



NAVAL POSTGRADUATE SCHOOL

IN REVIEW

MAGAZINE

JULY 2016

GENDER INTEGRATION

NPS STUDENT AND FACULTY
STUDIES ILLUMINATE THE
DEPARTMENT OF DEFENSE'S
PATH TO GENDER EQUALITY.

INSIDE:

Executive Education Extends
the NPS Mission

Chief of Naval Operations
Talks High Velocity Learning

Research Reports:
ICEX • Patents • Acquisitions



PRESIDENT'S MESSAGE



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

“When Chief of Naval Operations Adm. John M. Richardson offered his commencement address to our June graduates, he said, “The Naval Postgraduate School is not just any graduate school, it is OUR graduate school.””

Throughout modern American history, senior defense department leadership have made bold, albeit difficult decisions about the roles of women in our military forces. Certainly the issue of the day has to do with females in combat roles, but there have been several milestones in the Armed Forces for the outstanding women we all have the privilege to serve with, yesterday and today.

Defense and Navy department leadership have already made bold decisions about the future roles of women on the front lines of our nation’s wars. And I am proud to say that, here at the Naval Postgraduate School, we have a critical role to play in this compelling future.

Our role is not one of opinion, rather, it is one of knowledge. Ultimately, academia is about asking difficult questions, performing intensive research and discovery, and providing a well evidenced and sound analysis of the findings, adding to society’s greater body of knowledge. Often, these analyses are requested by, and provided to, our senior defense leaders – illuminating the varied paths before them so they can make informed, confident decisions in guiding our force.

It is this role, this impact, that truly sets NPS apart from the greater academic enterprise. When Chief of Naval Operations Adm. John M. Richardson offered his commencement address to our June graduates, he said, “The Naval Postgraduate School is not just any graduate school, it is OUR graduate school. This school is focused on our issues, it provides detailed solutions to hard problems, tactical and operational, and it will have a big impact on how our Navy moves forward.” I could not agree more, and our role in gender integration is a perfect example of it.

It is, however, far from the only example of it. Throughout this issue of In Review, we highlight several university education and research programs that are in direct response to the cares and concerns of the U.S. Navy. Cyber is clearly on the forefront of our service’s needs, and our cyber academic programs continue to produce graduates of the highest caliber. The DOD has also placed considerable effort in establishing a stronger connection with Silicon Valley, and NPS has been a key player in this initiative. Our participation in the recent “#HacktheSky” Navy Hackathon is just one effort in a long line of cyber-focused initiatives to advance the technical force.

Advancing the defense acquisition process is also a priority among our Navy and defense leaders, especially in the current fiscal environment. NPS’ long-standing Defense Acquisition Program, and its associated annual Acquisition Research Symposium, are leading the charge in advancing the overall knowledge base in this complex but critical process.

Similarly, faculty in our Department of National Security Affairs have been quietly contributing to national diplomacy through a longstanding program of track II dialogues, unofficial discussions by senior leaders in government, military and academia that provide the foundation for the advancement of official diplomacy interests.

Again, these are simply the beginning of NPS’ role and mission of advancing the combat effectiveness of the Naval service through graduate education and research. From mission-critical research in the Arctic Circle at the latest ICEX, to the pending launch of an advanced satellite that represents dozens of master’s student theses, NPS produces an invaluable resource that we all care about, knowledge.

As our Navy and Defense Department leaders begin wrestling with the next bold decision that will undoubtedly be waiting for them, there is one thing they can rely on ... The Naval Postgraduate School, and its world-class faculty and professional students will already be working on detailed analyses of the complex issues they care about.

Ronald A. Route



10 NPS Academics Quietly Contribute to International Diplomacy Efforts

More than a decade of track II dialogues with critical nations on the national security stage provide NPS with a unique contribution to international diplomacy. (U.S. Navy photo by Javier Chagoya)



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NPS student and faculty studies illuminate the Department of Defense's path to gender equality. (U.S. Navy photo by Javier Chagoya)



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Adm. John M. Richardson describes his vision of a Navy that embraces high-velocity learning. (U.S. Navy photo by MC2 Michael Ehrlich)



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Student, faculty research leads to flurry of patented discoveries. (Courtesy photo)

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On The Cover

Lt. Lindsay Anderson is a student in the NPS' acquisitions and contract management program, and an information technology graduate of the U.S. Naval Academy. She is also a submariner, and like the thousands of women who have served in new roles in our nation's fighting forces, she will forge a path for countless service members to follow. (U.S. Navy photo by Javier Chagoya)

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

Navy, DOD Dare Top Coders to #HacktheSky Bay Area

Last year, NPS set a world record by flying a swarm of 50 autonomous drones all controlled by a single operator. Now, NPS and the Department of the Navy Office of Strategy and Innovation have challenged some of the best developers, hackers and designers in Silicon Valley to hack their control system.

The Navy's "#HacktheSky" hackathon and future of autonomy workshop was held June 24-26 at innovation hub Galvanize in San Francisco, California. The event brought together an array of hackers, cyber experts, Silicon Valley tech representatives, and data scientists to find vulnerabilities in the drones' code. Also on hand to observe and judge their efforts were Under Secretary of the Navy Dr. Janine Davidson, and Chief of Navy Strategy and Innovation, Dr. Maura Sullivan.

Ultimately, the purpose of the hackathon is to improve software, innovate upon technology created at NPS for unmanned systems, and

foster stronger relationships between government, industry and bay area technical leaders.



Participants brainstorm their methods of attack during the 2016 Navy "#HacktheSky" Hackathon. (U.S. Navy photo by MC2 Victoria Ochoa)

"Right now, the commercial drone sector is six generations ahead of what the Department of the Navy is currently testing, because our cumbersome processes and requirements were designed for an era of manned aircraft and big expensive acquisitions," said Sullivan.

"One of the meta purposes of #HacktheSky, aside from drone specifics, is that we will have working prototypes of advanced capability developed in a single weekend to demonstrate for our leadership," added Navy Cmdr. Zachary Staples, Director of NPS' Center for Cyber Warfare. "We don't want to

tell leadership speed is possible, we want to show them. I am hopeful we can walk out at the end of this event, whether you're military or civilian, believing the Navy can innovate at world-class speed."

Celebrated Author, Journalist Thomas Friedman Guest Lectures at NPS

Three-time Pulitzer Prize winning journalist and author Thomas Friedman guest lectured at NPS, June 24, sharing insights from his latest book, "Thank You for Being Late: An Optimist's Guide for How to Thrive in the Age of Accelerations."



Three-time Pulitzer Prize winning author and journalist, Thomas Friedman. (U.S. Navy photo by MC2 Michael Ehrlich)

Friedman described the values, forces and people that are shaping the world today by illustrating a series of accelerations that he argues are rapidly changing the world we live in – a world divided on the lines of "control and chaos, order

and disorder," which is being influenced by markets, Mother Nature and Moore's Law, he explained.

"We are actually in the middle of three non-linear accelerations of the three largest forces on the planet, and the three of them are interacting with each other," said Friedman. "There are vintage years in wine and there are vintage years in history. In the fullness of time, we will understand that 2007 was one of the most important years in history," Friedman continued, pointing to the releases of the iPhone, Facebook, Twitter, Android, the Kindle, Airbnb and the emergence of big data to illustrate his point.

Friedman noted that the integration of technologies, specifically in sensors, processors, data storage, networks and software, into what is now the cloud, with its ability to disguise complexity, have added to this pivotal moment in human history.

"This ain't no cloud. This is a supernova. I believe the melding of those five technologies into a world with one touch, is the greatest release of energy, in my opin-

ion, since electricity, and I think in time we will understand, since fire," said Friedman.

Check out the Friedman presentation on NPS' YouTube channel, <http://youtube.com/NPSvideo>.

Use of NPS-Developed Watchbill Continues to Rise

The most prevalent watchbill rotation used by the U.S. Navy is five hours on watch followed by ten hours off, known simply as five and dimes. A decade of advanced research and studies within the fleet are demonstrating the benefits of a circadian watchbill, creating rotations that add up to a 24-hour workday.

"When you look at five and dimes, it creates either a 15 or 30 hour day, neither of those will work for humans ... We are unable to adapt to it," said NPS Department of Operations Research Associate Professor Nita Shattuck. "It's going to make us sleep at different times of the day or night for three days. With two of those days, you're going to be up for an extended period of time."

Shattuck's watchbill rotation is far from new, and has garnered significant support from senior Navy leaders. Commander, Naval



NPS' Crew Endurance Team. (U.S. Navy photo by MC2 Michael Ehrlich)

Surface Forces Vice Adm. Thomas S. Rowden encouraged the Surface Warfare community to look into the watchbill in a message to the entire surface fleet in early 2016.

"Fatigue has measurable negative effects on readiness, effectiveness and safety. After a day without sleep, human performance drops to dangerously ineffective levels," said Rowden in the message. "Recognizing the unique rigors and irregular hours that our mission often demands, we can do more to safeguard this necessary component of individual readiness."

For more information and resources on NPS' circadian watch-bill, check out the Crew Endurance portal at <http://my.nps.edu/web/CrewEndurance>.

Biennial Symposium Advances Naval Mine Warfare

Naval leaders, industry experts and guests from 12 countries gathered to advance the profession of

side, California, May 24-26. The three-day biennial symposium, executed by NPS, is the only Navy-sponsored event solely focused on naval mine warfare and associated technologies.

"By hosting pertinent events, such as the biennial International Mine Warfare Symposium, we escalate our chances of increasing combat effectiveness within the armed forces while making signifi-



12th International Mine Warfare (MIW) Technology Symposium. (U.S. Navy photo by Javier Chagoya)

hunting mines during the 12th International Mine Warfare (MIW) Technology Symposium held at the Embassy Suites in nearby Sea-

cant contributions to fundamental scientific, engineering, policy and operational advances that support the Navy, the Department of

Defense, and other national and international security establishments," said NPS President retired Vice Adm. Ronald A. Route.

"The key thing about a symposium like this is the sharing of ideas and working together [to solve problems]," added keynote speaker Commander, Naval Surface and Mine Warfighting Development Center Rear Adm. James W. Kilby. "We need to be able to experiment throughout the community on ideas, and expend some energy at the academic level, such as NPS."

Student Volunteers Reinvigorate Popular Tutoring Program

U.S. Army Capt. Ryan Miller, a Spring quarter graduate in the applied mathematics program, has put together a diverse team of dedicated volunteers from NPS and the nearby Defense Language Institute Foreign Language Center (DLIFLC), offering a boost to the Saturday tutoring program, Break-

fast for Your Brain.

Over the years, the tutoring program, originally established by the Monterey chapter of the National Naval Officers Association,



NPS volunteers tutor regional youth through the Breakfast for Your Brain program. (U.S. Navy photo by Javier Chagoya)

has had an ebb and flow of volunteers. With recruitment of a reliable source of volunteers difficult, the benevolent tutoring program had been curbed for the past year.

NPS Department of Applied Mathematics Program Officer Cmdr. Thor Martinsen picked up the baton, and found overwhelming support and enthusiasm from

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Cyber Endeavour Focuses on Internet of Everything

Cyber experts and technologists congregated at the Naval Postgraduate School in Monterey, California, June 21-23, for Cyber Endeavour. They focused on the theme, "The Internet of everything and the impact on national security," Cyber Endeavour is an annual conference designed to tackle the ever-evolving challenges of securing military and civilian networks from cyber attacks.

"Cities represent the highest level of advancement in a civilization," said Dr. John Arquilla, Chair of NPS' Department of Defense Analysis. "We have to develop our own resilience against cyber-attacks for today and tomorrow."

Cyber experts point out that much of the infrastructure for metropolitan areas across the globe such as power grids and water treatment plants precedes the Internet, which brings a plethora of challenges for those trying to defend it.

"We are taking advanced technology and connecting it to old infrastructure," said Arquilla. "This opens the possibility for cities becoming vulnerable to strategic attack."

A panel discussion during the Cyber Endeavour focused on defining the term "cyber

city." Cyber experts suggest it may not be a concept with a single, true definition, but one which is constantly changing or in flux.

"Cyber city is this wonderful marketing tool right up there with Web 2.0 and the cloud," said Cmdr. Pablo Breuer, Operational Security Officer at NPS. "I think what we are talking about is the use of automation to support the population density that we now have in an urban environment."

Cyber warriors must have a diverse skill set to work successfully in supporting and defending cyber cities. These skills include the ability to expect, predict, and assess threats while working in a team environment. Representatives from the private sector also participated in Cyber

Endeavour, highlighting the importance of collaboration in defending cyber cities for both the military and civilian sectors.

"More partnerships with government and other entities in the cyber security realm will be critical in the effort to reduce the likelihood of a breach happening," said Jim Patterson, American International Group.

Cyber Endeavour is an event co-sponsored by the 335th Signal Command (Theater), DOD Information Operations Center for Research, and the Defense Innovation Unit Experimental.



Cyber experts and technologists gather at NPS for the annual Cyber Endeavour conference. (U.S. Navy photo by MC2 Victoria Ochoa)

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Miller.

“Establishing a method of continuity for the leadership role is paramount for the program to flourish. We already have an NPS student who will continue in the leadership role when Capt. Miller graduates in June. I will serve in the continuity role along with the outgoing volunteers to continually groom future leaders,” said Martinsen.

“Each tutor works with up to three children that cover subjects ranging from reading, writing, English, history, geography and Earth sciences,” added Miller. “The parents of the children appreciate the reinforcement that comes along with the tutor’s enthusiasm, providing problem-solving strategies the youngsters may not have encountered in the classroom.”

Team Monterey Bids Farewell to Founder



Team Monterey honors California’s 20th District Congressman, Sam Farr. (U.S. Navy photo by Javier Chagoya)

California 20th District Congressman Sam Farr was honored by a regional collective of Defense Department, Homeland Security, and California National Guard leadership known as “Team Monterey” during a farewell gathering held in his honor, June 2. Farr is retiring from the U.S. Congress after 23 years of public service on the state’s Central Coast.

“It is the military that made this area so special. We’re the United Nations of intellect around here due to the military presence,” said Farr.

The Team Monterey concept,

establishing in 2007, was Farr’s brainchild. Today, it serves the interests of some 380,000 men and women employed by the Department of Defense in California, including more than 200,000 active duty service members.

“Team Monterey gives us the forum to explore each other’s mission sets and capabilities to discover new ways to collaborate and further our national security missions,” said Capt. Kevin Bertelsen, Commanding Officer of Naval Support Activity (NSA) Monterey.

As a token of their appreciation for his service and on the occasion of Farr’s retirement, Adjutant General for the California National Guard Major Gen. David Baldwin presented Farr with the California National Guard’s Order of California Medal.

“I started something with Team Monterey and I hope you all can grow it and make it better,” said Farr as he thanked attendees.

NSA Student Wins First USNI/Foundation Essay Competition

NPS student U.S. Marine Corps Capt. Christopher Bartos of the Department of National Security Affairs has been named winner of the inaugural NPS Foundation/U.S. Naval Institute Essay Contest, with his 3,000-word winning entry, “Cyber Weapons Are Not Created Equal,” featured in the June issue of Proceedings Magazine.

Bartos’ winning essay attempts to clear up misperceptions in cyber attack and defense operations,

and how they are postured. He declares that a rigorous network defense negates offensive penetration because, over time, attack methods become perishable and obsolete.



USNI/NPS Foundation Essay Contest winner, Marine Corps Capt. Christopher Bartos. (U.S. Navy photo by Javier Chagoya)

“My essay challenges a commonly held belief about cyber operations – that they favor the offense more than the defense. While it is true that cyber attacks happen quickly, and that expanding Internet use creates many gaps, the most significant forms of cyber operations require significant planning, resources, and expertise to develop and execute. Small attacks will cause problems for society and individuals at large, but it is only these advanced attacks that will influence security at the strategic level,” said Bartos.

Bartos is pursuing a Master of Arts in National Security Studies – East Asia. In August, he will be attending the Defense Language Institute Foreign Language Center to study Korean before going to South Korea to complete his training as a Northeast Asia Foreign Area Officer.

New CENTCOM Commander Offers Insights to NPS Students

Army Gen. Joseph L. Votel, Commander, U. S. Central Command (CENTCOM), provided

NPS students, faculty and staff with a first-hand account of his primary objectives and initiatives in the CENTCOM Area of Operations during a guest lecture in Ingersoll Hall, April 8.

As the new CENTCOM commander, Votel talked about his three big priorities ... gain a broad understanding of the area; continue to build, establish and nourish relationships; and ensure the headquarters is responsive and agile to all components and Joint Task Forces.

“After 15 years of continued combat operations in this area, which most of you have participated in at some time or another, CENTCOM continues to play an important role in commanding and directing a multitude of operations at the crossroads of three geostrategic continental divides,” he said.

“This area is now at its most unstable state in decades. Ongoing political transitions, civil war, ethno-sectarian and an expanding global terrorism movement make this region susceptible to prolonged, long-term turmoil and instability,” Votel added. “We are in need of cutting edge, innovative and creative thinkers ... [My]



Army Gen. Joseph L. Votel, Commander, U.S. Central Command. (U.S. Navy photo by MC1 Lewis Hunsaker)

thanks to all the faculty and staff here; keep pushing these students because we need them.” IR

Detailed Data Analysis Contributes to Understanding of Military Suicides

NPS Department of Operations Research Assistant Professor Andrew Anglemyer recently published the results of a detailed data analysis on suicide in the military in the *Annals of Internal Medicine* in an article titled, "Suicide Rates in Active Duty Personnel, 2005-2011."

"In 2010, suicide was the 10th leading cause of death in the U.S.



NPS Department of Operations Research Assistant Professor Andrew Anglemyer. (U.S. Navy photo by Javier Chagoya)

The overall suicide rate in the U.S. military has increased, almost doubling from 2001 to 2011," said Anglemyer. "Clearly a need exists to identify military personnel at risk for suicide and to provide them with necessary care."

Anglemyer's paper began as a student thesis by Lt. Cmdr. Matthew Miller who looked at rates of suicide over time among various subgroups of active duty enlisted service members.

"I went a step further to determine who chooses a violent method of suicide over a non-violent method, which may lead to prevention efforts," explained Anglemyer. "I became interested in violence because it acts like an infectious disease, a contagion, and it spreads quickly."

Key to Anglemyer's approach, and what he hopes will lead to suicide prevention measures, is his assumption that "anyone that

NPS Faculty Deploy With USS Eisenhower

When the USS Eisenhower arrived in the Mediterranean Sea for its latest deployment, a cadre of faculty from the Naval Postgraduate School and other universities across the nation were part of the crew.

Dr. Heather Gregg, an Associate Professor in NPS' Department of Defense Analysis, and Adjunct Faculty member Dr. Michael Rubin were on board to support the Regional Security Education Program (RSEP), providing key members of the crew

with in-depth briefings on current issues and the evolving culture for the specific regions they are deploying to.

"I will be instructing on my specialty, which is causes and preventions of religiously-motivated violence," Gregg said during an interview before her deployment. "I will also be looking at social movements with a focus on the Arab Spring, the Palestinian-Israeli conflict as a failed social movement, and the potential for a social movement in Iran."

serves in the military is at risk" for suicide. Anglemyer says there are many factors that must be considered when seeking to understand what leads a service member to take his or her own life. He refers to a potentially "unquantifiable stressor," perhaps the personal and familial stress associated with the potential to deploy into a combat zone, if not the deployment itself, as a possibility.

"Although the risk dynamics of deployment history, job classification, and branch are not fully understood, assuming all personnel are at risk, and assessing them appropriately by using a validated screening tool, may be an effective means of reducing

This was Gregg's fourth RSEP team, having deployed with two other aircraft carriers and a

Marine Expeditionary Unit on an amphib. Her experiences have taken her through Kantar, Israel, Palestine and neighboring regions.

"RSEP was created as a program within NPS, and so it has sought out NPS instructors from the very beginning," said Rubin. "The goal is to enhance situational, political and cultural awareness guiding events in the region be-

yond the day-to-day tactical issues upon which Sailors and Marines focus.

"Not only do subject matter experts get to go into detail in their fields of their expertise, but being onboard a deployed ship and seeing how the Navy works is an education for any civilian instructor or professor who might teach at NPS but never have served in the Navy," added Rubin. "To come off each RSEP trip is to gain a far greater understanding about how the U.S. Navy works, and makes us far more effective instructors."



NPS Associate Professor Dr. Heather Gregg lectures on the USS Eisenhower. (Courtesy photo)

suicide attempts," said Anglemyer. "The American Academy of Family Physicians has emphasized the need for clinicians first to identify at-risk service members by tailoring military-specific questions regarding their mental health."

SIGS Dean Receives Distinguished Scholar Award

Dr. James Wirtz, Dean of NPS' School of International Graduate Studies, received the Distinguished Scholar Award from the Intelligence Studies Section (ISS) of the International Studies Association (ISA). Wirtz was nominated and selected by his peers for his service to ISA and his numerous scholarly

contributions to the intelligence studies literature.



Dean, School of International Graduate Studies Dr. James Wirtz. (U.S. Navy photo by MC2 Michael Ehrlich)

"It's a great honor to receive this award," said Wirtz. "I've been

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Laser Test Bed Advances NPS Education, Research Programs

The Naval Postgraduate School (NPS), under the direction of Distinguished Professor Brij Agrawal with the university's Department of Mechanical and Aerospace Engineering, has successfully completed the development of a \$3 million High-Energy Laser Beam Control Research Testbed (HBCRT).

Agrawal's team will use the testbed to further student and faculty research with a focus on the development of adaptive optics techniques, which correct for atmosphere-induced laser beam aberrations in maritime environments.

"The main objective of the HBCRT is to educate Department of Defense civilians and officers

in this new and important area for the Navy," said Agrawal. "It is important for the Navy to correct this problem in order to protect ships from boats and UAVs [unmanned aerial vehicles]."

The HBCRT is already being put to use by students for both thesis research and class work. NPS student and Bowman Scholar Ensign Patrick Dods is using the HBCRT to test a series of beam control measures designed to correct for atmospheric aberrations.

"The tests that we did sought to determine what can be done with a laser system against a sailing vessel, like those used by cartels to deliver drugs to the U.S.," explained Dods. "It's a system of supreme interest to the Navy."



NPS High-Energy Laser Beam Control Research Testbed. (U.S. Navy photo by MC2 Victoria Ochoa)

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a member of the ISS for over 25 years ... I was introduced to the ISA and befriended by senior scholars, taken under their wing and became an active participant in the ISA. I also served as section president for six years."

The ISS studies the role of intelligence in international foreign affairs, from the role of intelligence in democracy, intelligence analysis, and the relationship between policy makers and intelligence analysts.

"At NPS, we deal a lot with the role of intelligence and strategy, how to create intelligence, how to use it, to improve the combat effectiveness of the U.S. military," said Wirtz. "We really are a combination of students who come fresh from the field bringing with them the latest operational experience, we have faculty who are experts in their respective fields that can help

these students address these real time problems with cutting edge solutions."

Researchers Lay the Foundation for Ultra High-Speed Navy Vessel

A futuristic vessel soaring like an aircraft across the electric blue Pacific carrying 25 Sailors at more



Dr. Johannes Royset. (U.S. Navy photo by MC3 Brian Abel)

than 100 knots isn't as far off as one might think. In fact, researchers at NPS are working on the very

early stages of making this vessel a reality, developing intricate models and simulations that would aid in the potential development of a Joint Ultra High-Speed Vessel (JUHSV).

The Defense Advanced Research Projects Agency (DARPA) awarded NPS Department of Operations Research Associate Professor Dr. Johannes Royset, in partnership with the Massachusetts Institute of Technology (MIT) and Brown University, a \$2 million grant to develop the mathematical models that will be utilized in the early design phase of a possible JUHSV.

"DARPA is thinking many decades ahead, and that really allows us to go outside of conventional designs and think about something that will bring a lot of change," said Royset. "Mathematical models are essential for developing a vessel of this type because we simply don't

know how a vessel of this type will behave."

NPS student U.S. Army Capt. John Sabol has joined Royset, assisting with the modeling and simulation for his NPS degree thesis.

"We're looking at how we can use existing mathematical equations and relationships to try and [limit] uncertainty in the most extreme cases," said Sabol. "It's a way to analyze the data we're collecting and estimate what the worst case could be even though we haven't seen it."

"The Marines and the Navy, Army included, have foreseen a need to operate at high speeds in littoral waters," Sabol continued. "Enhancing our expeditionary capabilities is pretty important to us."

NPS' Royal Australian Navy Liaison Presented Legion of Merit

Royal Australian Navy (RAN) Capt. Michael Smith, NPS RAN Liaison, was presented the Legion of Merit from Chief of Naval Personnel Vice Adm. Robert Burke at



Vice Adm. Robert Burke presents Legion of Merit to NPS Royal Australian Navy Liaison Capt. Michael Smith. (Courtesy photo)

Naval Support Facility Arlington, June 22.

"It has been a truly humbling experience to receive this important award, and I am honored that the work to set up and sustain the USN-RAN Strategic Workforce Personnel Steering Group (SW-PSG) from early 2011 to early 2016 has been valued by the U.S. Navy Chief of Naval Personnel," said

Smith.

The SWPSG reports to and supports strategic dialogue between the U.S. Navy's Chief of Naval Operations and the Australian Chief of Navy, providing a forum for the exchange of information on workforce and personnel initiatives as well as identifying areas for ongoing and future collaboration.

Smith said that he enjoyed "engaging with so many talented and interesting members of the U.S. Navy, as we managed over 200 action items in five years, [and] working with and being supported by a great team in Australia who shared my passion and commitment for the SWPSG."

Ultimately, Smith said, it was very gratifying to see "a number of the contributions to the SWPSG being used to shape U.S. Navy policy initiatives."

Faculty Team Wins Professional Association's Educator of the Year Award

NPS Department of Operations Research Visiting Professor Daniel A. Nussbaum and Senior Lecturer Gregory K. Mislick have been hon-



Co-program managers for NPS' Master of Cost Estimating and Analysis (MCEA) program, Dr. Daniel Nussbaum, right, and Senior Lecturer Gregory Mislick, left. (U.S. Navy photo by Javier Chagoya)

ored with the International Cost Estimating and Analysis Association (ICEAA) 2016 Educator of the Year Award. Nussbaum and Mislick are co-program managers for NPS' Master of Cost Estimating and Analysis (MCEA) program.

"I'm honored and humbled that we were both selected for the NAVAL POSTGRADUATE SCHOOL

award, and we join those who in the past have made significant contributions to the art and science of cost estimating, especially in the current economic environment," said Nussbaum.

"What the Educators of the Year Award means to me is that we bring attention to really how relevant cost estimating and analysis is to decision making, not only for the Navy but also in the national arena," said Mislick.

NPS Professor Honored with Cyber Security Award

NPS Distinguished Professor of Computer Science Dr. Cynthia Irvine has been recognized with the National Science Foundation's Women in Cyber Security 2016 Award of Excellence for her research, innovation and contributions to cyber security.

"I'm very happy to receive this award," said Irvine. "The cyber



Distinguished Professor Dr. Cynthia Irvine. (U.S. Navy photo by MC2 Victoria Ochoa)

security field has radically transformed since its early stages. It's necessary to find and educate people to protect our country and our expanding technology."

Cyber security has taken on greater import as multitudes of new devices are connected to networks each year. Failure to use appropriate security measures on these devices opens up networks to adversary attacks.

"Technology is advancing so rapidly that by 2020 every man, woman and child will have at least three devices on [a network] at one time," said Irvine. "All this technology is improving life, but we

have to build it and monitor it so it doesn't become corrupted."

Irvine has been an instrumental part of the NPS cyber security team since 1994 and has been a pioneer in the field since its early stages.

Wargaming Activity Hub Leader Honored With Annual Hamming Award

NPS Department of Operations Research Senior Lecturer Dr. Jeffrey Appleget is the latest recipient of the Richard W. Hamming Faculty Award for Interdisciplinary Achievement.

"It is an honor to be recognized with this award," said Appleget. "I've been privileged to teach students from many different NPS curricula in my wargaming applications course. The real reward for me is mentoring student teams working together to produce some truly amazing accomplishments for our DOD sponsors."

"No one better demonstrates interdisciplinary instruction on campus than Jeff Appleget," said



Dr. Jeffrey Appleget. (U.S. Navy photo by MC3 Brian Abel)

NPS Professor of Practice Wayne Hughes. "He teaches wargaming from both a tactical and campaign perspective to officers of all our services and also many international students. Jeff coordinates his instruction to complement other courses on campus and his projects capture the attention of many different defense agencies."

Open House Spotlights MOVES Education, Research

NPS' Modeling, Virtual Envi-

ronments and Simulation Institute (MOVES) conducted its annual Academic Working Group (MAWG) from May 24-26, at its headquarters on the NPS campus. MAWG is a meeting between stakeholder organizations and MOVES, which gives each party an opportunity to discuss NPS' modeling and simulation academic programs, and how MOVES can steer academic and research programs to stakeholder needs.

"This event gets the people of MOVES, the faculty along with



MOVES Academic Working Group. (U.S. Navy photo by MC3 Brian Abel)

our stakeholder organizations, together, and it acts as a steering meeting for us," said MOVES Deputy Director U.S. Army Lt. Col. John Morgan.

The event places a keen focus on student projects, with short briefings throughout the day detailing research efforts, challenges and solutions. During the open house in the evening, students were able to demonstrate their efforts.

Another aspect of MOVES academic portfolio highlighted in the event is their health care modeling and simulation certificate program, developed in partnership with the Uniformed Services University of the Health Sciences and the Department of Veteran Affairs (VA).

"MOVES faculty ... created and now deliver the health care simulation certificate for active duty, Navy civilian and VA health care professionals," said Morgan. "Simulation is a necessary tool for improving the safety and effectiveness of health care systems. It's a key part of how we teach, train and improve health care." **IR**



NPS Professors Christopher Twomey, left, and Paul Kapur, center, with NPS Lecturer retired Pakistani Army Brig. Gen. Feroz Khan, right, are pictured in front of the flags of the various nations with whom they have led a series of unofficial, track II, diplomatic efforts. (U.S. Navy photo by Javier Chagoya)

NPS Academics Quietly Contribute to International Diplomacy Efforts

By Kenneth A. Stewart

Unbeknownst to the general public, academics and subject matter experts from universities and think tanks quietly contribute to international diplomacy through what are known as track II talks - informal discussions with foreign states. The Naval Postgraduate School has played a central role in these talks with China, India and Pakistan.

The Defense Threat Reduction Agency (DTRA), which is tasked by the Department of Defense with countering weapons of mass destruction, has been funding NPS-sponsored track II talks for over a decade. NPS Professor Christopher Twomey, with the university's Department of National Security Affairs, has been a part of NPS' track II talks with China since their inception.

"The meetings are officially unofficial. They provide a means for some back-channel communication that can be walked away from if somebody says something out of turn," said Twomey. "Nevertheless,

they are a useful way of gaining some understanding of the other side and a means to indicate your priorities."

They are also a forum where academics and policy makers can do early work, like ensuring a common vocabulary between representatives of respective states, when future track I meetings occur through official diplomatic channels.

"We can kind of push the boundaries through diplomacy by other means," said Twomey.

There are two sets of meetings that occur between the U.S. and China that are funded by DTRA. The first meets most years in Beijing and the other meets most years in Hawaii. NPS, under the leadership of Twomey and NPS Assistant Professor Michael Glosney, manages the Hawaii-based series of talks together with support from Hawaii's Pacific Forum, part of the Center for Strategic and International Studies.

NPS Professor S. Paul Kapur, Ph.D.
Department of National Security Affairs

"We have also looked at cyber security, common spaces, maritime, and space security as well as discussion about how India and the U.S. think about securing nuclear materials."

“We try to build upon ongoing topics at each of these meetings,” explained Twomey. “We work with both regional and functional State and Defense Department policy makers to make sure that we are doing something that is useful to them at the end of the day.”

In the world of diplomacy, official diplomatic contact between nations can be tricky. The mere acceptance of a foreign dignitary or the acknowledgment of the need to hold talks can have political implications. This has been true of Twomey’s area of study, and because there have been few track I discussions between the U.S. and China, there has been an increased interest from key policy makers to conduct unofficial discussions.

“There has been limited, though some recent, track I diplomatic talks between the U.S. and China on nuclear issues. The Chinese have traditionally viewed their arsenal as so much smaller than the U.S.’s that they feel they do not belong at discussions akin to the Russian-U.S. arms negotiations.

“Instead, you fall back to unofficial meetings ... that are purely academic, or somewhere in the middle that may include academics, policy makers and some officials acting in an unofficial capacity for their respective governments,” explained Twomey.

NPS Professor Paul Kapur has led track II talks with the Indian government. He is a South Asia expert whose expertise in the areas of nuclear proliferation and deterrence is showcased in his, “Dangerous Deterrent: Nuclear Weapons Proliferation and Conflict in South Asia” as well as his co-authored “India, Pakistan and the Bomb: Debating Nuclear Stability in South Asia.”

“The opportunity to participate came along and I jumped in. It’s an interesting intersection between academia and policy,” said Kapur. “It’s very gratifying to be a part of it.”

That opportunity has become increasingly relevant as India and its neighbor Pakistan have engaged in a South Asian arms race that often leads to tension between the two nuclear states and the region.

“We try to create an environment where experts from both sides can exchange ideas in a frank open discussion that can be shared with policy makers,” said Kapur. “The talks are indirect, but we try to inform the policy side as much as we can.”

And while nuclear issues are of great import to all the stakeholders involved, NPS-sponsored talks with India also delve into other areas of shared interest.

“We have also looked at cyber security, common spaces, maritime, and space security as well as discussion about how India and the U.S. think about securing nuclear materials,” said Kapur.

NPS Lecturer retired Pakistani Army Brig. Gen. Feroz Khan, now an American citizen and author of “Eating Grass: The Making of the Pakistani Bomb,” leads NPS’ track II efforts with his native Pakistan. He has taken a different approach to NPS track II efforts.

“When you hold dialogues and seminars, you get a lot of discussion on major security issues but end up with one or two important points after talking all day.

“For the past couple of years, I have tried a different track. Rather than holding dialogues and seminars, I chose to change the methodology by conducting crisis-simulation exercises involving regional players. This method brings in some outside-the-box practical answers to complex regional security issues,” said Khan.

By conducting crisis-simulation games through Khan’s South Asian Stability Workshops, he has found that it is possible to take a much deeper look into how participating nations conduct diplomacy, implement policy, deploy their militaries, and make economic decisions.

“The simulation exercise was designed to reinforce our theoretical understanding of India-Pakistani strategic stability with conceptual

clarity. Although track II dialogues and academic conferences have been useful for developing a robust theoretical understanding of strategic stability, the South Asian Stability Workshop provides a laboratory in which theoretical hypotheses can be explored and stress-tested,” explained Khan.

But Khan left the sterile confines of the laboratory long ago. He is deliberately pushing the envelope with his Pakistani and Indian participants in an effort to observe how, or if, participants are able to de-escalate potential crises.

“We try to simulate the interplay of conventional, unconventional and nuclear warfare,” said Khan. “We create a perfect-storm situation.”

Khan notes that into that “storm” each country brings its own pre-conceived notions and its own diplomatic and strategic objectives.

“We place them into a narrative of their own making, giving them the option to identify the crisis and observe how they react to it over a 72-hour period,” said Khan. “It’s a very serious game. The primary focus of my research is determining how nations can de-escalate crises using these tools.”

The researchers that participate in track II talks through NPS bring many years of academic experience to the unofficial diplomatic arena. Their research contributes to myriad U.S. diplomatic efforts, but their work has ramifications beyond either the diplomatic table or the academic black board – their work drives the graduate education of naval officers and DOD employees that may one day participate in official diplomatic endeavors of their own. **IR**

NPS Represented in SECNAV Innovation Awards

When the winners of the Secretary of the Navy Innovation Awards were announced early this year, NPS was well represented among the honorees. NPS alumnus Lt. Brendan Geoghegan was named winner of the Innovation Scholar (Professional Military Education) Category for his thesis research while a student on campus. Similarly, Lt. Clay Greunke received an honorable mention for his student thesis, and members of university’s Advanced Robotics Systems Engineering Laboratory (ARSENEL) were recognized with an honorable mention.

“I was very excited to have been nominated for the award. To be selected for it by the SECNAV team is above and beyond. It was a great project to work on and hopefully the excitement of utilizing AR [augmented reality] and VR [virtual reality] in the military domain does not fade away,” said Geoghegan.

The Secretary of the Navy Innovation Awards were established by SECNAV Ray Mabus to recognize leading innovators within the Department of the Navy (DON) and to incentivize innovation across DON.

“Across the Department of the Navy, our talented Sailors, Marines and civilians are continually creating innovative solutions to our most complex problems. I want to recognize the top naval innovators in our workforce today and inspire future innovators to continue developing their bold ideas for the future,” Mabus said when he announced the program.



GENDER INTEGRATION

BY KENNETH A. STEWART

NPS faculty, student studies illuminate the Department of Defense's path to gender equality.

For decades, policy makers throughout the Department of Defense (DOD), and beyond, have relied upon the Naval Postgraduate School's interdisciplinary faculty and unique student body as they have wrestled with the often contentious issue of women in combat.

Faculty at NPS have been thinking deeply about this complex issue for some time. In his 2008 book, "Worst Enemy," Department of Defense Analysis Chair Dr. John Arquilla offered some compelling words for the integration of women into most types of combat units, and even posed the option for women to register for the draft. Also in defense analysis, NPS Associate Professor Anne Simons has written extensively on the issue, and raised several concerns with the integration of women in her 2001 paper titled, "Woman in Combat Units: It's Still a Bad Idea."

But NPS' contribution to the issue is not about debate, besides, Secretary of Defense Ash Carter has put the issue largely to rest. In January 2016, he ordered all military occupations and positions open to women and a group of senior generals recently called for women to register for the draft.

"[Women] will be allowed to drive tanks, fire mortars and lead infantry Soldiers into combat. They'll be able to serve as Army Rangers and Green Berets, Navy SEALs, Marine Corps infantry, Air Force parajumpers

and everything else that was previously open only to men," said Carter in a Dec. 3, 2015, press release.

Carter's historic decision may have settled the issue of women serving across the defense spectrum, but the transition is not going to be easy. And it is the day-to-day wrestle with change where NPS students and faculty truly make their contribution to the efforts, informing decision makers at every level with thoughtful, academically-driven analyses.

NPS Professor of Public Policy Mark Eitelberg has a unique perspective on this issue.

in 1975-1976, when I served as a Chief Scheduling NCO [non-commissioned officer] for a Women's Army Corps Basic Training Battalion," said Eitelberg. "I didn't realize at the time that I had become one of maybe just three men in U.S. history to have served officially as a male WAC."

The WAC was disbanded two years later and Eitelberg said goodbye to its 80th Division, but his interests in under-represented populations grew.

"I proceeded to study population representation in the U.S. military, which became

the topic of my doctoral dissertation in 1979. This led to a coauthored book, "Blacks and the Military," published by the Brookings Institution in 1982.

Since arriving at NPS, Eitelberg has worked on numerous research projects related to the integration of women and minorities for defense

organizations across the defense enterprise. He approaches military service as both a right and duty of citizenship.

"If fighting for one's country is considered an integral element of citizenship, whether a right or a duty, what does it mean if certain groups of citizens are prohibited from fighting based on their race, ethnic origin, religion or beliefs, sexual preference, gender, or some characteristic other than their proven, measured ability to serve?" Eitelberg asked.

"If a citizen is qualified to bear arms in

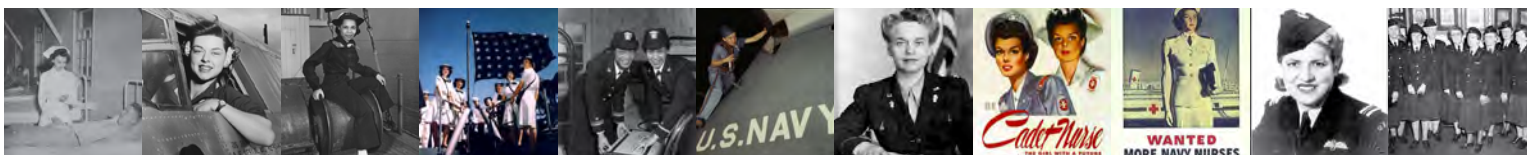


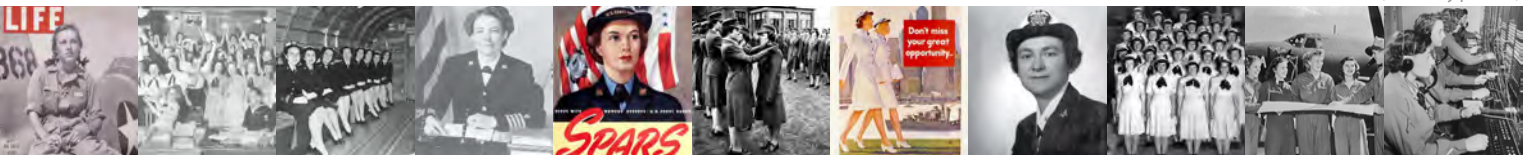
(U.S. Navy photos by Javier Chagoya)



He is one of the only men to have served in the now defunct Women's Army Corps. He went on to serve as a contractor for the Office of the Secretary of Defense (OSD) where he worked on various integration issues before joining NPS in 1982. Forty years later, Eitelberg continues to write about the integration of women and minorities into the combat units and is recognized as one of the nation's foremost authorities on "population participation" in the all-volunteer military.

"My interest in the subject probably began





other ways – physically, medically, intellectually, educationally, emotionally, morally – yet deemed unqualified merely for being African American, Japanese American, female, or homosexual, as in America’s past, what does that say about the group of which they are a part?” he continues. “Since citizenship is equated with military service, barring such demographic groups from equal service gives them the overt stigma of civic inferiority.”

Simons, as previously noted, has a different take on the issue. Her overriding concern is combat effectiveness, more than any notion of civic responsibility. She accurately predicted in 2001 that, “Various interest groups will continue to lobby to open all U.S combat positions to women” anticipating that proponents of integration will argue, like Eitelberg, that military service is a right of all Americans and that social and technological advances will make the military essentially “gender-neutral.”

Simons’ approach appears to be embodied by a single question, “How would the integration of women improve a combat unit’s survivability and the defense of the United States?” She has shared her candid answers to that question with some of the military’s most senior leaders, and this research provides a compelling advantage for what to watch out for as leaders guide the integration in the months and years ahead.

“Those who want to see women serve in combat units neither explain the price they believe combat units pay for women’s current absence, nor tell us what a squad would gain by having females present ... What would women contribute to a rifle platoon or a SEAL team? The short answer is distraction, dissension and distrust,” said Simons.

Throughout Simons’ writings on female integration into combat units there is little that suggests that women are incapable of

combat. She does discuss physical differences, and the issues of pregnancy and its effects, but she notes that common standards and family planning could render these concerns, at least for women, moot. On the contrary, she suggests that it is the weakness of men when faced with women that is detrimental to a unit’s success.

Soldiers in combat seem especially dependent,” explained Simons.

“There is the horrific world in which they’re mired. On the other hand, there is the far more ideal world which places women above the fray,” said Simons. “All the more reason, then, to treat the idea of women, girlfriends, wives, mothers, sisters and daughters as sacrosanct. Women as savior, and sanity to return to, provides something for Soldiers to live for beyond honor, duty, and the filthy, smelly, foul-mouthed males beside them. With women right there, ‘women’ as an ideal would never work.”

While the debate about whether or not women should serve in combat will likely continue, the DOD has made it clear that gender will no longer be a bar to service in the military’s most elite combat units. Now, it will be up to the DOD, and NPS researchers and innovation experts like NPS Professor Neal Thornberry, to help commanders to think about, and gain the willing acceptance of, Carter’s historic policy reversal on women in combat units.

“If we are going to do it, let’s learn while we are doing it and let the data inform the policy so we can reshape it with what we learn and make it better,” said Thornberry. “If you don’t make fact-based decisions, people will fall back on opinions ... Even if you think that you have

to do something, let’s experiment with the implementation in phases so we can learn as we move forward.”

While the integration of women into combat units is historic and has had national implications, it is just one of many issues that NPS’ diverse faculty and distinct student body contend with on a regular basis. Their work continues to inform the defense establishment’s most senior leaders about topics large and small that contribute to national security. **IR**

★ ★ ★

“If fighting for one’s country is considered an integral element of citizenship, whether a right or a duty, what does it mean if certain groups of citizens are prohibited from fighting based on their race, ethnic origin, religion or beliefs, sexual preference, gender, or some characteristic other than their proven, measured ability to serve?”

DR. MARK EITELBERG
NPS Graduate School of Business and Public Policy

“What men can’t say too loudly is that, when it comes down to it, they know they can’t always trust themselves. In the end, this unspoken truth is reason enough to keep combat units from being mixed, and it renders worries over women’s weaknesses, whatever they might be, largely irrelevant. It’s the vulnerability of men which proves the real stumbling



(U.S. Navy photos by Javier Chagoya)



block. Not only are men weak when it comes to women, they’re partial too. This isn’t just elemental; it’s immutable,” said Simons.

She also references the need for men to idealize women as sources of comfort, hearth and home and the potential for that ideal to be destroyed with integration.

“When absent, what [women] evoke includes home, family, the future, and everything that’s worth fighting for – nonviolence especially. Truth be told, men are more dependent on women than they often dare admit.



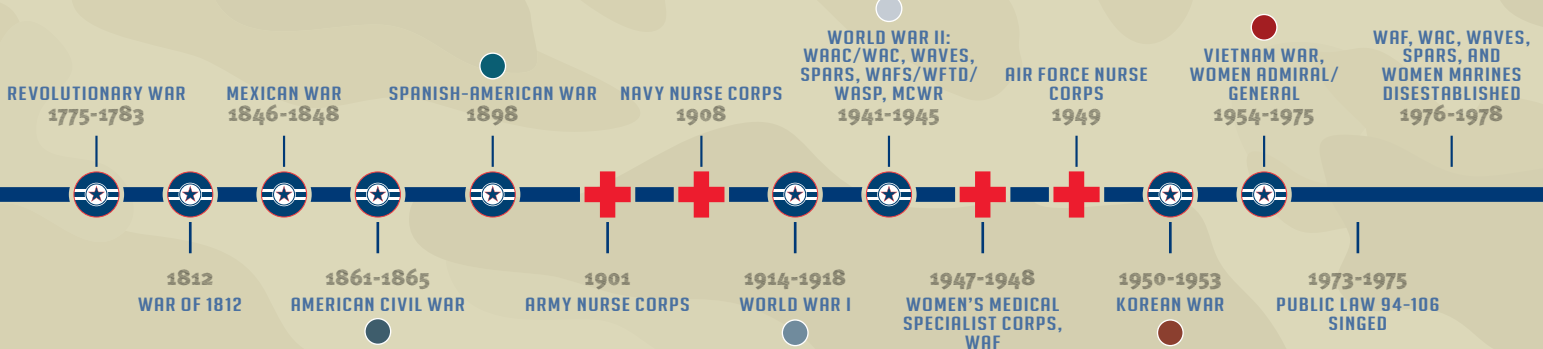
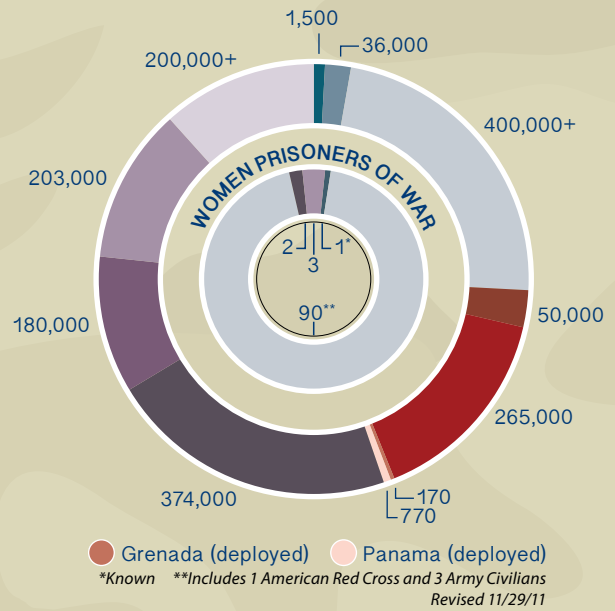


GENDER EQUALITY IN COMBAT

Just one more step for women in the U.S. Armed Forces...

The path to front-line combat has not been a short one for the thousands of women currently serving in the U.S. Armed Forces. Like all creations of social change, time is paramount to success, along with countless trailblazing individuals and leaders bold enough to make the step forward. In this issue of In Review, we focus on the contributions of the university in supporting leadership to push forward change, but we also take a moment to look back, and see how we got to where we are today.

WOMEN IN MILITARY CONFLICTS



Revolutionary War 1775-1783

Women followed their husbands to war out of necessity. Many served in military camps as nurses, water bearers, cooks, laundresses and saboteurs but only with permission from the commanding officers and only if they proved they were helpful.

War of 1812

Mary Marshall and Mary Allen, serve as nurses for several months aboard the USS United States at the request of Commodore Stephen Decatur.

Mexican War 1846-1848

Elizabeth Newcom enlists in the Missouri Volunteer Infantry as Bill Newcom and marches 600 miles to winter camp in Colorado before being discovered and discharged.

American Civil War 1861-1865

Women serve as matrons (administrators), spies, disguised as men to enlist, nurses, and cooks in both Union and Confederate battlefield hospitals. Dr. Mary Walker receives the Medal of Honor.

1901

Under the Army Reorganization Act the Army Nurse Corps is established, Feb. 2.

1908

Navy Nurse Corps (NNC) is established. Later, under a congressional enactment approved by President Roosevelt on July 3, 1942, members of the NNC were granted relative rank.

World War I 1914-1918

During the last two years of World War I, women are allowed to join the military. 33,000 women serve as nurses and support staff officially in the military and more than 400 nurses die in the line of duty. Navy enlists 11,880 women as Yeomen (F), 21,480 Army nurses serve in military, Marine Corps enlists 305 Marine Reservists (F) to "free men to fight", Coast Guard: Two women serve.

World War II 1941-1945

More than 400,000 women serve at home and abroad as mechanics, ambulance drivers, pilots, administrators, nurses, and in other non-combat roles. The Armed Forces establish reserves for women.

Army: the Women's Army Auxiliary Corps (WAAC) later became the Women's Army Corps (WAC).

Navy: the Women Accepted for Voluntary Emergency Service (WAVES).

Coast Guard: using their motto "Semper Paratus - Always Ready" (SPARS).

Air Force: Women's Auxiliary Ferrying Squadron (WAFS) and the Women's Flying Training Detachment (WFTD) later combined to become the Women's Airforce Service Pilots (WASP).

USMC: the Marine Corps Women's Reserve (MCWR).

1947-1948

Women's Medical Specialist Corps is established. Later amended to allow commissioning of males and became the Army Medical Specialist Corps (AMSC) in 1955. Congress passes the Women's Armed Services Integration Act granting women permanent status subject to military authority and regulations, and entitled to veterans benefits. Women in the Air Force was established. The first recruit in WAF was Esther Blake.

1949

Air Force Nurse Corps is established. The first African-American women enlist in the USMC.

Korean War 1950-1953

Over 50,000 women serve at home and abroad. 500 Army nurses serve

in combat zones and many Navy nurses serve on hospital ships.

Vietnam War 1954-1975

During the Vietnam War, over 7,000 women serve, mostly as nurses in all five divisions of the military: Army, Navy, Marines, Air Force, and Coast Guard. All were volunteers. Women first became eligible for promotion to Admiral/General (1967).

1973-1975

The military draft (only for males) ends and an all-volunteer military is formed creating opportunities for women. USAF: First woman promoted to Major (two star) General. President Gerald Ford signs Public Law 94-106 - Admitting Women to the Service Academies.

1976-1978

Disestablishment of the WAF, WAC, WAVES, SPARS and Women Marines as separate entities - full integration of women into their respective services and the first females are admitted to the service academies. 119 women entered West Point, 81 entered the U.S. Naval Academy, and 157 enrolled at the U.S. Air Force Academy. Women also enrolled in the Coast Guard Academy and the Merchant Marine Academy.



201,400 ACTIVE-DUTY MILITARY



60

FLAG OFFICERS

21

20

19

2,600

MILITARY ACADEMY CADETS & MIDSHIPMEN

9,200

OF NEARLY 71,400 MEMBERS CURRENTLY DEPLOYED

90%

MILITARY OCCUPATIONS OPEN TO WOMEN

**Data as of January 2015
Figures rounded to nearest one hundred*

WOMEN ON THE COMBAT SHIPS U.S.S. EISENHOWER
1993-1996

U.S. NAVY WARSHIP COMMANDED, FIRSTS MILITARY PROMOTIONS
2000

WAR IN IRAQ
2003-2011

FIRSTS IN HISTORY WOMEN ACCOMPLISHMENTS
2005

FIRST ALL-FEMALE USMC TEAM MISISON
2009-2010

DIRECT COMBAT ROLES POSITIONS OPEN TO WOMEN
2013

U.S. ARMY RANGER TRAINING ASSESSMENT COURSE
2015

1991-1992
PERSIAN GULF WAR (DESERT STORM)

1998-1999
FIGHTER PILOTS IN COMBAT, A WOMAN COMMANDS A SPACE SHUTTLE

2001-PRESENT
WAR IN AFGHANISTAN (WAR ON TERROR)

2004
19 SERVICEWOMEN KILLED IN HOSTILE ACTION

2008
16,000 WOMEN SERVED THROUGHOUT THE WORLD

2012
14,000+ JOB OPPORTUNITIES WILL OPEN TO WOMEN

2014 -PRESENT
WAR ON ISIL

2016
GENDER-BASED RESTRICTIONS LIFTED

Persian Gulf War (Desert Storm) 1990-1991

Congress authorizes women to fly in combat missions. More than 41,000 women are deployed to the combat zone. Two are taken captive.

1993-1996

The U.S. Air Force opens all aircraft to women. First Air Force woman completes combat pilot training. Congress repealed the law banning women from duty on combat ships and U.S. Navy assigns first women to the U.S.S. Eisenhower. First woman promoted to 3 star rank.

1998-1999

For the first time, women fighter pilots fly combat missions off aircraft carrier in Operation Desert Fox, Iraq. First woman commanded a Space Shuttle.

2000

Captain Kathleen McGrath commands a U.S. Navy warship assigned to the Persian Gulf. Firsts in history military promotions to women: USAF Brigadier General, Coast Guard flag officer rank - Admiral, and National Guard Major General.

War in Afghanistan (War on Terror) 2001 (Present)

Servicewomen are activated and deployed in support of the war on terrorism post the terrorist attack in the U.S. on September 11, 2001. First female African-American pilot in the Marine Corps, and later the first to fly combat missions in Iraq. Firsts in history military promotions to women: Army Brigadier General, African-American woman Army National Guard Brigadier General.

War in Iraq 2003-2011

Military women are performing combat roles on land, at sea and in the air in Operation Enduring Freedom, Afghanistan and Operation Iraqi Freedom in Iraq. Three Army women become prisoners of war in the first days of the invasion.

2004

19 servicewomen killed as a result of hostile action since the war in Iraq began, the most in hostile action history. Colonel Linda McTague becomes the first woman commander of a fighter squadron in U.S. Air Force history.

2005

Firsts in History women accomplishments: Army Sergeant Leigh Ann Hester is awarded the Silver Star for combat action. Coast Guard Lt. j.g. Jeanine McIntish-Menze becomes first African-American pilot. Air Force Maj. Nicole Malachowski joins the U.S. Air Force Thunderbirds.

2008

16,000 women served in Iraq, Afghanistan, Bosnia, Germany, Japan, and other areas. Army Gen. Ann E. Dunwoody became the first female four-star general in the U.S. Armed Forces.

2009-2010

The first all-female U.S. Marine Corps team conducts its first mission in Southern Afghanistan. The military lifts restrictions on women serving on submarines. Military hospitals/clinics worldwide will offer Plan B contraceptives.

2012

More than 14,000 job opportunities will be opened to women in smaller units closer to the front lines, 1.2% of the total positions in the military.

2013

Then-Defense Secretary Leon E. Panetta lifted the barriers that have prevented military women from serving in direct combat roles.

War on ISIL 2014 -Present

USMC opened 11 more specialties to females, first female reserve officer to fly in the USAF Thunderbirds. Michelle Janine Howard becomes the first woman to attain the rank of four-star admiral in the Navy's 238-year history.

2015

The first woman reported to the USS Minnesota, thus becoming the first woman to serve aboard a U.S. Navy fast-attack submarine. The U.S. Army allocated 40 slots for female candidates in each iteration of the Army Ranger Training Assessment Course, which precedes Ranger School.

2016

All gender-based restrictions on military service is lifted. Army Rangers and Green Berets, Navy SEALs, Marine Corps infantry, Air Force parajumpers, and other all-male special operations units specialties positions open to women.



NPS graduate Lt. Cmdr. Krysten Ellis, left, is pictured with fellow Graduate School of Business and Public Policy graduates Lt. Christopher Schrader, center, and Lt. Nathan Woodward, right, during graduation. A pioneering submariner herself, Ellis co-authored a report detailing the experiences of the first 24 female officers to deploy on board a Navy submarine. (U.S. Navy photo by MC2 Shawn J. Stewart)

The First 24 - Views from the First Wave

By Kenneth A. Stewart

On April 29, 2010 Navy Secretary Ray Mabus and then Chief of Naval Operations (CNO) Adm. Gary Roughead moved forward with an ambitious plan to integrate female officers on submarines and other naval vessels. Nearly a year later, the CNO issued a naval instruction permitting Navy detailers to assign female officers to a wide-array of surface vessels and designated submarines.

“Women will be permanently assigned to all ships, designated submarines, all afloat staffs, all units of the Naval Construction Force, all Riverine headquarter staffs, and all aviation squadrons regardless of mission, and will be fully integrated into the units to which they are assigned, without a separate chain of command,” read OPNAV Instruction 1300.17B.

With regard to the ‘Silent Service,’ what the instruction paved the way for was the placement of 24 hand-picked women, a mixture of sup-

ply and nuclear-trained officers, to serve on submarines beside their male counterparts for the first time in U.S. naval history.

The first cohort of female submariners graduated from Submarine Officer Basic Course in November of 2011, and were assigned to serve aboard the ballistic missile submarines USS Wyoming (SSBN 742) and the USS Maine (SSBN 741), as well as the guided ballistic missile sub-

marines USS Georgia (SSGN 729) and USS Ohio (SSGN 726).

For Lt. Cmdr. Krysten Ellis, a 2015 graduate of the Naval Postgraduate School (NPS), the opportunity fulfilled

“It is readily apparent from the experiences of the participants how important good command climate was to the success of the integration process, and, at the same time, how destructive poor leadership could be ... Some people deal with change very well, others do not.”

Lt. Cmdr. Krysten Ellis

a lifelong dream.

“My dad was a career submariner. I grew up around boats my whole life, they were my jungle gym and I wrote papers in high school about why women should serve on them. It was a childhood dream of mine, and it seems to have just happened magically,” said Ellis.

Her experience proved to be a powerful one indeed, compelling her along with fellow submariner Lt. Garold Munson, to chronicle the experiences of those ground-breaking 24 Sailors in a professional report for their NPS Master of Business Administration degrees titled, "Gender Integration on U.S. Navy Submarines: Views of the First Wave."

"We wrote the thesis because we wanted for there to be somewhere that the submarine force could go to hear the actual experiences [of female submariners] without a filter. I wanted our leaders to be able to understand that integration was not that big of a deal," explained Ellis.

"The major goals of this study were twofold ... to create a rich data set capturing the lived experiences of the first group of female submariners for follow-on studies, and to provide an analysis of the data that will address the main research questions," she continued.

Ellis and Munson's report is an ethnography, drawing upon the "lived experiences" of the women that agreed to participate in it. They interviewed 25 female submariners for their report, 16 of which were from the initial group of 24 female officers to serve aboard a submarine. Their comments, offered without attribution, share keen insight into the experiences of the integration and its supporting and hindering factors. Throughout the interview process, several themes emerged ... Female submariners often spoke of the difficulties associated with their initial integration, the command climate aboard the submarines they served on, and a common desire to be treated as equals.

"When we came to the submarines, the crews were, one, scared ... that women were coming, and two, very highly trained as to what was proper and what was appropriate, and what was not," noted one of the respondents.

"There was no animosity. It wasn't combative at all. It was really awkward because they just didn't know how to talk to me," wrote another.

Ellis offered her own views on the initial transition.

"The transition was not as painful as it was imagined. People thought it was going to be this awful, horrible thing. But, once you put a face to the monster that is change, it's not a monster anymore. It just becomes part of your routine. It took a week or two for the guys on the boat to figure out that I wasn't a monster, but after that, we were sharing the bathroom on the boat like brothers and sisters. It wasn't a big deal," she said.

Another prominent theme throughout Ellis and Munson's report was the desire for equal treatment by the new submariners. Several of the women who participated in the study noted a disconnect between the stated goal of equality, and the side effects of simply being the first females on board, and the notoriety that came with it.

"I am an expert in supply-related topics because I am a supply officer. I am not a subject matter expert on women. I didn't sign up for that," said one of the respondents. "I was supposed to be a mentor for the junior women, but I ended up being a mentor for the rest of the boat."

"Sub school was pretty interesting. We noticed ... they put the four of us girls in the same section, so everybody else was alphabetical and the rest of us were put in the same section," said another. "On the grade sheets our names were in red and everybody else's were in black ... that was another one of those things where it's like, we are not being treated the same."

"Getting my dolphins. That was ... a very bittersweet day. I did it pretty quickly in comparison to most of the [junior officers] on my boat. I probably worked myself a little bit harder than I should have to get them in the time that I did. Then having like such a huge press release with it where CNN and Fox News and everybody was there. I just wanted to be normal and I just wanted to be one of the guys," said another.

Even an honor as high as meeting the President of United States was a dual-sided sword for some of the Sailors. "That's kind of hard to explain to your guys, like oh well, I am just a normal JO [junior officer]. That's what we have been preaching for the last you know, X amount, and that's how you are expecting me, but now I am going to visit the president," one of the Sailors said.

In the end, Ellis and Munson's report noted that command climate and leadership, particularly the tone set by senior leaders, was a critical factor for success.

"It is readily apparent from the experiences of the participants how important good command climate was to the success of the integration process, and, at the same time, how destructive poor leadership could be," said Ellis. "Some people deal with change very well, others do not."

"Command climate must be driven from the top and fostered at every level of leadership. Of all the factors that contributed to the quality of the integration experience, leadership and climate likely have the largest effect, and this effect is lasting," added Munson.

Comments about command climate made by submariners interviewed for Ellis and Munson's thesis were revealing.

"I think [command climate] is the key for the leadership ... It has to be managed on an individual leadership level ... the CO

[commanding officer], the COBs [chiefs of the boat], the XO [executive officers], and the department heads setting the right tone," said one of female submariners.

Ellis, as both a documenter of the women's experiences as well as a participant in the process, has come to believe that integration will require more than welcoming crews, responsive commanders and equal treatment.

She notes that if women are to serve as career line officers within the submarine fleet, that serious changes will have to be made to accommodate female submariner career paths.

"You will not really be able to integrate unless you have thought out six or seven years of someone's career. Out of the [24] women in the first group, only two are going to go back to a boat. It is not necessarily due to bad experiences or because of the command climate, it's because the career paths that work for a man do not necessarily work for a woman," explained Ellis.

Perhaps the largest career consideration that Ellis believes the Navy must address is the issue of motherhood.

"The Navy needs to figure out when it is a good time for a woman to start a family as a submarine officer, they haven't figured that out yet. It has to get worked into a female Sailor's career path if they want a woman to one day command a submarine.

"Right now, the Navy needs women more than women need the Navy, and if you force them to choose between the Navy and a family, nine out of 10 times they are going to pick their family," said Ellis. ■

“Command climate must be driven from the top and fostered at every level of leadership. Of all the factors that contributed to the quality of the integration experience, leadership and climate likely have the largest effect, and this effect is lasting.”

Lt. Garold Munson



Executive education programs at the Naval Postgraduate School provide the university with a unique opportunity to extend its mission beyond the traditional master's degree student. With minimal direct funding, just \$2.5 million, NPS served nearly 500 individual courses impacting more than 28,000 students. (U.S. Navy photo by Javier Chagoya and MC1 Lewis Hunsaker)

NPS' Executive Education Programs Add Broader Reach, Impact to the Mission

By Kenneth A. Stewart

The Naval Postgraduate School has been at the forefront of the Navy's efforts to provide its officers with a defense-focused graduate education for decades. By taking advantage of the intellectual capital among its faculty, however, the university has developed several executive education programs that broaden the impact of the NPS mission throughout the service and the DOD.

Executive education offerings at NPS range from advanced topics in homeland security to tailored courses for senior military officers and civilian leaders preparing for their next assignment, and from defense resource allocation programs to efforts in building partner capacity and strategic relationships.

NPS' Center for Homeland Defense and Security (CHDS) is the nation's premier graduate education provider in homeland security. Beyond the master's curriculum, CHDS offers an Executive Leaders Program catering to senior government executives and officers representing federal, state and local organizations with a stake in homeland defense and security. Their offerings answer critical questions in the realms of counter-terrorism, counter-radicalization, force protection, intelligence and information sharing.

"It enables senior officials to interact with homeland and national

security leaders in a way that is not offered in any other place," said CHDS Director Dr. Glen Woodbury.

"This program has been a success. Our mission is to create a cadre of leaders who can handle complex issues and think critically," added CHDS Director of Communication Heather Issvoran. And NPS' cadre of CHDS alumni have put those abilities to the test time and time again in crisis response centers and battlefields around the world.

"For example, when the Washington Navy Yard shooting occurred, it was graduates of our master's program here that led the response," said Woodbury. Those responders included CHDS alumni John Donnelly Sr., D.C. Battalion Fire Chief, and Cathy L. Lanier, Chief, Metropolitan Police Department, Washington D.C.

Another major contributor to executive education at NPS is the university's Defense Resources Management Institute (DRMI), which recently celebrated 50 years of educating national and international defense leaders with an eye toward creating sound fiscal policy and the efficient allocation of precious defense resources.

Perhaps DRMI's mission can be best summed up in the words of former British Prime Minister Winston Churchill who said, "Gentle-

"The [Navy] wanted a way to provide additional support to flag officers as they transition to positions of greater responsibility and visibility."

Winli McAnally
Director, NPS Center for Executive Education

men, we have run out of money. Now we have to think.”

Since its first course in 1965, DRMI has educated approximately 15,000 U.S. students and nearly 21,000 international students from 171 different nations. DRMI graduates include prominent world leaders like His Majesty King Abdullah of Jordan, several ministers of defense and ambassadors, and other dignitaries from around the globe.

“Our goal is to develop a broad-based analytical framework for defense decision makers emphasizing the economic and efficient allocation of defense resources, and to provide an environment for the comparative exchange of ideas related to the management of national security,” said DRMI Executive Director Dr. Natalie Webb, a professor in NPS’ Graduate School of Business and Public Policy.

Under Secretary of Defense (Comptroller) and Chief Financial Officer, the Honorable Mike McCord weighed in on DRMI’s continued contributions toward the education of DOD policy makers.

“Many things have changed over the last 50 years, from the Cold War to a man walking on the moon and the fall of the Berlin Wall. For DRMI to stay relevant over this period of incredible change is a remarkable testament,” McCord said.

NPS’ Center for Executive Education (CEE), as its name suggests, is the Navy’s pre-eminent provider of customized executive education programs that address the strategic needs of the Navy. One of several efforts, the Tailored Support Program, provides senior Navy officers with a customized education immersed in the global and regional challenges of their designated future commands.

“The [Navy] wanted a way to provide additional support to flag officers as they transition to positions of greater responsibility and visibility,” said CEE Director Winli McAnally. “We help them see different perspectives of the business they will be doing. By gaining these perspectives, they are able to approach their new commands with tools that will make them more effective.”

McAnally works closely with course participants to create a syllabus tailored to the specific goals and interests of its executive attendees. In doing so, she leverages NPS’ diverse intellectual capital already in residence on campus.

“The great thing about this program is that we pull faculty from across NPS,” McAnally said. “It really highlights the resources, the faculty and the research that NPS conducts, and has led to research opportunities for our faculty members.”

Another front in NPS’ effort to provide executive education is the university’s Center for Civil Military Relations (CCMR), which was established in 1994 to support emerging democracies in the post Cold War era. Today, CCMR has expanded its focus to building partner ca-

capacity and improving international relations and interagency cooperation.

“We often bring together a variety of people, who have never gotten together before, from across foreign governments or our own governments and other agencies,” said CCMR Director Richard Hoffman.

“We learn as much from the students as they learn from us. We facilitate the discussion. They all bring their individual perspectives, experiences and expertise, but often times they have not really come together to look at a problem, like what they would do to address a refugee flow, a natural disaster, or respond to a weapon of mass destruction,” said Hoffman.

CCMR efforts have included advisory missions to Albania, counterterrorism efforts in South East Asia, as well as work in the areas of maritime security with special attention given to the challenges of human migration and instability.

In addition to several non-degree executive education and professional development programs, NPS also provides an Executive Master of Business Administration (EMBA) degree through its Graduate School of Business and Public Policy (GSBPP). Harnessing the power of distance learning, the EMBA program develops executive level skills in the areas of defense management and leadership to senior leaders whose schedules do not allow them to participate in NPS’ resident offerings.

Recently, students from the Space and Naval Warfare (SPAWAR) Systems Center Charleston and Naval Surface Warfare Center (NSWC) Panama City Division participated for the first time in the EMBA program.

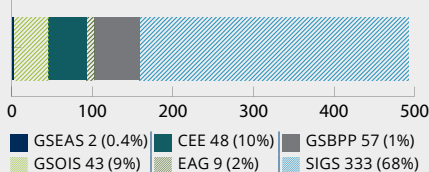
“I really think the EMBA program will help Panama City with new ideas and insights into processes, program management, and how we conduct business,” said Jonathan Armstrong from the Panama City cohort. “A few years ago, I started looking into the EMBA program after I received positive information from other Naval Surface Warfare Centers that had gone through the program.”

NPS’ mission is to provide graduate education to officers in the Navy, Marine Corps and all of DOD, but by capitalizing on the broad expertise reflected in its faculty, the university has been able to add several executive education and professional development programs to its lineup.

Although each are quite unique, they all share a common goal still very much grounded in the NPS mission, to improve the national security of the United States by ensuring executive leaders throughout the defense enterprise are ready and able to address our nation’s most challenging crises when it matters the most. ■

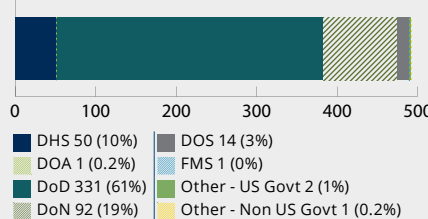
Executive Education ... By the Numbers

Total Courses Executed By Organization - 492 Total Courses



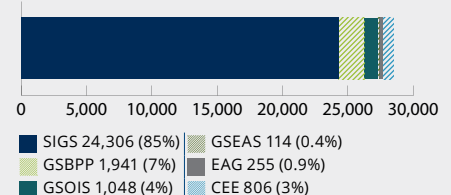
CCMR provides 68% of NPS’ EE/PD courses to 43% of NPS’ EE/PD students. The rest of the campus provides short course education to the remaining 57% of students, both in the U.S. and across the globe.

Total Courses Executed By Sponsor - 492 Total Courses



Most of the EE/PD conducted by NPS was reimbursably funded by DOD, with DON the second largest sponsor of EE/PD.

Total Students Enrolled By Organization - 28,470 Total Students



85% of NPS’ EE/PD students attend SIGS programs within CCMR, CHDS, NSA (RSEP) or SIGS’ academic departments.

Source: Office of Institutional Research, Reporting and Analysis (IRRA)



Chief of Naval Operations (CNO) Adm. John M. Richardson meets with NPS Associate Professor Ray Buettner at the Advanced Robotic Systems Engineering Laboratory (ARSENL), June 16. Richardson toured the campus and met with NPS faculty, staff and students during a visit to campus for the university's Spring Quarter Graduation ceremony. (U.S. Navy photo by Javier Chagoya)

Chief of Naval Operations Shares His Vision for High-Velocity Learning

By Kenneth A. Stewart

Chief of Naval Operations (CNO) Adm. John M. Richardson visited the Naval Postgraduate School to help celebrate the achievements of the university's 2016 Spring Quarter graduates, but while at the university, he took a moment to discuss one of the key lines of effort in his Design for Maintaining Maritime Superiority ... high-velocity learning.

The term high-velocity learning was penned by Steven J. Spear in his book, "The High Velocity Edge," which explores methods for building a system of "dynamic discovery," attacking and solving problems when they occur, converting weaknesses into strengths, sharing information and developing leaders invested in their subordinates' successes.

"If we achieved the vision of high-velocity learning, we would see across the Navy, a keen desire to improve each and everything that we

do," said Richardson.

Richardson has reached out to NPS to help him realize his vision. In doing so, he is relying upon the expertise shared by the dynamic faculty that NPS works to cultivate.

"The influence of the Naval Postgraduate School is going to be felt as we harness the deep expertise of the faculty here and inject that into our students, who then go off and start to lead around our Navy."

Adm. John M. Richardson
Chief of Naval Operations

"We have true scientists here ... The influence of the Naval Postgraduate School is going to be felt as we harness the deep expertise of the faculty here and inject that into

our students who, then go off and start to lead around our Navy.

"In learning institutions, particularly one as spectacular as the Naval Postgraduate School, they use the engine of high-velocity learning, which is very similar to the scientific method," continued Richardson. "You take that and you export it, not just as a scientific problem, but by [applying it to practical] problems."

Richardson stressed that his vision of a Navy that embraces high-velocity learning can only be achieved if it is able to break free from the confines of academia, and be put to use throughout the fleet.

“It is very important that this not be confined just to schools. It has to happen out in the fleet. We are working very closely with not just the Naval Postgraduate School, but all of the Navy’s schools, so that they can find a way to teach the principles of high-velocity learning. Our leaders can go out there and become teachers. We teach the teachers here, and that starts and spreads across the fleet,” said Richardson.

High-velocity learning also works from the bottom up, the CNO says. It recognizes the need to take advantage of the various talents and perspectives provided by the newest members of an organization.

“There is a tremendous amount of energy out there in the fleet, particularly among our young Sailors, who just see things that could be better. They see how we could be doing our business smarter and we want to tap into that,” explained Richardson.

According to Richardson, the success of high-velocity learning is also tied directly to creating a culture that is characterized by positive attitudes and the desire to constantly seek self-improvement.

“You start to get into this cycle where ... we’re better today than we

were yesterday [and you ask], how can we do it even better tomorrow, not only in our schools, but in every work center across the Navy? It’s important to achieve that attitude,” said Richardson.

Fresh from shaking the hands of the 343 members of NPS’ latest graduating class, Richardson had ample opportunity to speak to a wide swathe of the Navy’s best and brightest – students that will return to the very fleet he leads. He was quick to mention the confidence that he has

in them, and their ability to contribute to his vision.

“I have tried to impart on the students and faculty two things, one, that the Naval Postgraduate School here in Monterey is a real

treasure for the Navy and the entire nation. I want to bring home very clearly that the postgraduate school is a bright star in the constellation of [Naval educational institutions] and that this is a strategic place.

“I also want to be sure that [NPS students] understand that, by virtue of their time here ... they will cross all services throughout the Department of Defense. They will work across agencies and with international students, and those relationships cross cultural divides,” said Richardson. “These are going to be strategic relationships. As they go off into their new jobs around the globe, I want them to keep in touch and to understand that we are really counting on them to make a strategic difference out there,” said Richardson. **IR**

“In learning institutions, particularly one as spectacular as the Naval Postgraduate School, they use the engine of high-velocity learning, which is very similar to the scientific method.”

Adm. John M. Richardson
Chief of Naval Operations

Under Secretary of the Navy Tours NPS

By MC2 Michael Ehrlich

Under Secretary of the Navy the Honorable Janine Davidson toured several research labs and met with faculty for a roundtable discussion on current education and research programs underway at NPS during a visit to campus, June 27.

“Every day we fight to stay ahead of the adversary – that means the Navy must continue to adapt and innovate. If we lose our competitive edge, we risk mission failure,” stressed Davidson. “The Naval Postgraduate School’s world-class academics are conducting operationally-

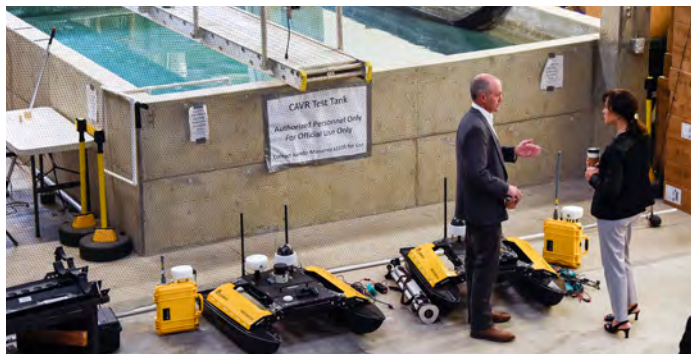
relevant research and sharing this knowledge with our next generation of Naval leaders, as well as our joint and international partners. Their innovative work and dedication to teaching is helping the Navy develop the intellectual capital of its people and will ensure that we are prepared to meet both the challenges of today, and the complex and dynamic battlespace of the future.”

Dr. Peter Denning, NPS Department of Computer Science chair and director of the university’s Cebrowski Institute, led a roundtable discussion with Davidson, where she posed several questions about autonomous systems and military doctrine.

“The Cebrowski Institute hosted an interdisciplinary group of faculty from across campus to talk and think together on these questions,” explained Denning. “Automation, doctrine, military innovation, approvals and thinking.”

One of the presenters during a tour of Halligan Hall, Research Associate and current doctoral student Sean Kragelund, discussed the opportunity of having Davidson visit the campus.

“I presented my research on algorithms to allow teams of autonomous systems to cooperatively search for mines ... My research is applying a new optimal framework to assess different combinations of vehicles and sensors for doing that mission,” said Kragelund. “It was a great opportunity to present some of the ongoing research we are doing here and show her the different spectrum of research that happens at NPS.” **IR**



Under Secretary of the Navy Dr. Janine Davidson tours NPS labs, facilities during a visit to the university, June 27. (U.S. Navy photo by MC2 Michael Ehrlich)



Assistant Secretary of the Navy for Research, Development and Acquisition the Honorable Sean Stackley addresses attendees at NPS' 13th annual Acquisition Research Symposium, May 4. The symposium brings together leading acquisition professionals from around the world. (U.S. Navy photo by MC2 Victoria Ochoa)

Annual Symposium Advances DOD Acquisitions Processes

By Kenneth A. Stewart

National and international leaders in the field of defense acquisition converged upon Monterey, California to attend the Naval Postgraduate School's 13th Annual Acquisition Research Symposium, May 4-5.

University President retired Vice Adm. Ronald A. Route welcomed a conference hall filled to capacity with the nation's leading acquisition professionals, and touted the importance of what he called "sharpening the spear" – NPS' commitment to honing naval officers with the education and skill sets required to serve at the tip of the nation's defense spear.

Assistant Secretary of the Navy for Research, Development and Acquisition the Honorable Sean Stackley served as keynote speaker at the symposium. Stackley highlighted efforts to break through bureaucracy, and to streamline the defense acquisition process while calling upon policy makers to see the bigger picture.

"Please, no more policy, no more rules and regulations. We have

plenty of policy, we need practices," Stackley said. "Process is important, but it's about product. It's about putting weapons systems in the hands of Sailors and Marines around the world and giving them the confidence to do their jobs."

Stackley also pointed to regulatory red tape as an impediment to the acquisition process, noting some of its more frustrating consequences.

"Admirals report to the Pentagon after solving the problems of nations with their fleets only to come to the Pentagon and learn that they do not have the authority to approve

a travel voucher to attend a conference," explained Stackley.

"[But] when you sort through all the details, a story emerges – extraordinary things are possible when congress, the Navy and manufacturers work together to defend the nation," Stackley continued. "Step by step we have been able to update our systems in a manner that has made us the most capable fighting force in the world today."

“It is my hope that we can continue to stimulate interest by research sponsors in relevant and timely acquisition research efforts by faculty and students at NPS, and affiliated universities and think tanks.”

Retired Rear Adm. James Greene
Chairman of NPS' Defense Acquisition Program

Retired Rear Adm. James Greene serves as the chairman of NPS' Defense Acquisition Program, and he summed up his expectations and hopes for the program's impact on the overall acquisitions process.

"It is my hope that we can continue to stimulate interest by research sponsors in relevant and timely acquisition research efforts by faculty and students at NPS, and affiliated universities and think tanks," said Greene. "We would like to see NPS emerge as the 'place of choice' for acquisition research efforts."

For Pakistan Navy Cmdr. Abdul Basit Rafique, NPS has been such

an institution. An international student currently at NPS, he is deeply involved in the financial side of defense acquisition in his nation.

"The Defense Acquisition Symposium provides a great opportunity to listen to some currently researched and thoroughly practiced acquisition principles and concepts directly from the 'horse's mouth,'" said Rafique. "As an international student, it helped me to better understand the workings of the U.S. Department of Defense Acquisition Management setup. I will definitely carry some worthwhile and modern concepts back home." **IR**

Students, Faculty Participate in Navy's Arctic Exercise

By Kenneth A. Stewart

An interdisciplinary team of faculty and students from the Naval Postgraduate School took advantage of the Navy's large-scale exercise in the Arctic circle, teaming up with members of Submarine Forces Atlantic (SUBLANT) among others to participate in Ice Exercise (ICEX) 2016.

"Ice Exercise 2016 allows the Navy to assess our readiness to operate in the Arctic, increase our operational experience in the region, develop partnerships and collaborative efforts, and advance our understanding of the Arctic environment," said Vice Adm. Joseph E. Tofalo, Commander, Submarine Forces and Commander, Submarine Force Atlantic.

The NPS delegation is supporting the effort by conducting a portfolio of detailed acoustic, environmental, and autonomous underwater vehicle (AUV) research at Camp Sargo, built on Arctic sea ice about 200 miles north of Deadhorse, Alaska. They shared the camp with more than 200 personnel on the ice, and 140 submarine crewmen during the five-week exercise.

NPS Department of Oceanography Faculty Associate John Joseph and his team were the first researchers from the NPS delegation to reach the ice.

"Our primary objective was to characterize the acoustic conditions of the changing Arctic environment. To do this, we deployed numerous oceanographic and acoustic sensors, both in the camp and at remote sites located several kilometers from the camp," said Joseph.

Research Professor Timothy Stanton, also from the university's Department of Oceanography, also headed to the ice. Stanton has been a fixture at NPS for 40 years, and has been participating in ICEX since the 90's. At ICEX 2016, his students deployed NPS-developed buoys designed to measure processes in the ocean that contribute to melting Arctic sea ice.

"I have been sending students up to the ICEX experiments for over a decade. It's been an incredible experience for them," said Stanton. "They make an important contribution to the NPS Oceanography program that is used by both Meteorology and Oceanography and Under-

sea Warfare students."

Rounding out the university's interdisciplinary team, Research Assistant Professor Doug Horner serves as director of NPS' Center for Autonomous Vehicle Research (CAVR). Horner and his team deployed advanced autonomous robots beneath the ice and in the skies above the camp.

"CAVR is primarily interested in intelligent autonomy – aerial, surface and underwater robotic system interaction and persistence," said Horner. "There are a lot of challenges that are inherent in 20-below operating conditions."

But those challenges are precisely why NPS and the Navy are so interested in the Arctic. Understanding the Arctic environment is critical to naval operations and has the potential to contribute to the burgeoning field of Arctic atmospheric science.

"In the undersea environment, GPS is unavailable. Instead of using GPS, we look at features as navigational references to reduce our positional uncertainty. In our case, we are using features underneath the ice to localize the position of our vehicles.

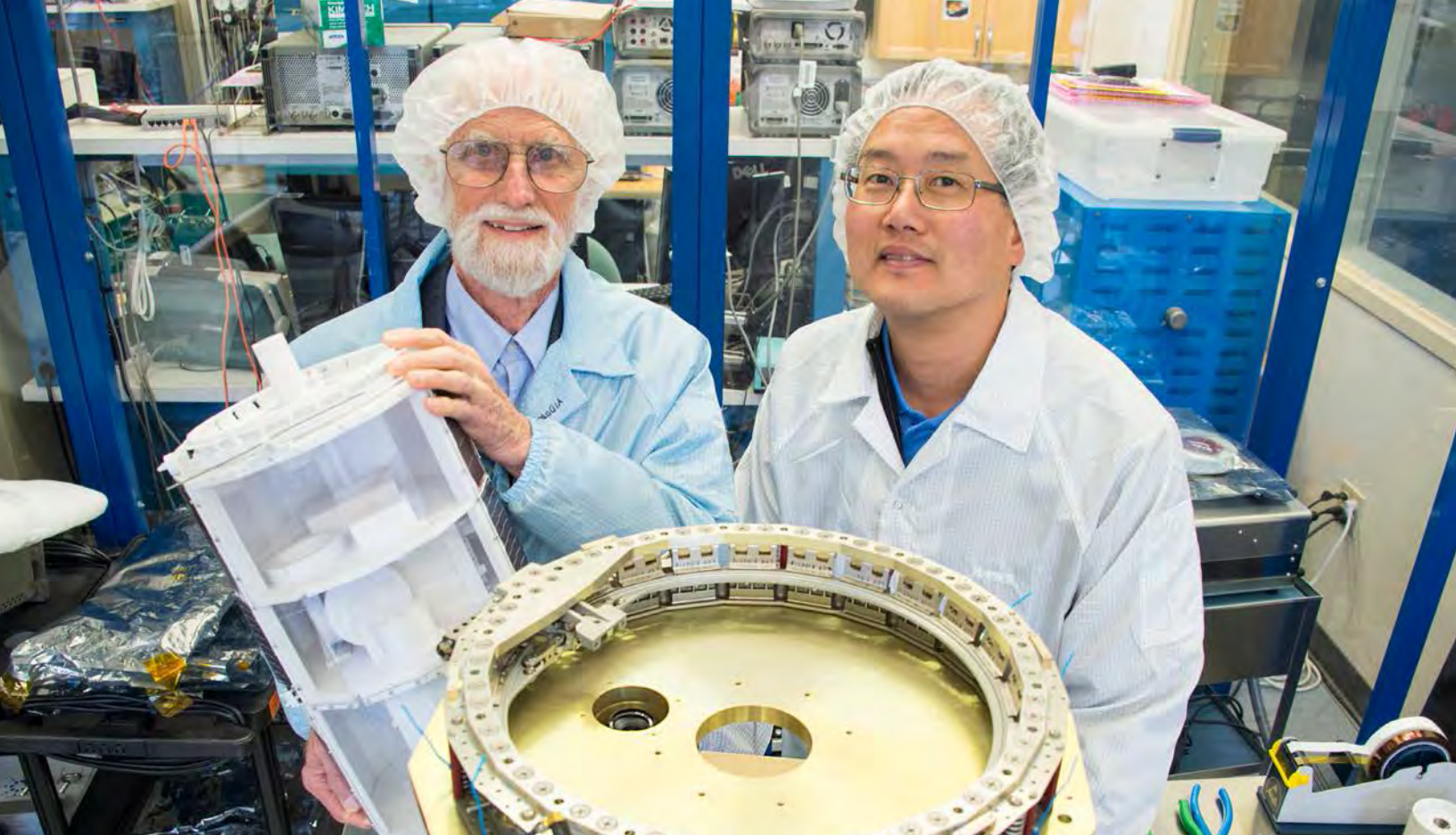
"The sonar aboard our REMUS vehicle, which generally is used to look downward, will instead be looking upward to create a map of the underside of the ice. We want to be able to look at the map and be able to navigate relative to it," said Horner. "We will be using what is called 'Terrain Aided Navigation' to localize the position of the vehicle without GPS."

And while there are multiple reasons for the Navy and NPS to participate in Arctic research, NPS Research Associate and doctoral student Sean Kragelund seemed to sum up the thoughts of all of the students and faculty members participating in the exercise.

"Participation in ICEX presents a once in a lifetime opportunity to go up and perform really challenging field experiments in an operationally relevant environment. We can take those lessons learned and bring them back and share them with other students at NPS and throughout the Navy," said Kragelund. **IR**



Ice Camp Sargo, located in the Arctic Circle, serves as the main stage for Ice Exercise (ICEX) 2016, housing more than 200 participants from four nations over the course of the exercise. (U.S. Navy photo by MC2 Tyler Thompson)



Space Systems Academic Group Chair Dr. Rudy Panholzer, left, and Research Associate Dan Sakoda stand near one of several structural pieces to NPSAT1 in the university's clean room in Bullard Hall, Jan. 11. The satellite is the product of years of student and faculty research and will carry several experiments from both NPS and the Naval Research Laboratory into orbit when it launches later this year. (U.S. Navy photo by Javier Chagoya)

NPS' Newest Satellite Prepared for Launch

By Kenneth A. Stewart

Students and faculty at the Naval Postgraduate School's Space Systems Academic Group (SSAG) are tentatively scheduled to launch a 3-foot, 180-pound satellite dubbed NPSAT1, as part of the next DOD Space Test Program (STP) mission onboard a SpaceX Falcon Heavy rocket from the Cape Canaveral Space Center, Sept. 15, 2016. The satellite is the product of years of student and faculty research and will carry several experiments from both NPS and the Naval Research Laboratory into orbit.

The primary motivation behind the building of NPSAT1 was education. Some 40 theses and many hours of student and faculty research contributed to the development of the satellite.

"We are not here to build satellites, but the satellite is a nice by-product of the educational process ... We designed it, built it and are testing it in house. We also developed the lab around it, and developed the curriculum that led to its completion," said SSAG Chair Dr. Rudy Panholzer, a 52-year veteran of the university who has been helping guide students through the many theses that culminated in NPSAT1 since the program's inception.

According to Research Associate Daniel Sakoda, the success of the program is largely a product of a systems approach to engineering that has incorporated many disciplines toward the success of the NPSAT1

project.

"It's all about space systems engineering, students can see how all of these components work together ... That's why a systems approach is necessary," said Sakoda.

NPSAT1 is being launched in conjunction with the Department of Defense's STP, which maintains a list of experiments to be launched into space. Researchers can apply to have their experiments incorporated into future launches in keeping with the STP charter, which calls for the organization to get as many experiments into space as possible.

U.S. Army Lt. Col. Thomas Pugsley is an SSAG graduate. He first came to NPS as an Army Space Systems Operations officer in 2005. After a series of increasingly difficult directed studies under current Acting NPS Provost and SSAG Professor Dr. Jim Newman, Pugsley went to work on a thesis that explored the use of Micro-Electro-Mechanical Systems (MEMS) aboard satellites – the NPS Small Satellite Laboratory and NPSAT1 were his classroom.

"Some of my fondest memories were from the time I spent sitting here in the lab solving problems," said Pugsley. "The guys that I studied with then are still here and offer a vast knowledge base that students can draw from."

After graduating from NPS in 2007, Pugsley "exported" his educa-

tion to the U.S. Military Academy at West Point where he started the institution's Small Satellite Research Center. Today, he is back at NPS where in addition to completing his doctoral studies he serves as a co-thesis advisor for SSAG students.

And while the development of NPSAT1 is quite an accomplishment,

Recent Patents Highlight Efforts in Innovation Across Campus

By Kenneth A. Stewart

The Naval Postgraduate School and its innovative faculty have begun to see their hard work bear fruit with a series of new patents highlighting the diversity of student, faculty led research endeavors ongoing at the university.

Recent patents include everything from the development of a novel explosive containment system to a geo-positioning method that relies upon digital television (DTV) signals, as well as an advanced manufacturing process, and an ion thruster for use aboard small satellites.

Kicking off the rash of patented discoveries, NPS Department of Defense Analysis alumnus Lt. Deward Cummings was awarded a patent for his "Explosives Storage System."

Cummings' invention is a technique for building collection points designed to mitigate the effects of Explosive Remnants of War (ERW). It provides a means to safely and securely store collected explosives and has both security and humanitarian implications.

ERW are a global problem contributing to instability in undeveloped and developing regions of the world. They have become a primary component used in Improvised Explosive Device (IED) fabrication, and pose a direct threat to the U.S. and its strategic partners, Cummings explained.

"In spite of the many robust ERW and landmine awareness education programs and disposal efforts, there remains a glaring capabilities gap in global ERW management," said Cummings. "Finding ERW is not the principal problem affecting stability, safely removing and disposing of ERW in a timely manner is."

NPS alumna, Kaylene Carter, along with university faculty Drs. Murali Tummala and John McEachen with the Department of Electrical and Computer Engineering, and Rohan Ramlall, an electrical engineer with the University of California, Irvine, were recently awarded a patent for their "Hyperbolic Positioning Method Using Broadcast Digital Television Signals and Monitor Receiver Ranging."

"I still can't believe that I hold a patent. It's something that I never thought I'd receive, not to mention something that I'd receive in my 20s," said Carter, who led the effort.

The team's invention has both military and civilian applications. And because it utilizes DTV signals to determine a user's location, it may fill a need for accurate positioning data in GPS-denied environments.

"The Navy relies on GPS for everything from targeting to positioning and our adversaries know that. TV signals are always around, and they tend to be global. We can leverage the fact that there are existing signals in the environment to help us locate ourselves in the event that we can't locate ourselves using GPS," explained McEachen.

"This is just part of that agility in the electromagnetic spectrum ... The idea is to stay one step ahead of the adversary. These techniques allow us to be agile and to conduct electromagnetic maneuvers," he

it will not be the first NPS-developed satellite launched into orbit. Former astronaut and Senator John Glenn launched NPS' first satellite, the Petite Amateur Navy Satellite (PANSAT), from the Space Shuttle Discovery in 1998. **IR**

added.

NPS Professor Emeritus Oscar Biblarz and Associate Professor Marcello Romano with NPS' Department of Mechanical and Aerospace Engineering were also awarded a patent for their "Field-Ionization Based Electrical Space Ion Thruster Using a Permeable Substrate."

Their thruster provides a dual satellite propulsion system utilizing carbon nanotubes. The invention has applications aboard small satellites and CubeSats and it can be miniaturized to perform aboard nano- and pico-satellites.

And finally, former NPS Mechanical and Aerospace Engineering student Army Maj. Andrew Johannes with Professors Sebastian Oswald, Luke Brewer and Joe Farmer were recently awarded a patent for their invention, "Method for Additive Manufacturing Using pH and Potential Controlled Powder Solidification."

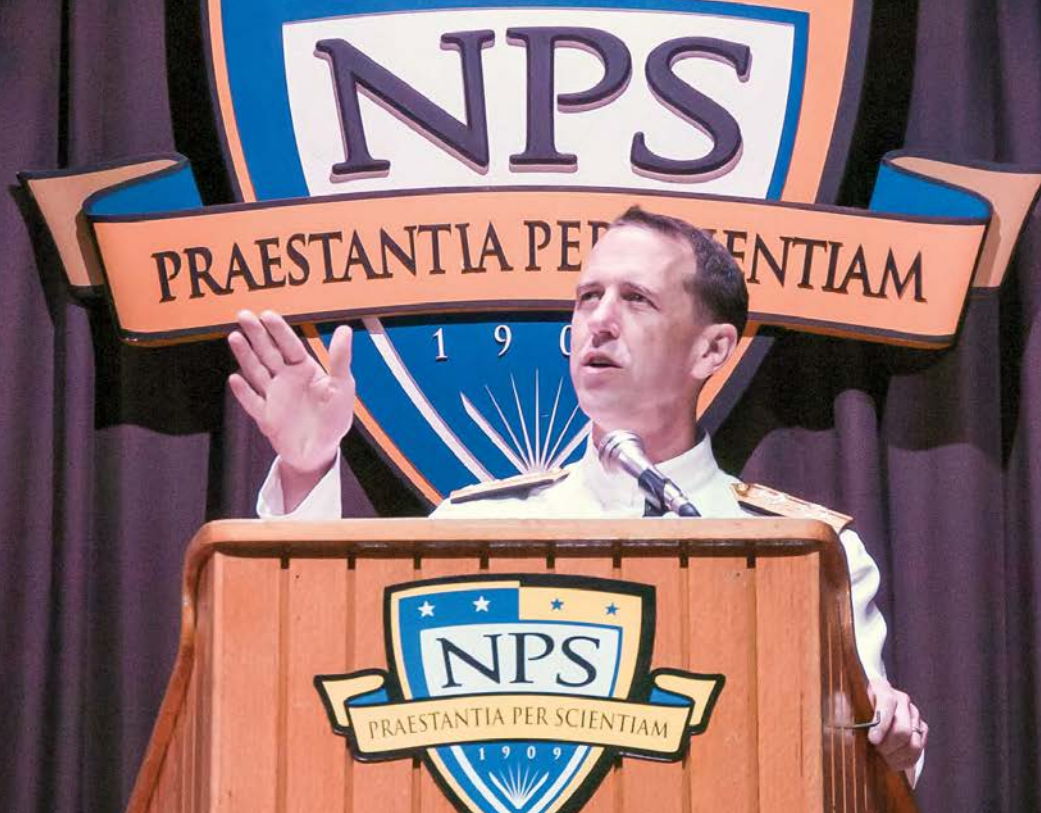
"It feels good to get this patent, it was a culmination of a lot of work, not just by myself but by Drs. Brewer, Oswald and Farmer as well. We were looking at one thing and observed an unexpected phenomenon that eventually led to this patent," said Johannes.

Their invention uses an additive manufacturing process for forming shaped bodies known as Chemically-Driven Powder Consolidation (CDPC) and provides an alternative method for manufacturing that is cheap and efficient.

"It's possible to take a micron-sized powder and add it to a solution and to have that powder turn into a larger object by merely adjusting the pH of the solution. We developed that into a process that allowed us to make several objects that could be used for anything from battery materials to other small parts," Johannes explained. **IR**



Former NPS student Lt. Deward Cummings holds a piece of light-weight, fibrous concrete while conducting thesis research into a recently-patented explosive containment technique. The effort is one of several NPS research projects completing the patent process in early 2016. (Courtesy photo)



Chief of Naval Operations (CNO) Adm. John Richardson addresses graduating students, family, faculty and staff during NPS' Spring Quarter Graduation Ceremony at King Auditorium, June 17. NPS said farewell to 343 graduates including 48 international graduates from 23 nations earning 346 advanced degrees at the ceremony. (U.S. Navy photo by MC2 Michael Ehrlich)

NPS Celebrates Spring Quarter Graduates, Welcomes CNO

By Kenneth A. Stewart

The Naval Postgraduate School said farewell to 343 graduates including 48 international students from 23 nations earning 346 advanced degrees during its Spring Quarter Commencement Ceremony at King Auditorium, June 17. On hand to congratulate the graduating class was Chief of Naval Operations (CNO) Adm. John M. Richardson who served as guest speaker.

"My preparations for this speech began last weekend ... I started by sitting down and reading through your theses," said Richardson. "The sense that comes through them is loud and clear ... This class represents a tremendous addition to the strategic arsenal of our nation.

"The other thing that became very clear from your theses, is that the world is getting far more complex and that its pace is picking up," continued Richardson. "Pace is the one word that I use to describe our strategic environment."

But despite the rapidly changing world in which the Navy operates, Richardson expressed confidence in the graduating class's ability to meet its challenges.

"This school has prepared you. NPS is ideally situated to make the most of this pace, and to make you individual experts in your fields. By virtue of your contributions, the Navy's performance curve will bend upwards," said Richardson.

Richardson also noted the value that NPS brings to the Navy.

"The Naval Postgraduate School is a bright star in the constellation of our Navy's educational institutions. And while there are many graduate schools in the nation, and in the world, the Naval Postgraduate

School is our graduate school.

"This school is focused on our issues, it provides detailed solutions to hard problems, tactical and operational, and it will have a big impact on how our Navy moves forward. It educates to our standards, in our areas of interest. It embraces the sincere self-assessment that is the very first step toward high velocity learning and continuous improvement. And indeed, in every aspect, it operates to our standards of excellence in every way," said Richardson.

Richardson also expressed his gratitude to NPS' "world-class" faculty, pointing to initiatives like the Robodojo, the upcoming Navy "#HacktheSky" Hackathon, the university's world record for autonomous drone flight, and Professor Nita Shattuck's work on shipboard watchbills.

"This faculty has invested deeply in you. When you travel throughout the world, you will carry a piece of them with you," Richardson said. "Today you are all leaving as weapons in our strategic arsenal. You are all strategic assets. You will go off and strengthen our Navy and preserve our maritime superiority."

Richardson assumed the role of Chief of Naval Operations, Sept. 18, 2015. His distinguished career includes, among other assignments, commanding the nuclear attack submarine USS Honolulu (SSN 718). He has also served as Director, Naval Nuclear Propulsion Program, and received the prestigious Vice Adm. James B. Stockdale Inspirational Leadership Award in 2001, among a long list of personal and unit awards. **IR**

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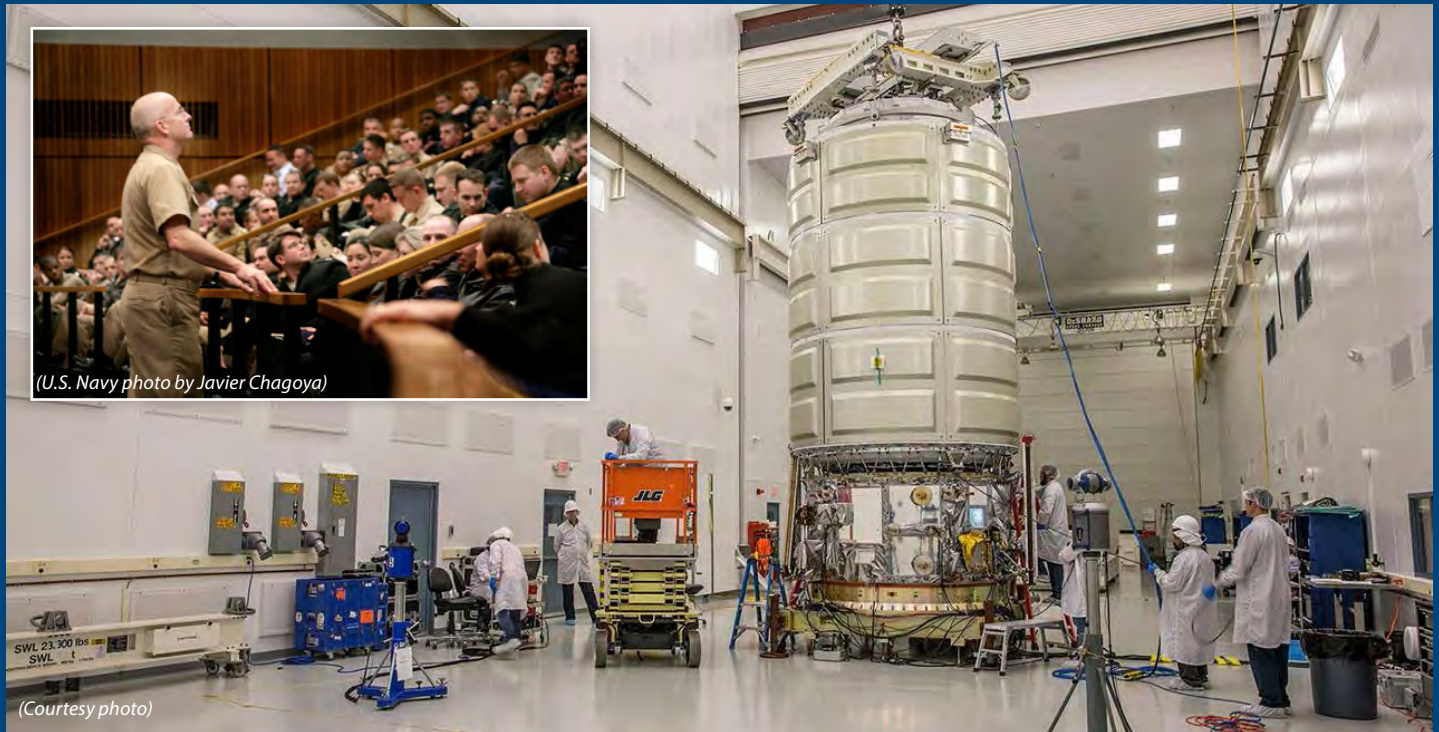
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(Courtesy photo)



(U.S. Navy photo by Javier Chagoya)

(Courtesy photo)

S.S. Alan G. Poindexter

Defense systems and spacecraft manufacturer Orbital ATK recently announced that it will recognize former Naval Postgraduate School Dean of Students and NASA astronaut Capt. Alan “Dex” Poindexter by naming its OA-5 Cygnus cargo spacecraft in his honor. The S.S. Alan G. Poindexter will carry approximately 2,400 kg of supplies and science experiments to the International Space Station when it is launched into orbit in July 2016.

NPS Acting Provost Dr. James H. Newman and current National Reconnaissance Office Chair retired Navy Capt. Daniel Bursch both served with Poindexter at NASA, and at NPS during Poindexter’s tenure as Dean of Students.

“He was one of the great guys that we meet from time-to-time in our lives. When he ended up here at NPS, it was really a treat,” said Newman. “We looked forward to many years of having him here

contributing mightily, as he does to all of the endeavors, to everybody’s benefit. Dex is still missed.”

“[Poindexter] had an amazing combination of personal qualities, usually not found together ... professional, kind, competitive, confident, and a keen sense of humor,” added Bursch. “He fully engaged everyone he met. He was the ultimate family man and I think that passion for his family touched anyone who met him. It was like you were family.”

Poindexter earned a Master of Science in Aeronautical Engineering while attending NPS in 1995.

He was selected to serve in NASA’s astronaut program in June 1998 and went on to fly two space shuttle missions logging 669 hours in space aboard the Atlantis (STS-122) and the Discovery (STS-131).

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