that will shoot a 3½-inch hail stone at about 350 knots, and we will shoot it at various components of the airplane to make sure it can hold up," explained Bluth. "We will start with parts from an A-10 that we will get from Davis-Monthan Air Force Base from junk airplanes, and we will start by building our own of different thicknesses, and use that as our certification process with the Air Force to be able to show that the modification is sufficient to support the environment that the airplane will be operating in."

Once operational, the aircraft will be used in much the same way as other NPS or NSF research assets, with a panel reviewing research proposals to select the ones to be executed. Bluth expects that the A-10 will be running an average of three missions per year once it becomes operational in the fall of 2013. He hopes to see the A-10 as an opportunity for NPS students and faculty to connect with other universities looking to conduct research with the aircraft.

"It's a niche field. There are not a lot of people who get into atmospheric science. But for the people that do, everybody will know that this is the place to come," explained Bluth. "Since we are a University-National Oceanographic Laboratory System facility, we work with a lot of other universities. That gives NPS and the faculty and students at both institutions an opportunity to work together. And there are dozens of universities that we have worked with, providing a national, even international, level of exposure." **IR**

CIRPAS Director Bob Bluth stands in front of the Twin Otter, an aircraft used for gathering meteorological data in the lower troposphere. Bluth and his team will be responsible for overseeing the operations of a newly acquired A-10 Thunderbolt, capable of flying into and gathering data in severe thunderstorms.

Students in NPS' new Remote Sensing Intelligence degree program are studying under a Scholarship for Service program sponsored by the ISR (Intelligence, Surveillance and Reconnaissance) Task Force, and will immediately apply their education to counter-IED operations in theater upon graduation.

The New Face of ISR

As a cohort of students reaches the midway point in their remote sensing intelligence master's program, they serve as a compelling example of the unique educational programs in highly-classified fields that only the Naval Postgraduate School can provide.

By Amanda D. Stein

THE NAVAL POSTGRADUATE SCHOOL celebrated a new addition to the academic lineup as 20 students in the Remote Sensing Intelligence (RSI) master's degree program recently completed their second quarter of classes. With two more quarters to go, the fast-paced program provides students with a comprehensive education in remote sensing, and prepares them for jobs in critical national security fields with one of several potential sponsor organizations after they graduate in the winter.

"Remote sensing means taking images from a distance," explained Physics Professor Richard Olsen, one of the key faculty facilitating the RSI program. "Satellite imaging of one kind or another — optical, infrared, radar — those are sort of the cornerstone technologies that comprise remote sensing. It has to do with obtaining information about something at a distance without interacting with it directly.

"It optimizes your ability to conduct warfare," he continued. "Because the more information you have about where you are going and what's there, the more effective you can be. Mission planning, absolutely, requires the type of work we are doing."

The students selected for the program come from a variety of academic backgrounds of study, all with the common goal of soon directly using their remote sensing education to benefit the warfighter. All civilians except for two, the students were accepted into the Scholarship for Service program, with this cohort sponsored by the ISR (Intelligence, Surveillance and Reconnaissance) Task Force to focus on counter-IED (improvised explosive device) efforts in theater.

> *[Remote Sensing] optimizes your ability to conduct warfare, because the more information you have about where you are going and what's there, the more effective you can be.*
>
> Dr. Richard Olsen
> Professor of Physics

Without having previously been government employees, the NPS environment is a new and exciting one for many of the students. RSI student Christopher Burt knew of NPS' academic reputation before he joined the cohort, and he sees the program as a unique opportunity to merge the perspectives of military and civilians.

"Having people trained in the civilian world as scientists — and with a lot of us having extensive commercial experience too — I think you get a new and fresh perspective on the scientific world," said Burt. "Adding that to the expertise of the military men and women in the DOD can only help."

Olsen noted that the students' education will directly benefit the Department of Defense. Remote sensing is an invaluable tool for gathering intelligence, and one that the defense community has seen the value of.

Olsen cited recently released comments by Secretary of Defense Leon Panetta that coming defense budget cuts would not take funding from three critical areas: special operations, cyber warfare, and intelligence, surveillance and reconnaissance.

"The military doesn't conduct operations without a significant amount of information," explained Olsen. "Operationally, it's very important. There's an anecdotal event that we talk about in our national systems class where some British Special Forces were about to go into a location in Afghanistan and very late it was determined using some remote sensing technology that the area they were going into, there were already people there. The British troops would have been killed if they had not been warned about the presence of these forces."

The RSI program has incorporated a significant number of new courses designed specifically to meet the needs of the intelligence community to which the students will be transitioning after graduation. Olsen has taken feedback from faculty on what areas of study are important, and developed a curriculum that he feels touches on the important aspects of the field. Students will, in the end of their studies, have the skills to solve critical problems for the warfighter.

Olsen highlighted an example. "One of our big projects in basic remote sensing was looking at helicopter landing zones," he explained. "One of the major problems for people doing helicopter operations in Afghanistan and Iraq is dust — dust clouds that come up from the helicopter blades. So the trick is to land some place that doesn't have dust.

"We actually had a project designed to, in a very operational way, provide the planners techniques for taking images of operational areas and running some simple algorithms that would tell them 'go'/'no go' landing zones. And it turns out you don't normally have to go very far to get from a bad place to a good place if somebody will just tell you ahead of time."

Texas A&M graduate Steven Terry received a Bachelor of Science degree in Animal Science and a Master of Science degree in Geography before joining the remote sensing program at NPS. He and his peers have incredibly diverse backgrounds. Terry is one of two former military students in the current class, having worked in the intelligence community.

"The main benefit of being at NPS is the relevance of the classes while building the body of knowledge about the science," explained Terry. "This education will provide us the background information to go into the intelligence community and contribute to solving their geospatial problems."

Olsen is pleased with the interest in the program, and hopes to add some Army students to future cohorts, giving some of the end users a chance to study remote sensing and the technology that will be utilized by soldiers in theater. Olsen noted that there are few universities currently offering remote sensing programs, and even fewer — if any — have the access to Sensitive Compartmented Information Facilities (SCIF) and faculty with the clearance to teach classified material.

"We think there is a tremendous hunger for this program at the student level," he noted. "I'm expecting that we will probably have four or five times more applicants than we will accept this year. And I think there is a tremendous hunger out there in the employment community as well." **IR**

NPS Physics Professor Richard Olsen conducts class with a packed house, among them the 20 students in the new remote sensing intelligence program. Roughly half of the courses in the program are new, developed specifically to prepare students for applying their remote sensing education within the defense community.

University's Center on Contemporary Conflict Leads Project on Countering Weapons of Mass Destruction

By Amanda D. Stein

THE NAVAL POSTGRADUATE SCHOOL'S Center on Contemporary Conflict (CCC) is now home to the Project on Advanced Systems and Concepts for Countering Weapons of Mass Destruction (PASCC), a multi-million dollar program directing research and strategic dialogues on weapons of mass destruction (WMD) on behalf of the Defense Threat Reduction Agency (DTRA) Strategy and Plans Enterprise. CCC has assumed these functions from the former Office for Advanced Systems and Concepts (ASCO), which was disestablished in June 2011.

"The core function of what ASCO did, and what PASCC now does, is to try to anticipate and analyze ways in which the United States can help itself and its allies manage and reduce the threat from weapons of mass destruction," explained Dr. Anne Clunan, Director of the CCC and Associate Professor in the Department of National Security Affairs (NSA).

The relationship between DTRA and CCC was initiated by former NPS faculty member Peter Lavoy, the current Principal Deputy Assistant Secretary of Defense for Asian and Pacific Security Affairs in the Office of the Under Secretary of Defense. Over a period of 12 years, Lavoy and other NSA faculty members helped NPS build a relationship with DTRA. As the relationship evolved, DTRA began to understand that NPS and its CCC were well prepared to handle the transition, and saw the program as an opportunity for NPS to help further an area of national security already being extensively studied by university researchers and students.

"Although PASCC is still fairly new, it demonstrates our capacity to manage these large and complex efforts," explained Rasmussen. "We are working on expanding the way we release research products to quickly and efficiently get results out to the public so that other researchers can leverage them, while also working with stakeholders in Washington to share our research agenda."

One of the primary functions of PASCC is to distribute millions of dollars in grants to qualifying research proposals and engage in strategic engagement with key global partners.

"The project fits very well with the expertise of the CCC faculty, and the National Security Affairs department faculty, in that we have a very deep bench of folks who are focused on WMD, strategic stability and extended deterrence issues and they also have very deep regional expertise," explained Clunan. "And that is not something found at a lot of major research universities."

"I think that this will be a growing opportunity for NPS as the definition of what is a weapon of mass destruction or mass effect will change as technology changes," she continued. "And this enables the university to be where it should be — which is on the cutting edge of research that is relevant to the nation's security." **IR**

Faculty and staff supporting the Project on Advanced Systems and Concepts for Combating Weapons of Mass Destruction (PASCC) stand beside the National Security Affairs sign in Glasgow Hall. The team helps acquire and distribute WMD research funding on behalf of the Defense Threat Reduction Agency, while also making the research more readily available for institutions to share their findings.

Commencement speaker Vice Adm. John M. Richardson, currently serving as Commander, Submarine Forces as well as Commander, Submarine Force Atlantic and Commander, Allied Submarine Command, center, with NPS leadership during the Winter Quarter graduation, March 30.

Submarine Forces Commander Highlights Winter Graduation Ceremonies

By MC1 Rob Rubio

AN INCREASINGLY DIVERSE community of graduates, representing the Navy and all U.S. services, several nations, law enforcement and a large group of civilians, were joined by a packed house of family and friends in celebration of Winter Quarter graduation, Mar. 30 in King Auditorium.

NPS President Dan Oliver introduced this quarter's guest speaker, Vice Adm. John M. Richardson — currently serving as Commander, Submarine Forces as well as Commander, Submarine Force Atlantic and Commander, Allied Submarine Command — noting, "We are very fortunate to have an officer of this stature with us today."

> *"NPS itself is a strategic star in our constellation as a Navy and the combination of Navy students, students from other services and government agencies, and of course the international students, make this truly a special place."*
>
> Vice Adm. John M. Richardson

Oliver would go on to describe Richardson as a visionary leader who last year developed and promulgated a document entitled, "The Design for Undersea Warfare," outlining a vision, strategy and plan for the future of our undersea forces. This design has been strongly endorsed by leadership and will play an important role in the future of our Navy, Oliver noted.

Vice Adm. Richardson opened his remarks by thanking the NPS community for the invitation to be guest speaker, and paid the graduating class a high compliment by noting that they "both individually and collectively represent a tremendous addition to the strategic arsenal of our nation."

He commented that this was a milestone day for the Navy, this nation and many nations as the graduates complete their studies and return to their units, home countries and commands. NPS is not just any graduate school or academic institution, he added, but is the U.S. Navy's graduate school … the students here are not focused on just any old issues, but rather on practical and detailed solutions to real problems that face our Navy and defense.

He stated, "You have had the chance to interact with one another from different warfare specialties within the Navy, different services across the Defense Department, and shared those experiences in your service histories, and as much as any joint professional military education course or war college, you have had the joint experience."

The relationships that have been built will reach across warfighting domains as you return to operate and fight together, he added, emphasizing

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the strategic advantage of NPS' international environment. Today's global problems require very comprehensive approaches and solutions that bring their own elements of national and international power, he said.

He closed by remarking, "You have bonds of friendship and trust already in place that you forged here in Monterey … You became international strategic thinkers without even realizing it," Richardson said. "Our nation needs you to rise and reach your strategic potential … Don't forget what you learned here in class and by all means stay in touch and keep those strategic bonds strong."

Following the graduation ceremony, distinguished guests and graduates alike transitioned to Herrmann Hall's Barbara McNitt Ballroom for the graduation reception. Here, Richardson commented that he felt it was a privilege to be asked to be the graduation speaker.

"When President Oliver asked me, I was completely thrilled," he said. "Anytime I can be the speaker at a graduation ceremony here, I'll take it.

"NPS itself is a strategic star in our constellation as a Navy and the combination of Navy students, students from other services and government agencies, and of course the international students, make this truly a special place," he added.

As is the tradition every quarter, several key students were spotlighted for excellence through NPS' various awards and honors. One of the most prestigious, the Monterey Council Navy League Award for Highest Academic Achievement, was presented to Navy Lt. Eric J. Blomberg.

"I am blown away by my selection for the Navy League award," Blomberg said. "As a nuclear engineer in the Navy, the curriculum in the National Security Affairs department was well outside of what I have worked with and studied for the last 15 years, and I really enjoyed the experience … I will go back to the fleet as a more well rounded officer," he added.

Lt. Cmdr. Meng Hwee Tan of the Singaporean Navy was selected to receive NPS' top award for international students.

"I am very honored to receive the Outstanding Academic Achievement Award for International Students. The award is a recognition of my hard work and effort put in over the past 18 months. I would like to thank the MAE (Mechanical and Aerospace Engineering) department for the award nomination.

"Receiving higher education at NPS was a very enriching experience. NPS provided the opportunities to work on real problems and issues related to military aspects," he continued. "The opportunity to interact with U.S. students as well as other international students has widened my knowledge and network." Tan added that he enjoyed the pace of life in Monterey, saying he would definitely miss it upon returning home to Singapore.

Part of the graduating class also included something of a rarity in NPS' commencements, as Navy Capt. Bryan S. Lopez, Executive Officer (XO) of Space and Naval Warfare Systems Center Pacific, walked with this quarter's class to receive his Executive Master of Business Administration (EMBA) degree.

"I feel humbled to have been part of the experience, and to be able to come back and do this and be part of the Executive MBA, it is phenomenal," he said.

Lopez was already familiar with NPS, graduating from the university as a Lt. a decade prior with a master's degree in Electrical Engineering. He had high praise for the experience, noting that the Executive MBA was a perfect fit to the type of work he performs daily as the XO at a major Naval systems center.

"It's all about operational procurement, money, manpower and cost schedule type of performance stuff … This will continue to help me with whatever I do in the rest of my career," he said. "At this point in my career, I'm not sitting down there working with engineering design teams. You're managing the big picture. It's budget, money and manpower, and if there's a follow on tour in Washington, that's where most of us end up some day," he remarked.

And in spite of the unique experience Lopez' second time around at NPS provided, he admits the campus also brought back some old memories. "It is nostalgic to be here 10 years later, as I remember being here as a Lt. and standing outside Root Hall … standing here again, it is just like a flashback," he added.

A total of 307 students graduated during the Winter quarter, earning 308 degrees. The graduating class was composed of 196 military, 81 civilians and 30 international students. IR

TOP: Vice Adm. John M. Richardson offers keynote remarks during the Winter quarter commencement ceremony, Mar. 30 in King Auditorium.

RIGHT: Navy Capt. Bryan S. Lopez, Executive Officer at Space and Naval Warfare Systems Center — Pacific, was one of the class's more senior graduates, receiving an Executive Master of Business Administration this past quarter. It was his second degree from NPS, Lopez graduated a decade prior as a Lt. from the Electrical Engineering curriculum.

Revolution Visualized

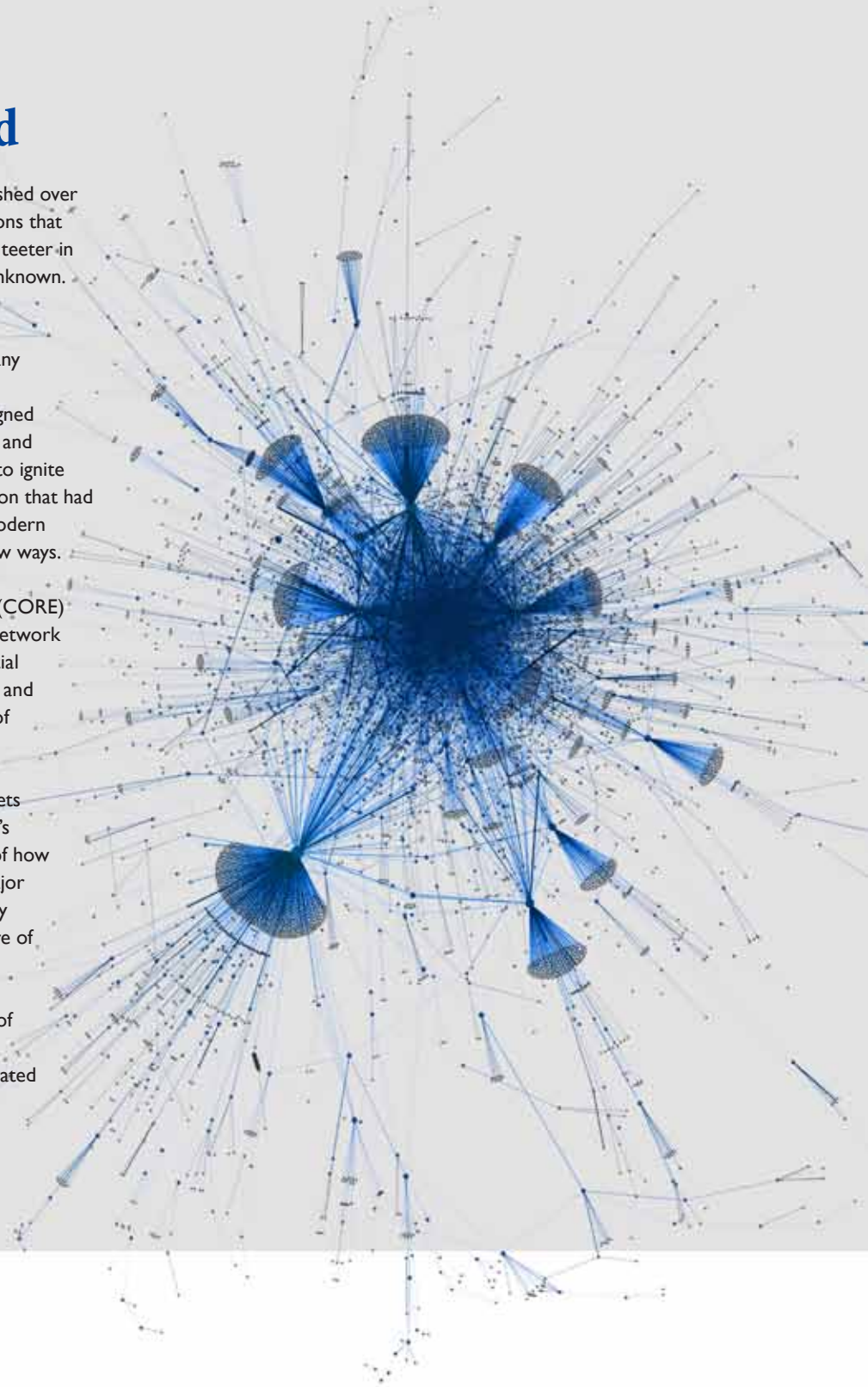
More than a year has passed since the Arab Spring washed over northern Africa and the Middle East, and so many nations that were once enthralled with the angst of revolution still teeter in a delicate balance between societal security and the unknown.

Egypt was certainly in the eye of the world during this ongoing storm of change. Revolution has happened many times before in human history, but not quite like this. Before former Egyptian President Hosni Mubarak resigned on February 11, 2011, Egyptian citizens, media, officials and impersonators used every day social media platforms to ignite and share, to organize and mislead. Unlike any revolution that had come before it, the interconnections made through modern technologies were very clearly impacting society in new ways.

In the Common Operational Research Environment (CORE) laboratory at the Naval Postgraduate School, social network analysis tells compelling stories … It highlights potential improvised explosive device networks in Afghanistan, and can be applied to anti-gang initiatives on the streets of American cities.

Researchers in the CORE Lab examined a million Tweets posted over the span of 11 days just prior to Mubarak's resignation all related to Egypt, and painted a picture of how they connected together. They recognized who the major players were within and outside of Cairo, and how they connected via Twitter — in short, they created a picture of revolution, and the role of social media within it.

Scholars will disagree to the day regarding the power of that role … but there is one truth that is undeniable. Like no revolution before it, the Arab Spring demonstrated how 140 characters can be used to change the world.



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