NAVAL POSTGRADUATE SCHOOL

IN REVIEW MAGAZINE

JULY 2012

AS POLITICIANS, MILITARY LEADERS AND STRATEGISTS ALIKE WRESTLE WITH THE RULES OF CYBERWARFARE,

BUILDING THE CYBER WARRIOR

NPS STUDENTS PURSUE MASTER'S DEGREES IN CYBER SYSTEMS AND OPERATIONS, READY TO LEAD IN THE CREATION OF TOMORROW'S CYBER WARRIOR

INSIDE:

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

Capt. Alan "Dex" Poindexter was a man of impeccable character and a true leader and mentor in every way imaginable. As Dean of Students, he was sincerely committed to the success of our students with a persistent and passionate desire to support and guide their efforts.

PRESIDENT'S MESSAGE

Advanced education has been credited with one of the highest compliments and responsibilities any individual experience can claim … In the simplest of terms, it changes your life. The process of challenging one's mind to absorb new concepts and theories, to develop and advance mankind's body of knowledge, and to confront one's own preconceived ideas or thoughts can indeed be a life-changing experience.

At the Naval Postgraduate School, we are fortunate to see this invaluable process unfold every day in classrooms and research labs across our campus. But what makes this process of education have such an impact on one's life? Certainly, mentally focusing on acquiring and creating knowledge is significant, but there is another critical element that is essential to the success of this otherwise solitary work. That element is the other people.

NPS faculty are world-recognized leaders in their respective areas of expertise and, as I have noted many times, are the single most critical purveyors of the NPS product of education. They carefully guide our students through life-changing challenges, creating the thoughtful leaders our U.S. uniformed services and our international allies require.

But, faculty are not the only other people who play indispensable roles in the powerful experiences of our students. Of this, we have recently been profoundly reminded by the sudden loss of one of those other people, one of the most popular and inspirational members of our team.

Capt. Alan "Dex" Poindexter was a man of impeccable character and a true leader and mentor in every way imaginable. As Dean of Students, he was sincerely committed to the success of our students with a persistent and passionate desire to support and guide their efforts. He was a valued member of the administration of this university, participating actively in the leadership team. He was a widely popular and trusted friend and colleague among the entire NPS community. And personally, he was a remarkable husband and father whose loving dedication to his family was matched only by his loyalty and love for his country.

An NPS graduate, Dex's impact on the university was incalculable, but he was also well-known as an accomplished NASA astronaut who twice flew in space and commanded the space shuttle Discovery on one of its final flights. As such, he was part of a small community of national heroes who have achieved one of mankind's greatest accomplishments. For decades, as early as the 1960s Gemini program through the entire run of the Space Shuttle program, NASA has maintained a long-standing tradition of playing a track of music, known as the Wake-Up Call, each day selected for a different member of the crew. The song marks the beginning of the day's activities, and is frequently chosen by loved ones of that particular crew member for very significant reasons. On the 15th day of the space shuttle mission on Discovery in 2010, the second to final day, the family of Capt. Alan Poindexter chose the "Star Spangled Banner" to be played for him and his crew.

While Dex was tragically taken from us much too soon, he was a wonderful example of how much difference one person can make and his absence continues profoundly to reinforce that lesson. Captain Alan Poindexter was, is, and always will be, a true, undeniable and real American hero.

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ON THE COVER
A dramatic representation of a cyber warrior … But the necessity to evolve the national cyber workforce cannot be overstated. As leaders throughout Washington have said, this is one of the most pressing issues in current American security. While the cyber warrior of the near future isn't armed with a rifle of ones and zeros, the role of cyber in offensive and defensive warfare is very real and will only increase. In this edition of "In Review," we examine NPS' newest educational degree programs in the Fifth Domain, educating the leaders of tomorrow's cyber workforce.

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NPS' DRMI Helps Moldovan Ministry of Defense Shed Old Soviet Practices

Moldovan Army Col. Anatolie Coguteac, director of the acquisitions department for the Moldovan Ministry of Defense, attended NPS' International Defense Management Course in 2011 and returned to the university to participate in the follow-on Senior Defense Management Course in July.

"The first course introduced me to new ways of looking at things, good ways of looking at things," said Coguteac. "We looked at the life cycle of supplies and how to optimize purchasing based on how various suppliers impact that cycle. Often times, the cheapest supplier is not the optimal one.

"After the first course, I was able to go back home and provide recommendations on how to adjust our acquisition and procurement process to secure the optimal vendor for our needs. There is legislation in the works now that will reflect those changes once it is passed," said Coguteac.

Helping politicians understand defense budgetary needs is an important skill for military leaders to possess, and a critical outcome of the senior coursework.

"Politicians know that almost no one will say their budget is sufficient, so they make us prove our needs," said Coguteac. "For the military, it becomes critical to get parliament, specifically the Security Council, to understand how cuts impact our capability.

Col. Anatolie Coguteac, Moldovan Army

"Of course we have our own way of doing things in Moldova, many inherited from the old Soviet practices, but as a nation we are always looking for new ways of solving problems: operationally, tactically and strategically," he added.

NPS' Defense Resources Management Institute (DRMI) facilitates both courses, and since its first course in 1965, has reached nearly 35,000 military professionals in over 160 countries. Participants expand their knowledge base in defense resource management, returning to their home countries and military commands to apply them. Among many high-level graduates of DRMI programs are King Abdullah II of Jordan, Lebanese President Michel Sleiman and Albanian President Bujar Nishani, to name a few.

RSEP Team Embarks With *Eisenhower* Carrier Strike Group

A team of faculty from NPS and beyond participating in the Regional Security Education Program (RSEP) deployed with the *USS Dwight D. Eisenhower* (CVN-69) supporting the Carrier Strike Group (CSG) under Commander, Rear Adm. Mike Manazir.

The two-week program of 26 lectures on the Middle East, Western Mediterranean, South Asia and Africa were presented to select members of the staffs of five ships and the air wing assigned to the CSG.

USS Dwight D. Eisenhower

"Adm. Manazir and the IKE [Eisenhower] Strike Group team took full advantage of the knowledge the RSEP team had to offer, both during our briefings and informal discussions aboard all the ships and in squadron ready rooms. Feedback from commanders, commanding officers and Sailors on the deck plates has been very positive, noting our contributions to mission readiness early in their deployment to 6th and 5th Fleet areas of operations," retired Rear Adm. Stephen Loeffler, RSEP Director, said. "Working together with the staffs, ships and air wing, the IKE CSG RSEP program was another highly successful outreach to the fleet from NPS."

RSEP was developed in 2001, following the bombing of *USS Cole* (DDG 67), at the request of then Chief of Naval Operations Adm. Vern Clark to better prepare naval forces to operate successfully in different regions around the globe. The program uses an interdisciplinary approach emphasizing political science, history and economics, national security affairs, defense analysis, current events and subject-matter experts to promote a better understanding of the regional environments in which American ships, Sailors and Marines operate.

Global Center Directors' Conference Solidifies Consortium Efforts

Established in 2006, NPS' Global Center for Security Cooperation (GCSC) was created by the Office of the Secretary of Defense under the Defense Security Cooperation Agency to centralize oversight, coordinate and integrate activities and capabilities of international education providers in the area of international security cooperation.

The center helps the member institutions share information, faculty and other resources in support of international partner education activities. To accomplish this mission, GCSC held its annual Consortium Directors' Conference, Jul. 10–12, at the nearby Monterey Hyatt adjacent to the NPS campus.

"This conference is a great event," said GCSC Director and Dean of the School of International Graduate Studies, Dr. James J. Wirtz. "It brings together much of the U.S. international engagement community and other U.S. organizations to talk about our international engagement activity as an enterprise-wide activity. It provides a wonderful opportunity to get together and network, and get to know each other's capabilities."

Presenters included Pete Verga, Chief of Staff in the Office of the Under Secretary of Defense for Policy, and Scott Schless, Defense Security Cooperation Agency Principal Director for Strategy.

"We have to adapt," said Verga, referencing current U.S. national security strategy resulting from drawdowns in Iraq and Afghanistan and the challenges brought on by deficit reduction goals. "We have to be more agile and more flexible … [And] have to look at programs in a very strict light and make some really hard choices."

Noting that consortium directors were innovative and resourceful enough to meet these and all coming challenges, he added, "National security activities must be aligned and re-teaching the same lessons will not cut it."

NPS Hosts 44th Annual Mathletics Competition

Several NPS faculty and staff volunteered to help Monterey County students show off their math skills during the 44th Annual Mathletics competition, May 12. For the second year in a row, NPS hosted the competition that brings hundreds of "mathletes" from the surrounding communities onto campus for a day of competition.

NPS Chair Professor and former astronaut Dan Bursch speaks to area students during a regional Mathletics competition on the NPS campus.

"Math is the gatekeeper for future opportunities," said Dr. David Nickles, NPS' Director of Research Communications and Outreach during a break in the competition.

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NPS Faculty, Students Explore New Sea Duty Watchbill

The human performance research of NPS Associate Professor Nita Shattuck and operations research student Lt. Matt Yokeley has caught the attention of surface warfare officers across the Navy, and was featured on the cover of a recent edition of "Navy Times."

The pair has proposed a revised watchbill of three hours on duty, and nine hours off, which they have dubbed the NPS Optimized Watchstanding (NOW) Schedule, in place of the traditional five hours on duty, 15 hours off. After conducting four weeks of research aboard *USS Jason Dunham*, testing Sailors on both the traditional watchbill and the revised watchbill, they confirmed that the Sailors were more alert when the workday is based on a 24-hour schedule. In addition, Sailors overwhelmingly prefer the NOW schedule.

"The traditional watch rotation for a four-section watch is five-on and 15-off … With three-and-nine, you maintain a static watch, you stand the same watch time every day for a week or two," Yokeley explained. "With the five-and-15, you are constantly rotating, because it puts you on a 20-hour workday. By doing that, you are constantly forcing yourself to shorten your day and move your daily sleep watch patterns. This disrupts the natural circadian rhythm that causes us to sleep and be awake at certain times."

In their four weeks aboard the *Dunham*, Yokeley and Shattuck worked with the Commanding Officer and his crew to gather data on the Sailors' alertness, sleep patterns, and overall feelings towards the traditional and NOW schedules. Using methods such as the psychomotor vigilance test, actigraphs, and the Fatigue Avoidance Scheduling Tool, the duo collected a large data set to statistically compare the two watchstanding schedules.

"We collected four weeks of data on the same Sailors, two weeks on either schedule. We looked at their sleep and reaction times on the two schedules and we also asked them how they felt about the new schedule," said Shattuck. "The results show how alert they are on the two different schedules. There was a statistically significant improvement in performance in the period of time when it's really hard to stay awake, which is midnight to 4:00 a.m. The bottom line here is these guys were more alert and they liked it better than the conventional watchstanding schedule."

Feedback onboard the *Jason Dunham* had been so positive that the CO agreed to maintain the three-and-nine schedule into a nine-month deployment to the Fifth Fleet.

"We operate on a 24/7 clock. There are operations all the time, and with the danger that lurks around every warship, Sailors must be alert. There is little margin for error," said Shattuck. "It has become a more dangerous world, and because of that we need sailors to be vigilant and ready to respond in an instant."

NPS operations research student Lt. Matt Yokeley and Associate Professor Nita Shattuck spent four weeks at sea conducting sleep tests to prove the value of a revised watchbill that provides Sailors with a more regular sleep schedule.

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"Without math, they can't get into other fields that can open doors to their future."

As a highlight to the experience, the mathletes were treated to a presentation from former Navy pilot and astronaut turned NPS National Reconnaissance Office Aerospace Chair Professor Dan Bursch, who emphasized that without having a proclivity for mathematics he would not have been able to become an astronaut.

Nickles noted that for the more than 350 kids from over 40 schools attending the competition, the importance of mathematics was not lost in them. Most of the competitors selected were among their schools' best. "These kids know how important math is and how valuable this experience is for their future," he said.

A select group of NPS graduates applaud the opening bell while touring the floor of the New York Stock Exchange during a special alumni event, April 27.

NPS Alumni Hit Wall Street

NPS alumnus Marshall N. Carter ('70), Chairman of the Board for NYSE Group also known as the New York Stock Exchange, hosted a lucky group of NPS graduates to a personal tour of the stock exchange facilities. Organized by NPS' Alumni Relations Office, the small group of 30+ graduates who were quick enough to reserve a spot, got a firsthand, behind-the-scenes introduction to the NYSE floor and its supporting technology.

"Having graduated from NPS in 1970, but still using the ORSA [Operations Research/Systems Analysis] knowledge on a daily basis, it was fun to host a very diverse group of NPS grads from all curricula at the NYSE. I think the floor tour showed them that we are at the front of IT technology," Carter said.

"Marsh Carter was a tremendous host for our NPS event at the stock exchange, and I think he really enjoyed hearing about the backgrounds and experiences of such a wide range of fellow alumni in attendance," said Director of Alumni Relations Kari Miglaw. "He invited us back for a future event, and we will definitely be taking him up on the offer."

Army Student Analyzes Resiliency of Undersea Cable Networks

Undersea cable communications infrastructures play a key role in intercontinental communications, a major shut down of a regional communications node has the potential to lead entire nations into chaos.

In his thesis, operations research (OR) student Army Maj. John Crain formulated and found a solution to an Attacker-Defender model of a given cable network. Crain's research was coordinated through NPS' Center for Infrastructure Defense (CID), whose two primary activities are to determine how infrastructure systems would respond to major disruptions, be they from deliberate attacks or natural disasters; and, to focus research on identifying optimal investment of limited resources to make these infrastructure systems as resilient to disruptions as possible.

Crain's thesis analyzed the global undersea cable infrastructure as it pertains to international telecommunications. "We represent countries, cable landing stations, and undersea cables using a network structure of nodes and edges that closely imitates the real-world system. For a given geographic region,

U.S. Army Maj. John Crain

we connect individual networks associated with stand-alone cable systems to create one large network model. We use a "gravity model" to estimate the traffic demand between each pair of countries based on the number of Internet hosts in each country," said Crain.

"Using public sources of data, we collect information from more than 220 real cable systems, and we develop a customized decision support tool that facilitates the analysis of different combinations of countries and cable systems," he added.

Crain's analysis provides insight into which components in the system are most vulnerable, along with how effectively the system performs in the face of disruptions. Crain was one of four students who worked on CID projects graduating this last Spring quarter, each focusing on a different system or infrastructure.

Experts Gather at NPS for 10th International Mine Warfare Symposium

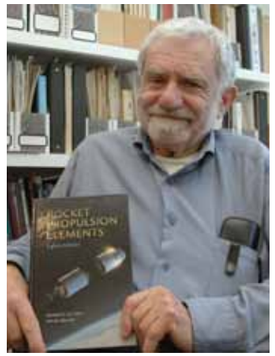
Chief of Naval Research and Director of Test Evaluation and Technology Requirements Rear Adm. Matthew Klunder opened the 10th International Mine Warfare Technology Symposium, May 8, beginning the two-day symposium that addressed a broad range of topics including the current status and future requirements of mine warfare technology.

"Mine warfare is a very critical topic, and this discussion is timely," noted Klunder in his opening remarks to the symposium. "Our [Chief of Naval Operations] thinks it's timely, and I'm supporting him in trying to help our international partners get those effective systems to our Sailors and Marines, and anyone else that is going to help us in our fight in the mine-countermeasure arena."

Specialized sessions focusing on Littoral Combat Ship-centric mine warfare, advanced undersea warfare systems, mine warfare applications in maritime homeland defense, gliders, environmental research and developments, operational data flow and communications, and other related areas were also scheduled throughout the symposium. IR

NPS Professor Emeritus Co-Authors Definitive Text on Rocket Technology

Dr. Oscar Biblarz, a Professor Emeritus in NPS' Graduate School of Engineering and Applied Sciences, has joined Dr. George P. Sutton in coauthoring the 8th edition of "Rocket Propulsion Elements," a seminal text within the discipline since 1949.



Dr. Oscar Biblarz, Professor Emeritus

"Rocket Propulsion Elements" focuses on the fundamentals, essential technologies, and key design rationale of rocket propulsion. Since the first edition, the text has been used by 75,000 students and professionals in nearly 37 countries, and according to the American Institute of Aeronautics and Astronautics, it is the longest living aerospace book continuously in print.

"This book appeals to academia and universities, as well as industry, government labs, and rocket amateurs. It has a wide breadth of interest, and has been quite successful in all of these fields," said Biblarz.

"Its depth and breadth are completely unique, and also it's the most-up-to date book on the topic — that says a few things about NPS," he added. "We're not only using that material, but we have certain expertise and we are able to contribute to the scholarly body of knowledge on the subject."

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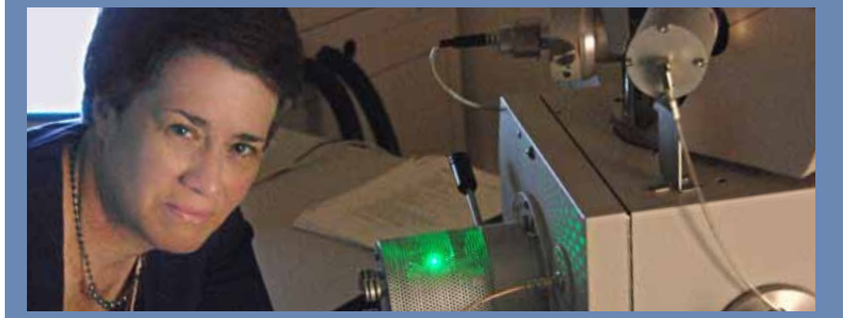

Distinguished Professor Nancy Haegel

Distinguished Professor Honored With Fulbright Award

Distinguished Professor Dr. Nancy Haegel was recently awarded a Fulbright scholar award for research and lecturing for her work in near-field scanning optical microscopy. Her work will take her to Hebrew University in Israel, where she will have the opportunity to work with and learn from head of the Department of Applied Physics, Professor Aaron Lewis, a world-renowned expert and pioneer in near-field imaging techniques.

"It is a great honor to be selected by the Foreign Scholarship Board for a Fulbright award to Israel," said Haegel. "I am very excited about the opportunity to participate in cutting-edge research at Hebrew University and also to help build the international relationships and collaborations that are central to the Fulbright Program. To do the best job in teaching and research, we always need to be learning new things and seeing the world from different perspectives. This is a great opportunity to do exactly that."

For the past several years, Haegel has been researching a new technique called transport imaging that uses near-field scanning optical microscopy, with the goal of better understanding solar cells and lasers. Haegel explained that her research involves taking pictures of incredibly small objects without allowing the light to diffract, resulting in crisper images.

"Normally when you take a picture of something, the sharpness of the picture, what we call the resolution, is limited by the wavelength of the light used to make the picture," she said. "When people take visible pictures, the wavelength is small enough that you don't really notice this. They are limited by how good the camera is and various other factors. But there is a fundamental limit there.

"Our research is looking to take pictures of really tiny things," she continued. "And the diffraction limit, the spreading due to light, can limit the picture you can take. So the idea of near-field imaging is to go in and collect the light so close to the surface that you don't give it the chance to diffract. You literally collect the light right from the surface of the sample. And when there's no diffraction, there's no blurring from that, and you can take much sharper pictures of very small things."

Haegel will spend four months at Hebrew University, during the 2012–2013 academic year, and will build upon work previously done in her NPS physics lab in near-field imaging. While proud of her accomplishments, Haegel is also quick to note that research frequently takes a team effort, and says she has received tremendous support from the NPS Department of Physics, and her students.

"We owe most of our success in this area to my thesis students who have been willing to tackle new and very challenging experimental work. In just a few years, we have gone from a new idea to a working technique that has been used to study solar cells, nanowires and a wide range of new materials. That doesn't happen without dedicated students spending large amounts of time in the laboratory," Haegel commented.

The Fulbright Scholar Program is administered by the Council for International Exchange of Scholars, and sponsored by the United States Department of State, Bureau of Educational and Cultural Affairs. The program sends 800 U.S. faculty and professionals abroad each year.

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EUCOM Honors Faculty, Student for Humanitarian Research

NPS Assistant Professor of Operations Research, Dr. Ned Dimitrov, was presented with a Certificate of Appreciation for his outstanding support to the United States European Command's Civic Engagement Program, June 25.

Dr. Ned Dimitrov, Assistant Professor of Operations Research

Dimitrov is a recent addition to the faculty of the operations research department, and dedicated his first six months with the department to analyzing authorities and methods of transporting donated goods into the European Command's (EUCOM) Area of Responsibility. "I got the project my second month after being hired as an assistant professor in operations research," he said.

As part of Dimitrov's proposal to EUCOM, he recruited student, Lt. Meredith Dozier, to work on the project for her thesis. She spent her experience tour in Europe to help understand and formulate the problem.

In addition to the report provided to EUCOM, a second output of the project was Dozier's thesis, providing a highly detailed version of the analysis. Dozier, who graduated recently, also received the EUCOM Certificate of Appreciation and was also nominated for the Military Operations Research Society/Tisdale Best Thesis in the department.

Executive Vice President and Provost Ferrari Keynotes Singaporean Graduation Ceremony

NPS Executive Vice President and Provost Dr. Leonard Ferrari had the honor of delivering the keynote address to a group of graduates of the National University of Singapore (NUS), July 13. During one of the institution's 22 degree conferral ceremonies, Ferrari participated in the graduation for students of the Temasek Defence Systems Institute (TDSI), a long-time partnership between NPS and NUS.

NPS Executive Vice President and Provost Dr. Leonard Ferrari joins National University of Singapore (NUS) faculty, staff members and students for a group photo following a ceremony on the NUS campus, July 13.

"I cannot emphasize enough how the U.S. Department of Defense, and in particular the U.S. Navy, values its partnership with the Nation of Singapore and the Singapore Ministry of Defense," noted Ferrari in his address to TDSI graduates. "In particular, the relationship between the Naval Postgraduate School and the National University of Singapore is seen by all as one of the cornerstones of an enduring international relationship that continues to support our own national securities and a growing collaboration on the broader and more complex global security issues of our time."

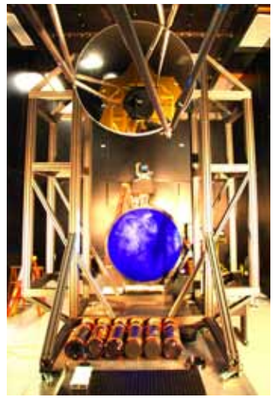
TDSI is a strategic alliance between NUS and NPS that was established in July 2001 to provide a platform that brings together military members and defense technologists in an education and research environment. TDSI's goal is to produce graduates who understand the complexities of a military force, enabled to create maximum leverage by the integration of operations and technology. TDSI is governed by a management board of select leadership that is responsible for the strategic direction and policies of the institute.

Adaptive Optics Center of Excellence Upgrades Experimental Assets

It make look nice, but it's the research capabilities that make this series of six giant mirrors controlled by 156 actuators each and a series of gimbals such an impressive sight. The Segmented Mirror Telescope (SMT), acquired when NPS was officially designated an Adaptive Optics Center of Excellence for Education and Research, serves as a test bed for analyzing surface controls used in space.

A recently integrated interferometer is capable of conducting surface profiling of the mirrors, providing the system with an ability to aid in the detection of primary mirror aberrations through segment phasing, center of curvature, and the use of a one-meter parabolic mirror for its return image.

Adaptive Optics Research Scientist John Bagnasco says a great deal of time and effort is spent on the sensitive fabrication and fine tuning of SMTs while on the ground, and in some cases satellites may not be launched for five years during this process, which skyrockets the cost of imaging satellites. If an ability to account for any potential issues can be done in advance, the telescope becomes that much more valuable of an asset.



NPS' Segmented Mirror Telescope

"If you can manipulate or control deformities on imaging satellites after they are launched instead of before then, time and expense per project goes down," said Bagnasco. "Why not start out with a deformable mirror or a not so perfect surface and achieve a tolerance level that performs just as well as the current process."

Researchers Leverage Online Wargames, Crowdsourcing to Address Current Issues

The latest installment of the Massive Multiplayer Online Wargame Leveraging the Internet (MMOWGLI) was launched campus-wide in May. This last round focuses on Department of Defense energy consumption, and marks the second MMOWGLI scenario.

Inviting experts and non-experts alike from the military and civilian communities to work together to generate insights into complex, real-world challenges, this MMOWGLI's theme focused on energy consumption and reduction within the Navy and DOD. Gamers were invited to submit ideas that were collaboratively developed into potential solutions or concepts of operation.

"We're asking for good ideas," said Associate Professor Dr. Don Brutzman, who is leading NPS' development of the software for the game. "How can your research studies help improve Navy and Marine Corps energy security? It is clear that major changes in efficiency and consumption are needed to keep our forces self-sufficient."

Through a process of gamer-submitted ideas and suggestions, potential solutions are continually developed, expanded upon or challenged by other players in the game. Researchers are hoping this collaboration between diverse parties will tap into the collective intellectual capital of a broader community interested in developing possible solutions, but may not have the opportunity to voice their opinions.

MMOWGLI's next challenge is already underway, returning to its first topic of piracy, focused on regional capacity building. The game is open to all the publc, and can be found at http://portal.mmowgli.nps.edu.

Prominent Science Publication Features Two NPS Faculty

The efforts of NPS operations research Professor Moshe Kress and Global Public Policy Academic Group Assistant Professor Karen Guttieri were featured in a May edition of "Science," the American Association for the Advancement of Science's popular research and news publication.

Kress' article, titled "Modeling Armed Conflicts," reviewed quantitative approaches to modeling military operations, threat situations, and force structure. The piece reviewed historical, classical, present and future armed conflict models, including the dynamics of today's insurgencies. He believes this article is an opportunity to present to the public the scientific side of military and defense affairs.

Dr. Karen Guttieri and Dr. Moshe Kress

"To the best of my knowledge, this is the first military or defense operations research article published by 'Science,'" said Kress. "I am honored to have this distinction and hope my article helps usher in additional operations research contributions to this journal."

"Science" also featured Guttieri's efforts in an article titled "Understanding Minds to Win Over Hearts," which highlighted her effort to model conflicts and study how lawlessness and weak or destabilized governments affect the behavior of their populations. Her efforts in teaching 12-week civil affairs and psychological operations courses were also highlighted in the article. IR

Quick Hits

Distinguished Professor of Meteorology **Chih-Pei Chang** was named co-chairman of the Science Advisory Committee of the Asia-Pacific Economic Cooperation (APEC) Research Center for Typhoon and Society. APEC is an organization of 21 member economies in the Asia Pacific region, establishing two international centers under the APEC Industrial Science and Technology Working Group, focusing on climate and extreme weather that present increasing challenges to society. The election was made at the APEC Climate Center board meeting in Taipei in June 2012. Chang also holds the National Science Council Visiting Research Chair at the Department of Atmospheric Sciences, National Taiwan University, and is chairman of the Monsoon Panel of the World Meteorological Organization.

Systems Engineering Senior Lecturer **Gary Langford** recently published the book "Engineering Systems Integration," examining the core fundamentals of integration. The work discusses in detail the subtleties of achieving integration, and suggests a detailed theoretical framework for the decision-making process with considerations for systems-integration metrics.

National Security Affairs Senior Lecturer **Alice Lyman Miller** was awarded both the Rear Adm. John Jay Schieffelin Award for Excellence in Teaching, as well as the Lt. Cmdr. David L. Williams Outstanding Professor Award the previous quarter. She said, "Winning both of these awards is an honor I deeply appreciate, but it is second to the greater honor of having the opportunity to work with people whose commitment to our country and dedication to their profession I admire."

Distinguished Visiting Professor of Applied Mathematics **Arthur J. Krener** is the recipient of the 2012 Richard E. Bellman Control Heritage Award. The award is given by the American Automatic Control Council and named after the applied mathematician Richard E. Bellman, inventor of dynamic programming. The award recognizes distinguished career contributions to the theory or applications of automatic control, and represents the highest recognition of professional achievement for U.S. control systems engineers and scientists. The award was bestowed at the American Control Conference, June 28.

Marine Corps Capt. Carrick Longley, right, developed Lighthouse to utilize mobile devices in gathering socio-cultural data for situational awareness. The project has evolved greatly, and current efforts such as those by NPS defense analysis students Lt. John Taylor, center, and Lt. Deak Childress, left, have expanded Lighthouse to develop a resource for gathering and mapping data on improvised explosive devices and the networks that create them.

For more information, read the Armed Forces Journal cover story.

Student-Driven Lighthouse Project Casts a Bright Light on IED Networks

By Amanda D. Stein

WHEN IMPROVISED EXPLOSIVE devices (IEDs) talk, they have a lot to say. Each wire and detonator helps tell a story of who created the device. Their locations across a battlespace help create a visual map of IED networks. And now, two students in the Naval Postgraduate School's defense analysis department are proving that efficiently recording and analyzing those IED details can save lives.

Building upon an NPS Common Operational Research Environment (CORE) Lab program called Lighthouse, which utilizes mobile devices to gather socio-cultural data, Navy Lts. Deak Childress and John Taylor have developed an iOS-based app called Improvised Explosive Device Network Analysis (IEDNA), which will allow Explosive Ordinance Disposal (EOD) technicians to compile key information about IEDs into a streamlined and accessible database.

"We really tried to look at a way to capitalize on all of the component data that counter IED forces are required to collect. As it stands now, dozens of times a day throughout Afghanistan, counter IED forces, specifically EOD guys, are required to go out and collect enormous amounts of data," explained Taylor. "What was the bomb made of? What were the specific components? How much explosive was used? Where was it located? They really try to paint a picture of exactly what happened.

"However, the data that's collected isn't being used efficiently or effectively in our opinion," he continued. "So when we both came to NPS and heard about Lighthouse, we thought, 'Why isn't this being used on IEDs?'"

Childress and Taylor saw an opportunity for the concept of human-network mapping to be used in mapping IED networks based on the bombs' 'signatures' or components that link the device to other IEDs collected. Presently, the raw data reports, collected in a post-blast analysis or IED neutralization, are done on paper, and later transferred into a digital report which is filed and largely unused at the tactical level. These reports are analyzed by multiple agencies, but according to the research done by Childress and Taylor, are not being fed back to the tactical operators in a timely or effective manner. Individual IED networks are commonly referred to as a single network, leaving little understanding at the tactical level about the individual threats.

With their combined intelligence and EOD perspectives, Childress and Taylor saw potential for the data to be analyzed to help tactical-level users better understand and potentially counter IEDs in hostile environments.

"According to the Joint Improvised Explosive Device Defeat Organization, the number of IEDs found and cleared continues to trend upward," explained Childress. "So we are getting better at finding and exposing them before they blow up. And the severity of injuries from IED explosions is trending downward. But the overall number of attacks continues to exponentially go up.

"And that tells anyone looking at the problem that you're not effectively attacking the network that's putting those things in place," he continued. "So that's the line of operation that we focus on — 'Attack the Network.'"

Using mobile devices to input data not only means reports can be generated instantly, but the data can also be unified to a common format with each entry. This streamlined system would mean analysts searching the database would be looking at seconds or minutes rather than the current system's days or weeks.

> *"And that tells anyone looking at the problem that you're not effectively attacking the network that's putting those things in place," he continued. "So that's the line of operation that we focus on — 'Attack the Network.'"*
>
> Lt. Deak Childress, USN
> NPS Defense Analysis Student

What IEDNA brings to the conversation is the possibility of bringing mobile devices to the front lines to help improve the ease and efficiency of data collection. When Lighthouse was thought up in 2009 by NPS information sciences student Marine Corps Capt. Carrick Longley — then a master's student and now in his Ph.D. program — Longley envisioned a data-collection system that would allow for socio-cultural data to be collected on-site, and later analyzed to map the social networks of people of interest.

Initially part of his thesis research, then called the Field Information Support Tool (FIST), went on to be utilized in other capacities, but Longley and the CORE Lab wanted to continue to explore the program's potential in more of an open source model of development.

"FIST and Lighthouse are similar in practice, but we have certainly advanced what we have been doing since transitioning to Lighthouse. If you look at the software today and the methods today, and you looked at it two years ago, they are not the same," explained Longley. "One is a commercial product that is out there being tested, evaluated and used, and the other one is a research project that is being tested, evaluated and used, but with a different aim. The aims of the research project are the advancement of knowledge and understanding of [this phenomena].

"We didn't feel like our project was finished simply because something had been transitioned into a commercial product. We wanted to continue to refine all of the practices and procedures for what we were doing, and really focus on the elements here in the CORE Lab," he added. "And that's why we have continued to really focus on open source and commercial-off-the-shelf technology and low-cost solutions to be able to do this data collection for the DOD."

Lighthouse has proven itself in more than just foreign hostile environments. The Monterey County Joint Gang Task Force has recently adopted the application in tracking and mapping gang activity using mobile devices. Still in its initial phases of implementation, personnel on the task force use their Android- or iOS-based smartphones to input data gathered in their daily interactions with the community.

The app acts much like their traditional paper reports in the field, but enables officers to streamline identifying information — such as tattoos, gang affiliations, and the names of individuals connected to the suspect — and reference previously gathered information that might help identify inconsistencies or connections.

California Highway Patrol Captain William Perlstein explained that the process will improve the efficiency of the reporting system, and make important gang information instantly accessible for law enforcement officers in the field. He commended Longley on his innovation, noting that the benefits of the system will likely continue to grow in number as law enforcement officers work on building a visual map of the human terrain in the areas with high gang activity.

"I've been doing this 23 years," Perlstein noted, "and for me, this is the first time that I've ever seen where emergency services and law enforcement have worked with academia on a research project that is just completely applicable to what we are doing in the field."

The CORE Lab continues to work with Lighthouse, providing training and education to students and end-users of the system. While designed with the DOD operator in mind, the department responds to the needs of first responder and law enforcement communities in delivering Lighthouse in a way that meets their unique needs.

"It's a way of taking advantage of the technology as it's advancing," said Longley, "to improve our ability to understand these environments by applying a lot of the academic rigor that exists here at NPS in a very specific application for DOD and law enforcement purposes." IR

U.S. Marines with 3rd Platoon, Alpha Company, 1st Battalion, 5th Marine Regiment practice sweeping for improvised explosive devices (IED) with combat metal detectors. NPS student research in IED data analysis hopes to expose critical information about the underlying networks behind the creation of the devastating devices.

BUILDING THE CYBER WARRIOR

BY DALE M. KUSKA

AS LEADERSHIP THROUGHOUT WASHINGTON WRESTLE WITH THE RULES OF CYBERWAR, GRADUATE STUDENTS AND FACULTY EXPERTS ON THE OPPOSITE COAST ARE USING EDUCATION TO CREATE THE LEADERS OF TOMORROW'S CYBER WORKFORCE.

A silent warrior speeds through a dense interconnected jungle, his clandestine mission a secret. He lives in the background, casts no shadows, and his presence goes completely unnoticed by anyone and everyone though their fingertips may be just inches from where this warrior lies.

He multiplies, divides and conquers with seamless ease and lightning speed. And he can inflict extraordinary damage. Such was the case in 2009, when this warrior did what most likely no other could have … destroying more than 10 percent of Iran's uranium enrichment capability in its Natanz nuclear facility.

But this warrior was no elite, highly trained and capable special operator … it wasn't really a warrior at all. Rather, it was more like a bullet — one not made of explosive powders and metal, but a series of carefully crafted characters that were collectively able to unleash havoc in what was thought to be an impenetrable fortress.

Slowly, the world became aware of just how powerful these 'bullets' — such as the infamous Stuxnet worm — can be, as cameras placed by the International Atomic Energy Agency, the U.N. nuclear oversight arm, recorded box after box of damaged equipment leaving the Iran's Natanz facility.

Although the fog of cyberwar has not lifted, there is one thing that is crystal clear, the age of cyberwarfare is upon us. President Barack Obama's 2010 "National Security Strategy" couldn't have said it any clearer. "Cybersecurity threats represent one of the most serious national security, public safety, and economic challenges we face as a nation," the document reads.

When the DOD released it's own "Strategy for Operating in Cyberspace" in mid-2011, defense leadership expanded on this sentiment, with a decidedly more ominous warning.

"Our reliance on cyberspace stands in stark contrast to the inadequacy of our cybersecurity — the security of the technologies that we use each day," the document states. "Moreover, the continuing growth of networked systems, devices, and platforms means that cyberspace is embedded into an increasing number of capabilities upon which DOD relies to complete its mission."

DOD leaders have put the many organizations and resources in place, from the U.S. Cyber Command (CYBERCOM) to the 10th Fleet and everywhere in between. But the bottom line is, it takes boots on the ground to win any war — that means building a workforce, and educating them.

During the Aspen Institute's Annual Security Forum in late July, U.S. Army Gen. Keith Alexander, a dual degree graduate from the Naval Postgraduate School (NPS), CYBERCOM Commander and Director of the National Security Agency (NSA)/Chief, Central Security Service, said that one of the keys to developing a strong cybersecurity infrastructure is educating its users.

Our reliance on cyberspace stands in stark contrast to the inadequacy of our cybersecurity — the security of the technologies that we use each day.

At the leading edge of that education is NPS, one of only four institutions in the world designated by Alexander's NSA as a Center of Academic Excellence in Cyber Operations. The program is a direct output from Obama's initiative to improve cybersecurity through education, and the designation shines a bright light on NPS' unique capabilities in the cyber arena.

In the Navy, Vice Adm. Kendall Card, the Deputy Chief of Naval Operations for Information Dominance (N2/N6), has the determined responsibility to develop the cyber workforce.

The cyber workforce, Card says, must provide the frontline warrior with assured command and control, accurate knowledge of the battle space, precise targeting, freedom to maneuver throughout cyberspace and the electromagnetic spectrum, and project power through the network. In short, the cyber workforce must provide information superiority over the adversary.

Card has also stressed that to accomplish this, the cyber workforce must possess a diverse and dynamic set of skills that include network operations, signals and communications operations, electronic warfare, network security, information assurance, space operations, cyber planning and enabling operations, and data management. These skills combine to provide the Navy and Joint leadership with decision superiority over the adversary, Card adds.

That is, in a nutshell, a broad set of skills. But as the Navy and DOD's research university, the role of the Naval Postgraduate School is to develop knowledge and skills through a portfolio of educational deliverables.

"It was clear from sponsors, such as N2/N6 in the Navy, that they wanted a program that would provide an educational continuum for Navy officers," said Dr. Cynthia Irvine, Chair of NPS' Cyber Academic Group, Professor of Computer Science, and one of the nation's leading experts in the information assurance and security discipline.

"What makes NPS so unique is the fact that, as a university, we are highly academic," she continued. "Yet we are also part of the Department of Defense, and are very sensitive to the needs of the military, and focus much of our research and educational activities on customers within the U.S. government and DOD. We are therefore able and willing to address issues that other public universities simply are unable to."

As a graduate university, the cornerstone on NPS' cyber education deliverables is the Master of Science degree in Cyber Systems and Operations (CSO), an 18-month program for officers to "help them become proficient cyber operators," as Irvine noted. The intensive program allocates time for the students to complete a graduate level thesis while also taking courses to satisfy Joint Professional Military Education (JPME) requirements.

"The Cyber Systems and Operations degree is an excellent program to prepare students for future leadership positions that support cyberspace operations," said Lt. Cmdr. Aaron Littlejohn, a student in the second cohort of CSO students now underway at the university.

"The rise in reliance on cyberspace by private citizens, commerce and government requires a larger workforce capable of securing, defending, and sustaining the information systems that exist in cyberspace. The NPS CSO curriculum is a strong response to this requirement," he continued.

"The rise in reliance on cyberspace by private citizens, commerce and government requires a larger workforce capable of securing, defending, and sustaining the information systems that exist in cyberspace. The NPS CSO curriculum is a strong response to this requirement."
– Lt. Cmdr. Aaron Littlejohn

"The MS in CSO degree will be extremely beneficial in DOD as a whole — cyber is not Navy blue or Army green," echoed Army Capt. Joe Billingsley, also in the second cohort of current students. "Cyber touches all things in the military and government, and there is a huge demand for personnel who understand it. This demand will increase as the years go on, and this program enables a wider pool of personnel from varied backgrounds to do what our nation expects of us. With the ever more prominent role of cyber in official policy, this degree in Cyber Systems and Operations will provide a level of credibility for those who have earned it."

As primary sponsors, N2/N6 senior officials were key players in developing the requirements for the program, and NPS brought a diverse group of departments together — electrical and computer engineering, operations research, computer science, defense analysis, information science, applied mathematics — to pinpoint existing courses, potentially modified courses, and needed new courses that would respond directly to

CONTINUED ON PAGE 16

WELCOME TO THE AGE OF CYBER-WARFARE

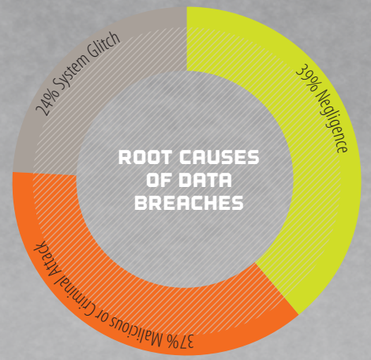
Nearly 20 years have passed since two researchers for the RAND Corporation think-tank published an article entitled, "Cyberwar Is Coming!" in a Spring 1993 edition of the journal, "Comparative Strategy." While the notion seemed innocuous enough at the time, these two men could not have been more prophetic. National security and defense strategies throughout the White House, the Pentagon, and beyond prove that cyberwar was indeed coming, and is upon us now.

The threat from cyberwarfare is not new, nor is it limited to the defense and government sectors. Computer and network technologies are fully integrated into nearly every aspect of societal life on earth, meaning warfare in the Fifth Domain could reach farther and impact more citizenry than any other form of war in history. Institutionally, the Naval Postgraduate School has long recognized the threat from cyberwar — in fact, one of the aforementioned RAND Corporation researchers, Dr. John Arquilla, has been a member of the NPS faculty since he co-wrote that article nearly two decades ago.

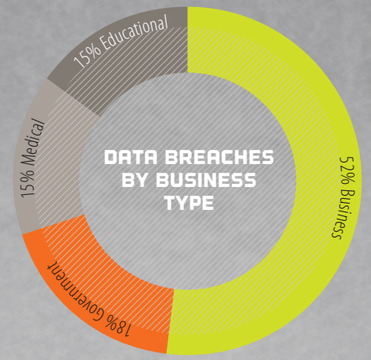
As the university continues on its path of educating students in a diverse group of cyber programs, we examine the power and impact of cyberwar and its cost on life in the age of information.

TOP FIVE TYPES OF REPORTED CYBER CRIME

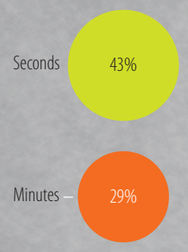
ROOT CAUSES OF DATA BREACHES



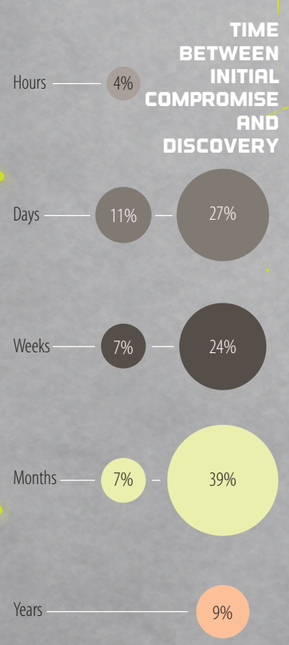
DATA BREACHES BY BUSINESS TYPE



TIME BETWEEN INITIAL CYBER ATTACK AND INITIAL COMPROMISE



TIME BETWEEN INITIAL COMPROMISE AND DISCOVERY



ANATOMY OF A CYBER ATTACK

RECONNAISSANCE
Learn and familiarize system vulnerabilities in a targeted network including any misconfigured settings and weak points in security. Bugs, modem and software weaknesses are identified which may provide direct access to internal resources. E-mail lists are created and inconspicuous e-mails sent out with attached malware.

INTRUSION
Exploit known vulnerabilities to penetrate network. Often a denial-of-service attack is executed which renders systems inoperable by overwhelming them with external communications requests. In a phishing scam, an e-mail successfully lures an internal agent to open the attachment bugged with malware.

INSERTION
As the system is infiltrated, malware is inserted creating an open backdoor allowing ongoing remote control of a network. Additional malicious software like Trojans and rootkits can then be inserted and executed to create zombie systems and harvest sensitive information and gain access to all parts of a network.

CLEAN-UP
After an attack has been accomplished, the goal is to erase any evidence of the attack by deletion of command and event logs. Often, a file server is mapped on an external drive for further information extraction. Self-replicating viruses and worms are often inserted to destroy evidence on server hard disks and backup drives.

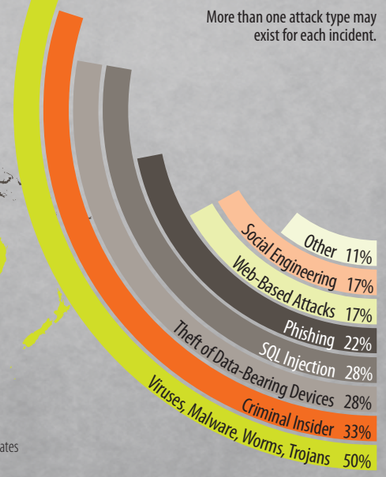
STATES UNDER ATTACK

In 2011, a record 36 countries hosted organizations that fell victim to a data breach.

Australia	Brazil	France	India	Jordan	Mexico	Poland	South Africa	Turkey	United
Austria	Bulgaria	Germany	Ireland	Kuwait	Netherlands	Romania	Spain	United Arab	Kingdom
Bahamas	Canada	Ghana	Israel	Lebanon	New Zealand	Russian	Taiwan	Emirates	United States
Belgium	Denmark	Greece	Japan	Luxembourg	Philippines	Federation	Thailand	Ukraine	

ANALYSIS OF MALICIOUS OR CRIMINAL ATTACKS

More than one attack type may exist for each incident.



$485,253,871
Total loss in dollars of 2011 Internet crime reports

262,812,546
Number of confirmed records stolen and/or exposed in 2011 in 1037 incidents of security breaches

$5.5 MILLION
Average organizational cost per data breach

37.4%
Rise in number of hacking incidents from 2010 to 2011

58%
Of all data theft is tied to activist groups

85%
Of data breaches took weeks or more to discover

Sources: 2011 Cost of Data Breach Study, Ponemon Institute LLC *March 2012*, 2011 Internet Crime Report, Internet Crime Complaint Center *May 2012*, 2012 Data Breach Investigations Report, datalossdb.org, Open Security Foundation, Foreign Policy Magazine

TIMELINE OF CYBER ATTACKS AND INCIDENTS

2012

20 Jan. 2012 Dept. of Justice and FBI sites taken down temporarily by Anonymous.

2011

June 2010 The ***Stuxnet*** worm targets Iran's nuclear facilities.

2010

2009 ***Ghostnet*** Discovered by Canadian researchers, the massive electronic spy network infiltrated 1,300 computers in over 100 countries including ministries of foreign affairs and embassies in Iran, Bangladesh, Indonesia, India, South Korea, Thailand, Germany, and Pakistan.

2009

2008

Aug. 2008 ***The August War*** During the Russia-Georgia war, key government, media, corporate and military networks and websites were taken down.

7 March 2008 Around 20 hackers operating from a Chinese island claim to have gained access to the world's most sensitive sites, including the Pentagon.

2007

2006

9 May 2006 Jeanson James Ancheta becomes the first person to be charged for controlling large numbers of hijacked computers or botnets.

2005

2004

2003

25 Jan. 2003 The ***Slammer*** worm affectes thousands of computers in the U.S. delaying airline flights and disrupting financial networks.

2003 The hacker group Anonymous is formed.

2002

June 2002 President George W. Bush creates the Department of Homeland Security, responsible for protecting critical U.S. IT infrastructure.

2001

May 2000 ***ILOVEYOU Worm*** Made by an AMA Computer college student in the Philippines for his thesis, the worm spreads accross the globe in hours and infectes 10% of all connected computers worldwide.

2000

Feb 2000 ***Mafiaboy*** A series of massive distributed denial-of-service attacks against Amazon, eBay, Yahoo, Dell, E-trade and CNN, traced to a Montreal-area teen.

1999

1998

1997

1996 Hackers alter websites of the United States Department of Justice (Aug..), the CIA (Oct.) and the U.S. Air Force (Dec.).

1996

1995 U.S. General Accounting Office reports 250,000 attempted breaches into DOD computer files with about 65 percent of attempts successful.

1995

1994

1993

1992

1991

2 Nov 1988 ***Morris Worm*** Cornell student, Robert Morris creates first computer worm distributed via the Internet resulting in first conviction of the 1986 Computer Fraud and Abuse Act.

1990

1989

1988

Jan. 2011 Tunisia and Egyptian government websites attacked by Anonymous.

2011 The Hacker group Lulz Security is formed

2006-2011 ***Shady Rat*** In 2011, McAfee reported a five-year hacking campaign against 49 victims including the International Olympic Committee, the United Nations, the Association of Southeast Asian Nations, companies in Japan, Switzerland, Britain, Indonesia, Denmark, Singapore, Hong Kong, Germany, and India, and the governments of United States, Taiwan, South Korea, Vietnam, and Canada. The hack works by e-mailing a Trojan Horse attachment to employee e-mails. It has been called the biggest cyber attack of all time.

21 June 2007 A spear phishing attack on the Office of the Secretary of Defense steals sensitive U.S. defense information, leading to significant changes in identity and message-source verification.

April-May 2007 Coordinated attacks take down government websites of Estonia as well as the country's major banks and media outlets. At the peak of the crisis, bank cards and mobile phones were inoperable within the country.

2003-2007 ***Titan Rain*** In 2004, U.S. federal Investigators discovered ongoing attacks penetrating U.S. computer networks including DOD, State, Energy, DHS, NASA and defense contractors like Lockheed Martin and Sandia National Laboratories where terabytes of data was downloaded.

19 July 2001 ***Code Red Worm*** Infects an estimated 395,000 computers in one day, defaces websites and launches Trojan code in a denial-of-service attack against fixed IP addresses, including the White House and Microsoft.

1999 President Bill Clinton announces a $1.46 billion initiative to improve government computer security.

1998 U.S. Attorney General Janet Reno announces National Infrastructure Protection Center.

Oct 1989 In the first act of Hactivism, the ***WANK*** worm shut down DOE HEPNET and NASA networks to protest nuclear armament.

CONTINUED FROM PAGE 13

those requirements. Coursework through the CSO curriculum covers everything from offensive and defensive cyber mission planning to detailed courses in information assurance and cyber policy.

"Education widens the aperture to understand the many different components that are involved in cyber systems and operations. They understand the hardware, the code, the software, how it all functions together. They get an appreciation for space assets, for unmanned systems, the mechanics of a network," said Cmdr. Tim Unrein, Director of NPS' Information Dominance Center for Excellence. "Education plays a role in giving students that tool set.

"There are capabilities right now on campus that exist, or are rapidly being marshaled together, that will answer the requirements of the Navy. In addition, some of our facilities, resources and connections that we can establish, such as the Cyber Range, make us completely unique from civilian universities," he added.

But the program, as Irvine noted, is more about a continuum of education beyond the core master's degree program, as outlined in a mandate by then Chief of Naval Operations Adm. Gary Roughead.

"We have a continuum now that includes courses that can be taken online, a variety of certificate and degree programs, specializations, such as those in computer science and electrical and computer engineering.

Developing the coursework for an accredited, approved degree program was challenging enough, keeping it up-to-date in the lightning fast, technologically-driven cyber realm is even more difficult.

"Cyberspace existed long before it was decided that cyber would be a warfare domain. The challenge of preparing tomorrow's cyber warriors is in addressing the fact that the game is well in motion and ever-changing," said Littlejohn. "Potential students and even established cyber warriors must not allow themselves to be intimidated by what they don't know. Instead, they must acknowledge that they work in a world where the technology, potential adversaries, and cyber criminals adapt and advance at a very rapid rate."

"What makes NPS so unique is … we are very sensitive to the needs of the military, and focus much of our research and educational activities on customers within the U.S. government and DOD. We are therefore able and willing to address issues that other public universities simply are unable to."
– Dr. Cynthia Irvine
Chair, NPS Cyber Academic Group

Irvine adds that NPS is fortunate to have a diverse group of faculty already conducting research in many areas of cyberwarfare on behalf of an equally diverse group of sponsors, and the broad scope of this research gives them an advanced look at the educational needs soon to follow.

"Our faculty are already conducting research under sponsorship from several organizations involved in cyber, so they're on the leading edge of what is coming," Irvine stated. "Because of this, we have a number of faculty who are already leaders in the cyber operations area."

But Littlejohn is quick to point out that the rapidly changing cyber environment is very much a significant part of what makes the field so compelling, and so critical.

"This is not a static world or profession. We are perpetual students ever educating ourselves to avoid becoming obsolete in our ability to fight this war. The importance that our national and military leaders have put on deterring and defeating aggression in cyberspace, as well as ensuring the freedom of action in cyberspace, should be backed by established cyber educational programs in both DOD and federal learning institutions," Littlejohn said.

"There are capabilities right now on campus that exist, or are rapidly being marshaled together, that will answer the [cybersecurity] requirements of the Navy."
– Cmdr. Tim Unrein, Director of NPS' Information Dominance Center for Excellence

"I am very excited about being a part of the further integration of cyber into Navy and National Defense Strategy. I don't believe I am at the forefront of this effort because a lot of hard-working, brilliant men and women have been at this effort for a while now," he added.

In addition to a variety of educational deliverables on campus, the university has also offered a portion of them to students off campus. A cohort of students at Ft. Meade, Md., is already underway in a dedicated program of coursework, and several distance learning certificate programs, as well as select courses for workforce development, are also being provided to organizations such as the Department of Homeland Security.

In addition, NPS is currently working through the logistics of bringing a limited number of enlisted Navy students in the program as well, extending the continuum not only through educational products, but throughout the Navy workforce as well.

"We have a degree, a Master of Science in Applied Cyber Operations (MACO), that takes advantage of excess capacity in our classes for enlisted students," Irvine noted. MACO students will complete a capstone project in lieu of a thesis, and do not need to satisfy JPME requirements, she added. The program will provide an invaluable opportunity to a community of the Navy's cyber workforce.

"The enlisted education is just as important as the officer's education, because the enlisted personnel are the technicians, the people at the terminals pushing the keys," Unrein said. "We have an opportunity to shape the education of the technicians, the ones who really need to understand the technical mechanics of the [network] environment … That's an important effort that NPS is well positioned to support." IR

LARGEST DATA BREACHES

17 March 2012
Shanghai Roadway D&B Marketing Services Co. Ltd.
150 million records

26 Dec. 2011
Tianya
40 million records

March-April 2011
Sony Corp.
129 million records

20 Jan. 2009
Heartland Payment Systems
130 million records

6 Oct. 2008
T-Moblie
17 million records

20 Nov. 2007
HM Revenue and Customs
25 million records

17 Jan. 2007
TJX Companies, Inc.
94 million records

22 May 2006
U.S. Dept. of Veterans Affairs
26 million records

6 June 2005
Citigroup
30 million records

19 June 2005
Visa, MasterCard, and Amex
40 million records

24 June 2004
America Online
30 million records

6 March 2003
Data Processors International
5 million records

1 Nov. 1986
Canada Revenue Agency
16 million records

1 June 1984
TRW, Sears Roebuck
90 million records

The Honorable Sean Stackley, Assistant Secretary of the Navy for Research, Development and Acquisition, discusses the latest trends in defense procurement with a colleague following his keynote lecture on the second day of NPS' 9th Annual Acquisition Research Symposium, held May 16–17. Stackley offered candid remarks on the state of acquisition and the fiscal challenges that lie ahead of the community.

Annual Symposium Explores Critical Issues in Defense Financial Stewardship

By MC1 Grant P. Ammon

CENTERED ON THE theme of "Creating Synergy for Informed Change," the Naval Postgraduate School's 9th annual Acquisition Research Symposium brought together nearly 300 acquisition professionals, industry representatives, and researchers to focus on affordability in defense acquisition, and to capitalize on the immense body of knowledge created by the symposium's nine years of shared research.

Held in Monterey, Calif., May 16–17, attendees were presented with two days of academic research and plenary discussion panels hosted by leaders in the defense acquisition community in what has become the de facto exchange of acquisition management knowledge and scholarly research.

Opening keynote sessions — led by Under Secretary of Defense for Acquisition, Technology and Logistics, the Honorable Frank Kendall III, and Assistant Secretary of the Navy for Research, Development and Acquisition, the Honorable Sean Stackley — were honest, candid and to the point.

"Failing to improve the way we do business — and that's every aspect of the business from setting requirements, to estimating, contracting, competing, developing, building and testing — places at risk our ability to deter future wars or to carry out those missions assigned to our naval forces in the next war," noted Stackley. "It places our men and women in uniform at risk, and those risks are intolerable.

"The [Naval Postgraduate School] is the one place in the world that research is being done on acquisition," Stackley continued. "When that is mentioned, I have to raise my eyebrows. We have to figure out how to tap into this resource better than we have been doing before."

> *"The [Naval Postgraduate School] is the one place in the world that research is being done on acquisition … We have to figure out how to tap into this resource better than we have been doing before."*
>
> Honorable Sean Stackley
> Assistant Secretary of the Navy
> Research, Development and Acquisition

Well versed on the symposium's impact, NPS President Dan Oliver saw the event as a great opportunity for participants to take part in meaningful discussions focused on improving the quality of research devoted to improving acquisition practices.

"I'm very proud the Naval Postgraduate School is able to host the symposium," said Oliver. "We are in the workforce development business, and hosting this event is a natural fit for us. This is clearly not just a conference that happens once a year, but an opportunity to continue a dialogue that goes on all year, and a chance to highlight the ongoing work that all of you are involved in, and to stimulate activities for the future."

Participants of the symposium praised the event as a unique forum that introduces academics working on acquisition research to senior policymakers in the field.

"There is no other place that brings together acquisition policymakers with those very technical people focused on research," said Dr. Bob Kenley, a Research Associate at the Massachusetts Institute of Technology.

"The policymakers that came out to the symposium, and researchers, were actually interacting with and understanding each other. It makes them better able to perform their jobs, and hopefully in the long run, it will support the military with an efficient procurement of systems that actually works," Kenley added. IR

The latest cohort of students in NPS' Executive Master of Business Administration (EMBA) program includes a group of five civilian employees from NASA's Johnson Space Center, a handful of which discuss the program with EMBA Program Deputy Director Houda Tarabishi, right, during a campus orientation early this year. The EMBA program's focus on federal management and business management practices have made it a popular fit for a broad spectrum of federal institutions beyond DOD.

Latest EMBA Cohort Includes Group from NASA's Johnson Space Center

By MC1 Grant P. Ammon

WHEN NPS WELCOMED its newest cohort of Executive Master's of Business Administration (EMBA) students, among them were the usual military officers representing traditional Fleet concentration sites such as San Diego, Pearl Harbor and Norfolk.

But a unique group found its way to the university from Houston as well, as a cohort of five federal civilian employees from NASA's Lyndon B. Johnson Space Center joined the ranks as NPS students, marking the first-ever group participating from the space agency.

"For us in the business school, it's the first time we have had students coming from NASA," said Dr. Bill Gates, Dean of NPS' Graduate School of Business and Public Policy (GSBPP). "From the feedback I've received so far, the team at NASA is really excited about this program. We're able to offer tailored instruction that meets their needs at half the cost of similar programs offered at local universities."

Highlighting the similarities between Department of Defense (DOD) financial management policies and regulations of other federal entities, Gates notes the relevancy NPS' EMBA has in all facets of the federal government.

"In the program, we focus heavily on financial management and acquisition which is regulated by federal statute," said Gates. "It's a program that is fitting for all federal organizations, not just DOD."

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Joe Williams, Special Assistant for Procurement within the Mission Operations Directorate at Johnson Space Center, notes the distance learning format as a key enabler in allowing him to participate in the program.

"My primary motivation for enrolling in the program is to gain practical, academic grounding for business management and administration, which I've been learning informally, on the job," said Williams. "The NPS EMBA program offered the perfect combination of topic and distance learning format that allows me to remain in Houston to perform my regular duties when I'm not in class.

"Being a civilian, I feel so humbled to be in a cohort with active service Navy and Marines," added Williams. "The orientation week at NPS was a wonderful way to kick off the program, mainly for getting to know the rest of the cohort in person."

In addition to the flexibility of the distance learning format, Williams attributes his motivation for enrolling in the EMBA program to the changing of his roles and responsibilities within the NASA ranks.

"My current role at NASA is to devise contract strategies for Mission Control-Houston, astronaut training systems and facilities, mission planning systems, and mission operations services for NASA's human spaceflight programs," said Williams. "As I've transitioned in my leadership role at NASA over the last few years from a technical to business orientation, I found that I was at a slight disadvantage not being familiar with business terminology, practices and processes, and chose to take a proactive step to address my shortcomings."

For incoming EMBA student José Garcia, who currently serves as Deputy Chief Financial Officer for the Johnson Space Center, the ability to focus on studies with other professionals with years of experience was a draw to the program.

"I first heard about NPS' (EMBA) program while on travel at the Ames Research Center, and then again when I returned to Houston," said Garcia. "I looked at the curriculum, and it really seemed to focus on the real-life experiences brought to the classroom by other students."

Williams' opportunity to participate in the program came after expressing interest in continuing education during a periodic performance review.

"During a mid-term performance review with my supervisor last December, I expressed the desire to look at options to continue my education," said Williams. "A few days later, I saw an official announcement about a fellowship being offered by the NASA/Johnson Space Center for the NPS EMBA program."

From the earliest stages of the program, Williams sees the relevant correlations between the program's course of study and his day-to-day duties at NASA.

"I'm early in the program, yet I am seeing benefits right away," noted Williams. "The Financial Reporting and Analysis class is bringing me up to speed on the language of accounting that is so prevalent in the NASA cost management world, and I have found that to have helped in my interactions with the cost analysts."

GSBPP Lecturer Bill Hatch, NPS' EMBA Program Manager and a retired Navy commander, notes the relevancy of the education provided in today's economic environment.

"As the Department of Defense, and the federal government in general, become more fiscally constrained … there is a tighter focus on funds and where those funds are spent," said Hatch. "The EMBA program provides students with the key skills necessary to execute financial management and resource management plans."

Williams is already seeing the benefits of studying at NPS, and ascribes much of the rich educational experience provided to the faculty that lead the program.

"The classes are excellent, and the professors I've met so far have this aura of academic credibility that makes the whole experience that much more worthwhile," noted Williams. "It's like the difference between reading about something, versus being immersed in it with world experts at your side. It simply can't be beat." IR

EMBA Program Graduates First-Ever Flag Officer

NPS' Executive Master of Business Administration (EMBA) program celebrated another milestone when the first Flag officer to complete the program graduated this past winter quarter.

Rear Adm. Bruce Doll, currently serving as Senior Health Care Executive, Navy Medical Department and Medical Advisor to Allied Command Transformation (NATO), completed the EMBA distance learning while serving in his current roles in Norfolk, Va.

Rear Adm. Bruce Doll

"Studying at NPS was an excellent experience," noted Doll. "The courses I took here introduced me to a completely new arena. Clearly, to an officer in any senior leadership position in our service, a great working knowledge of acquisition and how the budget process works is essential. I had a peripheral knowledge from exposure during on the job training throughout my career, but this program offered a strong sense of clarity and coordination in those areas.

"Participating in the EMBA program was an opportunity to look at what would amplify the skills that I have to work in the Navy and at the same time, I enjoy learning, everything seemed to align," he added.

With the program now behind him, Doll said that he would definitely encourage young officers to embrace the idea of continued education, throughout their careers.

"It's the nature of growing intellectually, maturing from a junior to senior officer, and this is one mechanism for doing that," he noted. "There is such value in training officers in a continuum from the point of their affiliation with the service through the point where they are a senior leader, and I think NPS plays a very important role in that. I certainly benefited from that."

Naval Postgraduate School alumnus Adm. William McRaven, Commander, United States Special Operations Command, presented a Secretary of the Navy Guest Lecture, June 7, in King Auditorium. McRaven is a 1993 graduate of NPS, receiving dual degrees in National Security Affairs and Special Operations/Low Intensity Conflict — a program developed in large part by McRaven himself.

USSOCOM Commander, Alumnus McRaven Outlines the Future of SpecOps During SGL

By Amanda D. Stein

NAVAL POSTGRADUATE SCHOOL alumnus Adm. William McRaven, Commander, United States Special Operations Command (USSOCOM), presented a Secretary of the Navy Guest Lecture and received the NPS Distinguished Alumni award, June 7, in King Auditorium. McRaven graduated in 1993 with a dual degree in National Security Affairs, while also leading the establishment of the Special Operations/Low Intensity Conflict (SOLIC) curriculum, and was its first graduate.

With over 66,000 people under his command, McRaven knows firsthand the value of education, and the things that can emerge from good ideas and quality research. He referred to a time when he faced a challenging problem, but found solutions were easier having developed critical thinking skills in his time at NPS.

In his remarks following the award, McRaven spoke about the future of the Special Operations Forces (SOF), and the importance of strong leadership. McRaven noted that while the USSOCOM may be widely known for their direct action operations, there is much, much more to their worldwide mission than that. He noted that one of the challenges of being in his position is helping those outside of the U.S. government understand the role of the USSOCOM.

"The fact of the matter is that most of what we do in the special operations arena is on the indirect side. We are in 75 countries around the world today, building partnership capacity, allowing those countries to deal with their own security problems," he noted. "So that frankly, we don't have to be at the point where we are conducting raids. We're looking to get to the point where the host nations can do their own thing."

McRaven noted that although he considers the USSOCOM to be the strongest force the world has ever seen, when standing alongside members of the international SOF communities, they are all cut from the same cloth. And that, he said, should encourage cooperation and collaboration whenever possible.

He pointed to a recent international SOF conference, where something he has recognized many times was re-enforced once again … Special operators, no matter where they come from, simply have some core traits in common. And, he added, those commonalities should help USSOCOM develop one of their core initiatives in the SOF Vision 2020 initiative, building the global special operations forces network.

"If we are all kind of alike, how come we aren't all talking together? How come we're not taking the relationships that we have built, particularly in NATO and Afghanistan, and begin to look at those on a global scale?" he continued. "I will tell you the feedback that I got from folks was just tremendous. People that normally don't work together are out there recognizing that we as a SOF enterprise can do great things globally if we partner, if we talk, if we communicate."

McRaven noted that as valuable as missions and technologies are to USSOCOM, leadership is critical to making them successful. He pointed out four important things for military leaders of all services and ranks to remember — take care of the troops, lead from the front, take risks, and learn to fail. He also noted the importance of setting expectations of those one is leading.

"Nobody came into the service to be mediocre," he said. "I can guarantee that."

In recognition of his exceptional leadership and service, McRaven was presented the alumnus award, with NPS President Dan Oliver stating, "As a significant contributor to the fields of national security affairs and special operations, your ingenuity, leadership and vision demonstrate the value of an NPS education."

Later in the day, McRaven checked in with the defense analysis (DA) department to hear from Chair, Dr. John Arquilla, Common Operational Research Environment (CORE) Lab Co-Director Army Col. Greg Wilson, and a number of DA students and faculty in a briefing about the department's recent progress and ongoing projects.

DA students, Lts. Deak Childress and John Taylor, presented their thesis research to McRaven, sharing with him a project that has merged intelligence with tactical-level operations to produce an app for mapping improvised explosive device (IED) networks based on the bombs' signature components (*see feature article, page 10*).

"The value for me was in tying the potential operational impact of our project together with Adm. McRaven's comments as he was briefed on DA and CORE lab projects," explained Childress. "Literally seconds before receiving our portion of the brief, the Admiral stated that the real value of CORE Lab efforts was in doing research and development that would impact operations, not just 'science projects that brief well.' Based on his feedback from our briefing, we are confident that he saw the value in what we are doing, and he understands perfectly well that IEDs are not going away anytime soon and will continue to threaten operations wherever our forces find themselves operating." **IR**

Adm. William McRaven, Commander, United States Special Operations Command, focused on the current efforts of the special operations forces he commands during his lecture. While direct action operations may grab headlines in the news, McRaven noted, his forces are in 75 countries around the world and operate far more frequently in partnership and capacity building efforts.

Defense Analysis Professor Reflects on Receipt of USSOCOM Medal

There are many occasions when a star pupil returns to his or her alma mater to pay tribute to a key teacher, a mentor who played a significant role in the educational experience. But rarely has that star student become one of the most prominent figures in DOD circles.

That was exactly the case, however, when NPS alumnus Adm. William McRaven presented defense analysis Professor Dr. Gordon McCormick with the USSOCOM Medal. The award is one of the highest honors the command can give to a civilian, and is rarely awarded, given only to select individuals who have made significant contributions to the defense of the U.S. through special operations during war or peacetime operations.

In what was a surprise addition to McRaven's visit to campus to address NPS students, and a self-described "intelligence failure" by McCormick, his old student succeeded in bestowing one of the top honors USSOCOM can give without his prior knowledge.

"It was a surprise, but I don't really consider it to be a recognition of me … More so, it is a recognition of what our department has been able to accomplish on behalf of USSOCOM," McCormick said. "Truthfully, it is a mark of validation that the command appreciates and approves of what we are doing."

Quick to point out that the success of NPS Department of Defense Analysis (DA) programs is a team effort, McCormick notes that his receipt of the medal is due to the hard work of a growing group of highly-talented faculty and staff, and constant contact with their sponsoring Special Operations Forces (SOF) community.

"Although my name is on the award, this is without question a team effort, and it was given to me in recognition for what our department, and our institution, has done collectively for the Special Operations command," McCormick said.

"We have also been fortunate to maintain a strong connection with our sponsoring community," McCormick noted. "Nearly every month, we have leaders from across the [Special Operations] community visiting our department, learning about the program. It keeps us relevant, and it evolves the program. And they have always been very supportive of our efforts."

The current defense analysis program began as a curriculum in Special Operations/Low Intensity Conflict (SOLIC), created by McRaven and McCormick while the former completed his studies at NPS.

Under Secretary of the Navy Outlines State of the Navy-Marine Corps Team

By Amanda D. Stein

UNDER SECRETARY OF the Navy, the Honorable Robert O. Work, visited his alma mater to discuss the "State of the Navy/Marine Corps" during a special Secretary of the Navy Guest Lecture in King Auditorium, May 10.

Work began by commending the men and women of the Armed Forces for their commitment, noting that the current U.S. Navy and Marine Corps are arguably the best they have ever been in the nation's history.

"The Sailors and Marines we have today are just unbelievable," Work said. "You do not know how lucky you are," he noted, adding that the current force is the most well-educated, tech-savvy, motivated, disciplined group of people America has ever had in its history.

"These [Sailors and Marines] are the best people on the planet," he continued. "They are the true secret weapons of the Navy-Marine Corps team."

During his presentation, Work addressed the concerns and challenges currently facing defense leaders. At a time when the world's waterways are being so heavily utilized for trade, the services' importance to the global economy is growing.

"The big thing for the Navy and Marine Corps team is that the oceans are more vital to both our national and our global trade than any time in history," he continued.

Work noted that the military's organizational structure is as focused as ever on being battle-ready and adaptable. Military leaders are implementing new strategic concepts to reduce operational expenses, and looking for engagement support from allies and partners. Work emphasized, however, that the development of a smaller, leaner force does not mean a weaker force.

"We have big payload bays and open combat systems," he noted. "We can adopt to the threat faster than bad guys can build ships. It's a tremendous advantage because we think of ourselves as a total force battle network.

"We are a Navy and Marine Corps team that is built and ready for war, and we operate forward to preserve the peace," Work continued. "We are first a warfighting organization. The CNO [Chief of Naval Operations] has said it, and the [Marine Corps] Commandant has said it — warfighting first. We are built and ready for war, and we'd better never, ever lose our edge."

Also during his visit, Work explored current research efforts underway by NPS students and faculty during the 2nd Annual Robots in the Roses event, sponsored by the Consortium for Robotics and Unmanned Systems Education and Research, or CRUSER, an effort he played a lead role in establishing to create a collaborative environment for research and education on unmanned systems and robotics. IR

The Honorable Robert O. Work, Under Secretary of the Navy, is pictured in front of Herrmann Hall during a campus visit, May 10. Work, a Space Systems Operations graduate, visited his alma mater to deliver a "State of the Navy-Marine Corps" address.

Secretary of the Army, the Honorable John McHugh, discusses a variety of the university's educational programs, and their application to the Army's needs, with NPS President Dan Oliver during an exploratory campus visit, May 21.

Army Secretary McHugh Lauds NPS Cyber Program During Campus Visit

By MC1 Grant P. Ammon

SECRETARY OF THE ARMY, the Honorable John McHugh, visited the Naval Postgraduate School, May 21, to learn more about research conducted by the university and to see the academic programs military officers take part in firsthand.

McHugh and his staff began the afternoon by receiving a command brief from NPS President Dan Oliver and key faculty members. One of the first programs the group was briefed on in detail was the university's new cyber systems and operations degree program.

"The Naval Postgraduate School is an important place to the Army, and we need to make sure we are taking full advantage of it," said McHugh during the command briefing. "The joint approach to training at the graduate and postgraduate level is impressive and I have an enormous respect for the work that is being done here. I want to know how the Army can help your efforts."

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>
> The Honorable John McHugh
> Secretary of the Army

Dr. Cynthia Irvine, director of the Cyber Academic Group, delivered an overview of the university's master's degree focused on both offensive and defensive cyber warfare.

"We're here to focus on maximizing cyberspace operational effectiveness, and we're very excited about the programs in this field of study that we are offering our students," said Irvine during her presentation.

Noting the gap of cyber proficiencies between senior and junior service members, McHugh applauded the university's efforts in the area of cybersecurity, and specifically the efforts targeting senior enlisted Sailors and Soldiers, who will be allowed to enter the newly-formed program in upcoming academic quarters.

"Interestingly, I've noticed how much of a gap exists between our junior and senior enlisted Soldiers in knowledge of the cyber world," McHugh noted. "It's crucial that we get these senior enlisted Soldiers the foundations they need to succeed."

Upon conclusion of the command and cyber operations brief, McHugh and his staff were joined by local Congressman, Rep. Sam Farr, for a tour of select university laboratories and academic facilities, including a visit to the Common Operational Research Environment (CORE) Lab.

"I briefed the Secretary on the CORE Lab, which is embedded in the defense analysis department," said Dr. Sean Everton, co-director of the lab. "We train students, most of whom are Army, how to fuse cutting-edge methodologies, such as social network analysis and geospatial analysis, to real world situations, so that they can gain a better understanding of the operating environment."

"I appreciate all that you're doing in this important field of study," McHugh told the collection of faculty and students in the lab. "This is really fascinating stuff, and it demonstrates the inescapable reality of what the future holds." IR

A small group of graduates await the procession into King Auditorium in advance of the Spring quarter's graduation ceremony, June 15. More than 320 students — representing all U.S. uniformed services, civilians, law enforcement agencies, and 19 nations — received advanced degrees during the ceremony.

Computer Science Alumnus Keynotes Spring Quarter Graduation

By MC1 Rob Rubio

A DAY OF perfect weather welcomed family and friends of this quarter's graduates to the NPS campus for the Spring 2012 Graduation ceremony in King Auditorium, June 15. NPS President Dan Oliver introduced the guest speaker, Gordon Eubanks, commenting, "He is a pioneer in the microcomputer industry … He and his wife are staunch supporters of NPS, and delightful people to have in our community."

Eubanks is an alumnus of NPS, graduating in 1976 with a Master of Science in Computer Science. He founded C&E software, served as a senior executive at Digital Research, Inc., was president and CEO of Symantec Corporation for 15 years, president and CEO of Oblix and currently holds positions on the boards of several companies. He noted during his comments that he wanted to link his experience in business with issues that he feels are valuable to the Navy.

He reflected back to his tenure as a student at NPS remembering that it was a great school with great professors, but that the university is different today than it was during his time, stating that NPS leadership has "raised the bar" tremendously.

"The school is every bit as good academically, as it had been in the past, as other universities, but provides a very unique value in tying in with the needs of the military and the Department of Defense," he said. Eubanks went on to spotlight critical lessons in leadership that he has learned after a long, distinguished career in the information technology and security sector.

Following the graduation comments, Oliver presented Eubanks with the NPS Distinguished Alumni Award for his contributions in building the foundations of today's computer technologies, demonstrating the value of an NPS education, and for his continued support of the institution.

"It is an incredible honor and distinction … It is truly amazing to be here," he said, adding that he would have never imagined back when he was a student sitting in the crowd that he would be up on stage delivering an address, adding in jest that some of the leadership from that time would be rolling over in their graves seeing him on the stage today.

Lt. Myron E. Lind was this quarter's recipient of the Monterey Council Navy League Award for Highest Academic Achievement. Along with that award, he also received the Louis D. Liskin Award for Excellence in Business and Public Policy, the Department of the Navy Award for Academic Excellence in Financial Management and the Conrad Scholar Award for Distinguished Academic Achievement in Financial Management.

He stated, "I am very humbled to have been acknowledged by these awards. I considered my studies at NPS to be of the utmost importance and wanted to ensure that I gave them the best effort I could. The MBA I am receiving will allow me great flexibility and provide the Navy with a more, well-rounded officer than before."

Lt. Cmdr. Meng Wee Joses Yau, of the Republic of Singapore Navy, was awarded the Outstanding Academic Achievement Award for International Students.

"I was indeed pleasantly surprised to hear about the news at first but was too pre-occupied with my thesis work to find out what the award is all about. I only recently found out that it is a very competitive award that compares all the international students on both the academic level and their contributions to the society. To have won it, is indeed an honor," he explained. "I have made a number of new friends and will always remember my time here in Monterey," he said.

A total of 322 students graduated earning 326 degrees, with 268 students crossing the stage. The graduating class included 230 military, 62 civilians and 30 international students representing 19 countries. IR

NCO Honored with University's Top Army Student Award

By Amanda D. Stein

NAVAL POSTGRADUATE SCHOOL defense analysis student Master Sgt. Jim Monroe was the first non-commissioned officer (NCO) to ever be awarded the Association of the U.S. Army, Gen. Joseph W. Stilwell Chapter, Award for Outstanding Army Student.

The award is presented quarterly to a resident Army student who demonstrates exemplary academic achievements and community service. Monroe was also nominated for an outstanding thesis for his work, titled "Deception: Theory and Practice," and is up for the title of distinction.

> *"To me, beyond the knowledge gained in the classes, the true values of a graduate education lay in the increased understanding of how to process and synthesize information, and in how to approach problem solving. As an NCO, the defense analysis program has improved my worth to the force — both as a leader, and as a resource for my commander."*
>
> Master Sgt. Jim Monroe
> Defense Analysis, '12

After graduation, Monroe headed to the Fourth Military Information Support Operations Command at Fort Bragg, N.C. He had previously served in the First Cavalry Division, and in operational and tactical military information support operations positions at Fort Bragg. He says he is proud of the support he received from his previous command, as he heard about opportunities to study at NPS.

"To me, beyond the knowledge gained in the classes, the true values of a graduate education lay in the increased understanding of how to process and synthesize information, and in how to approach problem solving," said Monroe. "As an NCO, the defense analysis program has improved my worth to the force — both as a leader, and as a resource for my commander.

"I was just happy to be able to study here in the first place," he added, "so to be recognized and get the Award for Outstanding Army Student was just a humbling experience."

Monroe's thesis explored military deception history and practice, an often overlooked but important topic for the military. His work was described by Senior Lecturer Dr. Hy Rothstein as being of a caliber not frequently seen in his 11 years at NPS.

"'Today's doctrine does not say much about deception. It's an undervalued and underappreciated tool in war," said Rothstein. "Jim shows very clearly that the benefits of deception, historically, have been remarkable. The return on investment — in training, education and material necessary for deception — have almost always produced benefits that far outweigh the investment."

"My thesis had a few different parts," Monroe added. "For the first part, I surveyed deception within U.S. Army doctrine, and looked at reasons why the level of emphasis of deception has fluctuated over the years. In the second half of the thesis, I surveyed and synthesized the various civilian and military works on deception theory and practice. And I finished up with an overview of U.S. Army use of deception from the Revolutionary War to the present.

"Currently there is a void in unclassified deception guidance in the U.S. Army," he continued, "so I tried to go over theory and practice and create an overview designed to be used as an unofficial handbook for deception practitioners."

Monroe was one of 17 enlisted service members to graduate in the Spring quarter. Although the majority of NPS' military students are officers, senior military leaders have demonstrated a commitment to providing all qualified and eager officers, commissioned or otherwise, with advanced education opportunities. And, as Monroe and his fellow NCOs have demonstrated, the classroom provides everyone a level playing field from which to excel.

"Of course, our job at the Naval Postgraduate School is to educate the people that the services send us, so it's really the services that have made the decision that education is valuable for non-commissioned officers. And I think that's a good decision," said Rothstein. IR

Defense analysis student Master Sgt. Jim Monroe was the first non-commissioned officer (NCO) to ever be awarded the Association of the U.S. Army, Gen. Joseph W. Stilwell Chapter, Award for Outstanding Army Student. Monroe was one of 17 enlisted service members to graduate in the Spring quarter, and will soon report to his next command, the Fourth Military Information Support Operations Command at Fort Bragg.

Alumnus Applies Engineering Studies to Building the Navy's New DDG 1000

By Amanda D. Stein

FROM THE HALLS of the Naval Postgraduate School to shipyards across the country, NPS electrical engineering alumnus Capt. Robert Crowe, Supervisor of Shipbuilding (SUPSHIP), Conversion and Repair, Bath, now has the opportunity to help the Navy build the most capable fleet in the world. A 2003 graduate, Crowe focused much of his NPS work on power systems and semi-conducting technology, looking for more efficient ways to power ships, ultimately doing his thesis on integrated power systems.

In his position, Crowe is now applying some of that very same knowledge in his responsibilities for overseeing construction on the new DDG 1000 Zumwalt Class destroyer, named for former Chief of Naval Operations Adm. Elmo Zumwalt. The first ship in its class is more than 60 percent complete, and is designed to provide surface fire support in near-shore operations, with automated technology to allow for a much smaller crew than an average ship of its size and function.

"Traditionally, U.S. Navy ships have been powered with the engines driving the shafts that went through a reduction gear and then out to the propeller to move the ship through the water," explained Crowe. "And then the Navy recognized that the power used to move the ship through the water takes up a lot of room on the ship.

"That power can be applied to other things on the ship, like the radar or gun systems," he continued. "So the plan was to make everything electric, and run power through a motor that runs power to the shaft and then that same generator can provide power not just for the propeller but for other parts of the ship. And that's what is being done here in Bath, Maine, with the DDG 1000."

One component of the DDG 1000 is the integrated propulsion system (IPS), one that Crowe sees as having great potential for the Navy. His 2003 thesis, titled "Design, Construction and Testing of a Reduced-Scale Cascaded Multi-Level Converter," helped establish the basis for what would be a multi-dimensional, scale IPS model, developed by a series of thesis student projects.

"By using an integrated power system, the ship will be inherently more efficient because the power we produce onboard can be distributed through the different parts of the ship in an effective and optimal manner," explained Crowe. "For instance, if I'm running at a low speed, I don't have to provide a lot of power to my propulsion motor. And if I really need to run radar, I can focus all of my attention on the radar and not focus on my speed. So that really makes us more efficient and effective … and ultimately it makes us more powerful. "

Crowe credits his education and experience as a leader that has taught him the value of listening and communicating with the men and women he oversees.

"For me, the value of my experience is evident when my people come up and brief me on things and I understand what they are talking about," explained Crowe. "I understand their challenges. Now I am directing my people to think ahead to not just what tomorrow brings, but where we're going to be in a year's time, and how we can be ready for those challenges." IR

NPS electrical engineering alumnus Capt. Robert Crowe, a 2003 graduate, now serves as Supervisor of Shipbuilding, Conversion and Repair, Bath, where he oversees private shipbuilding contracts at shipyards across the country, including the new DDG 1000 Zumwalt Class destroyer, a piece of which is pictured above in transport in the shipbuilding yard.

Still on Watch

On Sunday, July 1, a tragic accident off the coast of Florida claimed the life of Naval Postgraduate School Dean of Students and Executive Director of Programs Capt. Alan "Dex" Poindexter.

Dex was an accomplished combat Navy pilot and a two-time space shuttle astronaut. He was widely respected across campus for both his professional leadership and exemplary personal character. And he was a 1995 aeronautical engineering graduate of this institution.

He possessed a keen and insightful understanding of what it meant to be a student at NPS, in every sense of the experience — from professionalism, hard work and academic responsibilities to the personal value of a tour in Monterey. His well-known open door policy made him an accessible leader and mentor to a very large group of students who themselves are leaders.

But Dex succeeded in accomplishing his mission of leadership with a sense of true character as well. Soon after he arrived on campus in 2010, while setting up his office in the basement of Herrmann Hall, he pulled out a small, two-foot high cardboard cutout of himself adorned in a bright orange NASA flight suit, and placed it high on a shelf near the entrance of the Office of the Dean of Students.

He noted to a member of his staff that it was a smaller replica of a life-size version he used to place in his home whenever he was away in space, to remind his children that he was 'still on watch.' "And now I have my eyes on you," he jokingly said with a smile to the member of his team.

While the campus community mourns the tragic loss of one of its most senior leaders, the university's community of students, faculty and staff must simultaneously also continue to move forward — but would like to think Dex, once in a while, still stands on watch over campus.

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