

NAVAL POSTGRADUATE SCHOOL



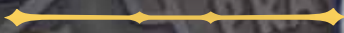
# IN REVIEW



OCTOBER 2009



side:





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

**“Vital to our future is ensuring that all of our constituents — from leaders in the Departments of Defense, Navy, Energy and Homeland Security to international partners and peer universities — are aware of the work accomplished on this campus.”**

# PRESIDENT'S MESSAGE



I have often heard the Naval Postgraduate School referred to as one of DoD's "best kept secrets." Certainly those of us familiar with NPS know it to be a source of cutting-edge research, world-class faculty, and students whose professionalism and commitment are unmatched anywhere. But for those who are not in the know, ours is a story worthy of sharing.

Vital to our future is ensuring that all of our constituents — from leaders in the Departments of Defense, Navy, Energy and Homeland Security to international partners and peer universities — are aware of the work accomplished on this campus. Increasing awareness of NPS' excellence can result in more grants, more competitive recruitment of faculty and staff, and a growing enrollment profile. Increasing awareness can also result in greater funding support as well as beneficial collaborations with other institutions. This was echoed by the recent report from the WASC team that visited the campus in March which stated, "A strong 'brand identity' will be an asset in gaining grant funding and opening doors to partnerships that will strengthen educational programming at NPS."

As part of a total outreach and building awareness effort, NPS has undertaken several initiatives. First, we are improving and increasing the quality and number of our external publications. In addition to an overhaul of our flagship quarterly publication, *In Review*, this past year we produced an extraordinary *View Book* and both items have been distributed broadly to nearly 1,000 military, government and higher education leaders. A recently completed *Factbook at a Glance* gives key facts and figures about NPS in a small, compact document. New display booths are available for use by those attending conferences as exhibitors and NPS is now represented at major naval and military technology conferences throughout the year.

This past September, faculty and students from all segments of the institution traveled to the Washington, D.C. area to share information about their research. This Centennial Showcase was held as an all-day event at the Office of Naval Research in conjunction with the fall meeting of the Board of Advisors. The following day, the Showcase was the highlight of a reception hosted by the Chief of Naval Operations and funded by the NPS Foundation. Nearly 300 people attended that event including Vice Chief of Naval Operations, Admiral Jonathan Greenert. The feedback on this event has been extremely positive and many potentially valuable contacts were made.

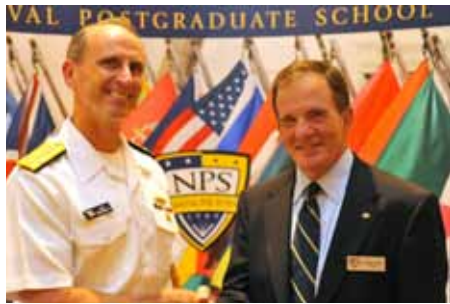
Over the coming year, we will concentrate on more outreach to defense agencies through a variety of means including print, video and by increasing our presence throughout DoD-specific media, military and federal agency journals, and mainstream media outlets. Support for NPS' expanded visibility at conferences will also be emphasized.

Moving forward, NPS will continue to seek out new paths to increase awareness of our superb education and research. Our Centennial year is an appropriate time for us to redouble our efforts to tell the NPS story.

# TABLE OF CONTENTS



Page 10



Page 12



Page 18

## NAVAL POSTGRADUATE SCHOOL IN REVIEW MAGAZINE

### President

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## Features

### 8 Mullen Inducted Into University Hall of Fame

*Chairman of the Joint Chiefs of Staff, Adm. Mike Mullen, becomes the 11th member of the Naval Postgraduate School's illustrious Hall of Fame.*

### 10 FX Program Rapidly Deploy New Technologies

*A new situational awareness tool went from concept to operation in nine months, just one example of NPS' unique Field Experimentation (FX) Program.*

### 12 Centennial Celebrations on Campus and Beyond

*From astronaut alumni returning to their alma mater to a comprehensive showcase of research to top brass in D.C., NPS' 100-year anniversary celebrations continue both on and off campus.*

### 16 New Discoveries in Futuristic Weapons Systems

*University researchers expand efforts in directed energy and hypersonic weapons, some of the next generation of possible naval armaments.*

### 18 Legacy of Adm. Wayne Meyer Lives On

*NPS mourns the passing of legendary alumnus Rear Adm. Wayne E. Meyer, the "Father of Aegis," as the ship bearing his name is commissioned.*

### 20 Marine General Congratulates Summer Grads

*Commanding General of the 3rd Marine Aircraft Wing Maj. Gen. Thomas Conant rallies NPS graduates to use their intellectual capital to the fullest.*

## Departments

### 4 University News

### 6 Faculty Showcase



### ON THE COVER

*During a ceremony in King Auditorium on the university's campus, Adm. Mike Mullen, 17th Chairman of the Joint Chiefs of Staff and a 1985 graduate in Operations Research, becomes the university's latest addition to the NPS Hall of Fame.*

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## Online Human Systems Integration Program Launched

There is a single, common thread amongst nearly every system procured, and every product acquired, by the Department of Defense – no matter what it is, it will be used by people. How these products and systems integrate humans into their operation has become paramount to the acquisition process, and NPS has long been leading the charge in mastering the budding field of Human Systems Integration, or HSI, and is now offering that expertise via a series of online courses.

“You’ve heard of the expression ‘The human in the loop?’” Operations Research (OR) Associate Professor Nita Miller asked rhetorically. “The Department of Defense and other federal agencies are increasingly recognizing that the human is the loop – that people are critical components in any complex system – and that their capabilities and limits need to be researched, documented and inte-

grated if the system as a whole is to achieve optimal performance.”

“As a result, HSI has become a vital aspect in the acquisition of DoD and other federal systems,” added OR Senior Lecturer Lawrence Shattuck. “And though it’s now mandated by many organizations as part of their acquisition process, there are few practitioners who have the actual knowledge, skills and abilities to perform HSI.

“That’s why we created this new distance learning program,” Shattuck continued. “To equip a new cadre of HSI practitioners with what they need to ensure their agencies’ systems are designed, developed and deployed with appropriate consideration for human operators, maintainers and supervisors, making explicit the lifecycle tradeoffs across all HSI domains – manpower, personnel, training and human factors engineering – to optimize total system performance within cost constraints.”

For more information about

the NPS HSI program, go to [www.nps.edu/or/hsi](http://www.nps.edu/or/hsi). For additional information on all NPS DL programs, visit [www.nps.edu/dl](http://www.nps.edu/dl).

## Local College Students Gain Valuable Research Experience

Ever since he was a child, 23-year-old Rodrigo Sanchez knew he wanted to be an engineer. But as a first-generation college student with limited financial support, Sanchez didn’t know how he was going to find the resources he would need to pursue his lifelong dream. While studying at Hartnell Community College in nearby Salinas, Calif. two years ago, however, Sanchez found his answer.

Sanchez applied to Hartnell’s Science, Technology, Engineering and Mathematics (STEM) internship program, which would place him in a research internship at a partnering institution. Sanchez has since spent the past two summers as an intern at NPS working in the school’s Marine Propulsion

laboratory, as well as the Control and Optimization Laboratory.

With the support and experience he gained from working on graduate-level research at NPS, Sanchez went on to become the recipient of the Matsui Foundation Scholarship as well as the NASA-MUST scholarship, which provides him with tuition assistance and a paid summer internship at one of NASA’s space centers. He is currently attending California Polytechnic State University San Luis Obispo this past fall, and expects to graduate in 2012.

For the summer 2009 STEM program, nearly 35 students were placed in 14 research institutions across the state, with NPS and its Cebrowski Institute playing a leading role by hosting almost half of the participating students.

## 9th Annual MOVES Research Summit

NPS’ Modeling, Virtual Environments and Simulations (MOVES) Institute opened its doors to the military, defense

## NPS Hosts AIAA Homeland Security Conference

*Rep. Sam Farr (D-CA 17th), far right, speaks to Operations Research Professors W. Matthew Carlyle (far left) and David Alderson at the Third Annual American Institute for Aeronautics and Astronautics (AIAA) Homeland Security Conference in early September. Supported by NPS’ National Security Institute, the theme of the week-long conference was “Mission Integration” and featured keynote speeches from government and industry leaders, in-depth discussions on emerging technologies, and tours of NPS research labs. Farr, who serves on the House Appropriations Subcommittee for Homeland Security, spoke to attendees during the closing session and urged them to work collaboratively to develop homeland security technology solutions that can be applied at the local level. Farr also highlighted the interconnectedness of NPS and its neighboring institutions, and the significant contributions they collectively provide to homeland security.*



industry and academe at its 9th Annual MOVES Research Summit on the university's campus in Monterey.

"I've been trying to get to this research summit for three years," said Dr. Paul Roman of Canada's Royal Military College, Directorate of Land Synthetic Environments, a conference speaker who is the policy adviser to the Canadian Army on modeling and simulation. "I'm not a gamer and, in the beginning, didn't think games had any serious use in a training environment – I thought gamers were from Mars and trainers were from Venus," he said.

"But then we adapted a tank simulator game for a training exercise, and the results startled me," Roman continued. "We went from 75 percent to 95 percent effective in only about half the time it would have taken for live training alone. We now see virtual world training as the road to high readiness, and that we're at the beginning of an experiential learning renaissance."

Roman's comments are not unlike many throughout the Department of Defense who have come to see the value in utilizing advanced synthetic environments for an expanding range of training and readiness requirements.



"Advances in modeling, simulation and synthetic environments enable us to significantly improve readiness; have a more flexible, adaptive force; reduce risk much

## New Joint Program Develops FAO's Unique Skills

The Joint Foreign Area Officer (FAO) Program held its inaugural in-residence course customized to this rapidly growing community of officers in September. Given a clear mandate from top Department of Defense officials that all services develop their respective FAO programs, this officer community has grown by 50 percent over the last three years, and is projected to continue growing.

Army Col. Robert Duggleby, Defense Attaché in Budapest, Hungary, expressed an appreciation for the program's new-found emphasis on continuing education,

especially given the multi-service representation. "The most beneficial aspect of this program is getting senior FAOs away from their assignments to work in a joint environment," he said. "They brought in a great bunch of FAOs for this. We have been able to help fine tune."

DoD Foreign Area Officers are considered a vital link in Defense Department efforts to promote U.S. goals for stability, community and growth in a challenging world environment. FAO regional, cultural and language expertise supports our nation across the full spectrum of defense missions. FAOs must be able to anticipate and manage emerging crises, support operational commanders, and help guide United States policy implementation.

To sustain professional development and enhance the skills of seasoned FAOs, the Defense Language Office has partnered with NPS to create the Joint FAO Program. This advanced education program includes in-resident instruction at NPS and the Defense Language Institute in conjunction with a wide range of distance learning courses. The online home of the Joint FAO Community is FAOWEB, a dynamic online portal delivering continued education and providing a virtual community environment to network FAOs worldwide.



earlier in the acquisition process; and choose design elements for leap-ahead capabilities without having to buy everything of value," Dr. John Tangney, Director of the Human and Bioengineered Systems Division at the Office of Naval Research.

"It's valuable that these conferences happen here, because NPS doesn't exist within a naval stove-pipe, but serves all the Naval enterprises, other services and international partners with advanced science and technology," Tangney stressed.

For speaker presentations and demo night abstracts from the MOVES Summit, go to <http://www.movesinstitute.org/events.html>.

## Naval War College Monterey Partnership Celebrates 10th Anniversary

The 40th graduating class of the Naval War College (NWC) Monterey partnership with NPS for Joint Professional Military Education stands for a class portrait at the International Flag Garden near Herrmann Hall, marking the 10-year anniversary of the creation of the NPS/NWC partnership.

A total of 70 U.S. Navy, Air Force, and Marine Corps officers, and DoD civilians, earned their NWC Command and Staff diploma with JPME Phase I certification this past quarter, bringing the total number of officers who have

earned this certification since the program's inception to just under 2,000.

Rear Adm. Philip Wisecup, President of the Naval War College, recently visited his Monterey faculty to celebrate the anniversary of the partnership.



# FACULTY SHOWCASE



## DRMI Prof Awarded Fulbright Scholarship

Assistant Professor **Jomana H. Amara** of the Defense Resources Management Institute is a recipient of a 2009 Fulbright Scholarship. “To be able to join the ranks of the Fulbright Scholars, such tremendous achievers, is a great honor,” she said.

Amara will spend a year in Jordan researching hard data in relation to governmental decentralization, the transfer of power over the functions of government



*Jomana H. Amara*

from a single, centralized capital to more individual localities.

“What I hope to do is get on the ground and get detailed measures of decentralization to map the progress of this nation over the past 40 years ... To fully understand the implications of decentralization, if they had indeed decentralized, and what form of decentralization took place,” she explained. “If you’re not actually there knocking on doors, you’re not going to get the data you’re looking for. That’s one of the wonderful benefits of programs like the Fulbright Scholarship.”

The Fulbright Program is considered one of America’s flagship international exchange programs. Proposed by Arkansas Senator J. William Fulbright, and approved in 1946, the program was created

to promote “mutual understanding between the people of the United States and the people of other countries of the world.”

Amara has a B.S. degree in Chemical Engineering and a Masters of Industrial Engineering from the University of Houston. She also received her M.A. and Ph.D. degrees in Economics also from the University of Houston. Dr. Amara joined the DRMI faculty in August 2004.

## Prof Honored with Army’s Wilks Award

Distinguished Professor **Donald P. Gaver, Jr.** of the Operations Research (OR) department was honored as the 2009 recipient of the U.S. Army’s Wilks Award at the Army’s Conference on Applied Statistics, October 19-23 in Tempe, Ariz.

The U.S. Army Wilks Award is given periodically at the applied statistics conference when a deserving individual warrants selection. The recipient is honored for substantial contributions to statistical methodology and application that impacts the practice of statistics in the Army through personal research in, or application of, statistics specifically in the solutions of Army problems. The award was established to commemorate the career of Prof. Samuel S. Wilks,



*Donald P. Gaver*

one of the most notable and honored statisticians in history.

“Distinguished Professor Gaver is most deserving of the U.S. Army Wilks. His receipt of this award enhances the reputation of the Operations Research department and the Naval Postgraduate School. It adds to his already impressive list of awards,” said OR department chair Rob Dell. “Professor Gaver is a member of the National Academy of Engineering and is an elected fellow in all of these organizations: the American Statistical Association, the American Association for Advancement of Science, the Institute of Mathematical Statistics, the Institute for Operation Research and the Management Sciences, and The Royal Statistical Society.”

## Faculty Honors This Quarter

- Assistant Professor **Marcello Romano** of the Mechanical and Astronautical Engineering Department and the Space Systems Academic Group has been elected an Associate Fellow of the American Institute of Aeronautics and Astronautics. “I am honored to join the group of talented astronautical engineers and scientists, several of which are from NPS, who have obtained this national recognition in the past,” said Romano. “I want to dedicate this recognition to my research team, and, in particular, to the NPS student-officers who have been performing their M.S. and Ph.D. thesis research with me since I joined the NPS faculty in 2004.”

- Professor **Peter Chu** of the Oceanography department has been elected as a Fellow of the American Meteorological Society. The society elects fellows based on outstanding contributions to

atmospheric or related oceanic or hydrologic sciences. “I was elected as a Fellow ... for contributions to the understanding of atmospheric and oceanic dynamics and predictability, air-ice-sea interactions as well as the development of new methodologies in analysis of multiparametric observational data and high accurate numerical schemes,” Chu noted. “This honor is bestowed on a small percentage of the most impactful scientists in our community.”

- Operations Research Professor **Jerry Brown** and Associate Professor **Matt Carlyle** won the 2009 Harold W. Kuhn Award for their paper, “Optimizing the U.S. Navy’s Combat Logistics Force.” The Kuhn Award recognizes the best paper published in the journal *Naval Research Logistics* during the last three years.



*Marcello Romano*



*Peter Chu*

# FACULTY SHOWCASE

## Advising on Afghanistan

Faculty at the Naval Postgraduate School include some of the most respected experts in regional and cultural studies in the United States. One of those regions is Afghanistan. As the Obama Administration and leaders across the Departments of Defense and State wrestle with developing strategies to improve the condition of this tumultuous region, faculty at NPS are hoping their expertise can help shape these evolving policies.

“The intellectual capital at NPS is truly unique. It creates an environment that not only provides expertise, but also provides a forum where expertise from other organizations, countries and disciplines can come together and engage in lively discourse,” said Provost Leonard Ferrari. “NPS not only has the ability to provide advice to decision makers, we have a responsibility to do it,” Ferrari emphasized.

Two examples of this kind of advisory expertise occurred this past quarter.

In September, Dr. Karen Guttieri of the Global Public Policy Academic Group (GP-PAG), together with Drs. John Arquilla and Hy Rothstein of Defense Analysis, convened the Afghan Theatre Security Strategies conference, an intimate brainstorming session that brought together top academics, policy experts and de-

velopment strategists to bring new ideas and approaches to the table.

For a full day and a half of the two-day conference, experts in policy, strategy and the regional experts from NPS conferred with leaders from other research universities, NATO, the UK, Geneva and more on some of Afghanistan’s most difficult questions. What is the primary objective(s) of the Afghanistan operation? Are they narrow humanitarian goals or broader institution-building ambitions? Who are the “we” when setting these goals? What are acceptable risks? What timelines govern these ambitions? The questions were varied, and the opinions equally so.

The team will compile the results of their two-day workshop into a report on possible strategies, potential outcomes and fresh perspectives and will deliver that report to DoD and State Department officials currently in the midst of a major re-evaluation of strategy in one of the world’s most significant regions.

Just over a week earlier, the about-to-be commander of NATO’s task force in Kandahar – ground zero for the fight against the Taliban – was at the Naval Postgraduate School for three days of intensive briefs from faculty members freshly returned from the

country and other top experts on Afghan culture and counterinsurgency.

Canadian Brig. Gen. Daniel Menard and a dozen top officers of his Joint Task Force-Afghanistan took time from preparing to take charge of NATO operations in Kandahar, the center of gravity for the Pashtun insurgency, to attend the Conference on Culture and Counterinsurgency in Southern Afghanistan hosted by the NPS Program for Culture and Conflict Studies. Menard’s mission is considered central to the success of U.S. and NATO efforts in the country.

The goal of the conference was to paint a clear picture of the battle space the Canadian Task Force was about to enter, enabling its members to better understand the institutions, organizations and individuals affecting conditions on the ground in their areas of responsibility.

“We’re extremely happy to be here,” General Menard said in his opening remarks. “This conference will definitely enhance our knowledge in these increasingly critical areas, and we’re very much looking forward to the exchanges, both here and in the future.”

In alignment with a recent speech by CENT-COM Commander Gen. David Petraeus that “the key terrain is the human terrain,” a theme of the conference was that, in the war on terror, militaries win battles but counterinsurgencies win wars.

“We all realize that military forces alone will not bring the Afghan conflict to an end,” NPS President Dan Oliver said in opening the workshop. “Canada has been a critical partner in counterinsurgency efforts to clear, hold and build in the southern provinces of Afghanistan. These workshops are a great opportunity for the Naval Postgraduate School and the Canadian Task Force to build upon our shared knowledge and experiences in this critical country.

“Professor (Thomas) Johnson and his team have put together some of the finest experts in the world on southern Afghanistan,” Oliver noted. “This forum truly represents a unique opportunity to wrap your heads around the critical strategic, operational and tactical details as you make your way through the planning and preparation phase of your mission.”



**Thomas Johnson (left), Director of NPS’ Program for Culture and Conflict Studies, offers compelling remarks on the challenges faced by Defense and State Department officials in Afghanistan while Werner Schleiffer of the Conference on Non-Governmental Organizations and NPS Senior Lecturer Hy Rothstein listen.**

# Mullen Inducted Into University Hall of Fame

By MC2 Kellie Arakawa

## *Chairman of the Joint Chiefs of Staff becomes the 11th member of the Naval Postgraduate School's illustrious Hall of Fame.*

Adm. Mike Mullen, chairman of the Joint Chiefs of Staff, was inducted into the Naval Postgraduate School (NPS) Hall of Fame during an all-hands ceremony August 11.

Mullen, an NPS graduate who received his master's degree in operations research in 1985, is the school's 11th Hall of Fame inductee and first alumnus to serve as chairman of the Joint Chiefs of Staff.

Upon receiving the award, Mullen said he was humbled and at a loss for words. "To be able to come back to an institution that both my wife Deborah and I care about so much is indeed special," he said. "In 1983, I never had any vision of anything like this happening."

Special guests at the ceremony included retired Adm. Thomas Fargo, former commander of U.S. Pacific Command; retired Adm. Jay Johnson, former Chief of Naval Operations; and retired Adm. Henry Mauz, Jr., former commander of U.S. Atlantic Fleet and a fellow Hall of Fame member.

During the induction ceremony, NPS President Dan Oliver lauded Mullen's leadership and dedication to higher education.

"His commitment to education in general and to this institution in particular is palpable, and has been of great significance to NPS in recent years," Oliver said. "He is an accomplished naval officer of course, but it is his personal qualities of sincere and thoughtful

intelligence, and proactive and compassionate leadership that have propelled him to become the first NPS graduate in our 100-year history to become the chairman of the U.S. Joint Chiefs of Staff"

Mullen's former thesis advisor, retired Navy Capt. Wayne Hughes, also spoke at the ceremony and recalled Mullen's impressive leadership qualities as a student 25 years ago. Hughes commended Mullen for doing "more to continue the school's value and reputation than any other graduate, senior official or faculty in our 100-year history."

With an opportunity to speak with the entire NPS student population, Mullen then took the time to thank service members in the au-



*Chairman of the Joint Chiefs of Staff Adm. Mike Mullen is inducted into the NPS Hall of Fame, the 11th individual to receive this distinguished honor. Congratulating Mullen are NPS President retired Vice Adm. Dan Oliver (right), Professor Wayne Hughes (left), Mullen's thesis advisor while completing his '85 Operations Research degree, and NPS Chaplain Cmdr. Thomas Hall, who coincidentally was a high school classmate of Mullen's at Notre Dame High School in southern California.*

**“To be able to come back to an institution that both my wife Deborah and I care about so much is indeed special ... In 1983, I never had any vision of anything like this happening.”**

*Adm. Mike Mullen  
NPS '85 Operations Research  
Chairman of the  
Joint Chiefs of Staff*



***Above: Following the ceremony inducting him into the NPS Hall of Fame, Adm. Mike Mullen dedicated several minutes to answer questions directly from the university's students. Officers posed a range of tough questions, from issues relating to Tricare and family support to the current operation in Afghanistan.***



***Adm. Mike Mullen and NPS President Dan Oliver share a laugh as Mullen's thesis advisor, Professor Wayne Hughes, offers a few tales about his former student during the chairman's induction into the university's Hall of Fame. DoD photo by MC1 Chad J. McNeeley.***

dience and called upon the students for their leadership, asking them to take what they've learned at NPS to their next assignments and instill their excitement for change. He also urged students to study leadership in a time of change, "because it is often the most difficult and rewarding kind of leadership"

As he continued his address to the school, Mullen emphasized the importance of reserving time for higher education and training, and said it needs to be embraced across all services. Mullen also recognized the way in which NPS has emerged within a joint environment, and

for its broad recognition not only within the military, but among the federal agencies as well.

Mullen's success, like all 11 NPS Hall of Fame members, only furthers that recognition. "To honor one of our most distinguished alumni at the same time we're celebrating our 100th year of academic excellence makes this an extraordinary moment in the history of NPS," Provost Leonard Ferrari said after the ceremony. "We believe Adm. Mullen's remarkable accomplishments – and those of all our great alumni – speak volumes about the value

of this institution and the quality education our students receive."

The NPS Hall of Fame was established in 2001 to recognize the accomplishments of the school's most distinguished alumni and friends who have made the highest contributions to society, the nation and the school. Other NPS Hall of Fame members include retired Marine Corps Gen. Michael Hagee, former commandant of the Marine Corps; retired Adm. Wayne E. Meyer, the founder of the Aegis technology; and former Secretary of the Army Thomas E. White.

# Field Experimentation Program

## Rapidly Deploys New Technologies

By MC2 Kellie Arakawa



*A ScanEagle Unmanned Aerial System is launched during a recent field experimentation exercise in Camp Roberts, Calif. In less than a year, NPS researchers and students developed a concept for improving the craft's surveillance and situational awareness capabilities, field tested a prototype, and now have it deployed with operating U.S. Marines in Afghanistan. Photo by Kevin Jones.*

Warfighters in the battlefield typically have to wait several years for new technologies to trudge through the defense acquisition and field-testing/evaluation processes. But an expanding effort at the Naval Postgraduate School is changing that. In fact, right now, U.S. Marines on operations in Afghanistan are taking advantage of a brand new surveillance and situational awareness tool that, less than a year ago, did not exist.

For that tool, dubbed SIGEAGLE, those Marines can thank the USSOCOM - NPS Field Experimentation Cooperative, an all-inclusive, campus wide endeavor that unites advanced research efforts through nearly every department into a cumulous quarterly field exercise in Camp Roberts, Calif.

With help from NPS faculty and student researchers involved in the Field Experimentation (FX) Program, the SIGEAGLE went from initial concept to the battlefield in just nine

months, according to Information Sciences Associate Professor Ray Buettner, Director of Field Experimentation at NPS. "The normal acquisition process is about five to 10 years, so we're really proud of this," he said.

SIGEAGLE is part of a project sponsored in part by the National Security Agency and is currently being deployed to Afghanistan. The SIGEAGLE is actually a modified ScanEagle, an unmanned aerial system widely used across the services in the operational theatre. This modified version equipped the ScanEagle with a "Firefly" payload that provides enhanced geolocation capabilities and improved situational awareness. Using the SIGEAGLE, Marine units on the ground can identify enemy radio targets at a much faster rate and with increased accuracy.

According to Buettner, in addition to the SIGEAGLE, nearly a dozen new technologies supported by Field Experimentation research have been moved to the battlefield within the

last year.

"The research done through the Field Experimentation Cooperative really shows that our students and faculty can work with the best in the industry to make a real difference," Buettner stated. "The research-education piece makes NPS unique, and the Field Experimentation Program is really an inherent advantage for NPS ... it may be one of the best field experimentation programs in the world."

The Field Experimentation Program was established several years ago through an agreement between NPS and the U.S. Special Operations Command. Establishing director of the program, Distinguished Professor Emeritus Dave Netzer, built the effort into the interdisciplinary, cumulous operation that it is today, a program that is truly one-of-a-kind in defense relevant research.

"The NPS Field Experimentation Program occupies a unique space; it's not just validating vendor-supplied hardware, nor conducting ex-



**“We typically have about 50 experiments at this event, which include everything from experiments on biometrics to studies on how the first responder and military communities interact. Anyone at the school can participate and conduct studies on anything they want.”**

***Dr. Ray Buettner  
Director of Field Experimentation***

***Dr. Alex Bordetsky, Director of the Center for Network Innovation and Experimentation at NPS, and his team utilize a Bergin Observer UAS (shown inset) during a battlefield medical experiment at Camp Roberts, one of more than 50 experiments conducted during the most recent exercise. The UAS extends communications range, and provides enhanced situational awareness and surveillance capabilities – it is one of several operational assets available to researchers through the NPS Field Experimentation program.***

ercises, however complex. It’s real science and technology, real exploration of new concepts, witnessed by the fact that we have our first two ‘Netzer pre-doctoral Fellows’ doing their Ph.D. thesis research there,” said NPS Vice President and Dean of Research Dr. Karl van Bibber. “But the real secret is that the research there is operationally inspired, and that’s why the work there can get back into the operational theatre so quickly.”

Now headed by Buettner, the program has since expanded significantly, providing greater coordination for field experiments, and creating a comprehensive set of guidelines for research operations at the school.

By providing greater structure and support to its researchers, NPS also hopes to integrate

more of its resources at a cross-campus level.

“FX research here is not just a departmental asset or an institute asset, it’s really a university asset,” Buettner said. “This program provides an overarching framework that will help the outside world see FX as a coherent NPS capability ... this is an alignment of some of our best independent research programs.”

The central feature of the FX Cooperative is the quarterly research event at Camp Roberts where researchers and students from across campus conduct field experiments and collaborate with other universities, military units, government agencies and industry.

Buettner explained that the quarterly field experiment encourages innovation by creating an environment where faculty and students can work collaboratively with each other while accessing a number of resources.

At Camp Roberts, researchers have access to a fleet of manned and unmanned aerial ve-

hicles, ground vehicles, a tactical operations center, restricted air space, and secure networks.

“We typically have about 50 experiments at this event, which include everything from experiments on biometrics to studies on how the first responder and military communities interact,” Buettner said. “Anyone at the school can participate and conduct studies on anything they want.”

For the summer quarter, the Field Experimentation program sponsored a 10-day research event that drew hundreds of participants and observers. Attendees included 146 representatives from local, county, state and federal government agencies; 148 representatives from 46 companies, including Google and Raytheon; 36 people from four other universities (Harvard, MIT, Georgetown and UC Berkeley), and six representatives from three foreign countries.

For more information about the NPS Field Experimentation Program, contact Ray Buettner [rrbuettn@nps.edu](mailto:rrbuettn@nps.edu).

# Centennial Celebrations Cont

From astronaut alumni returning to their alma mater to a comprehensive showcase of research to top brass in

## NPS Showcased in Our Nation's Capital

By MC2 Kellie Arakawa

**Coinciding with the school's fall Board of Advisors meeting, the two-day event served as a platform for NPS students, faculty and leaders to interact directly with representatives from the Office of Naval Research and senior leadership across the Pentagon, intelligence community and Department of Homeland Security.**

Research projects and academic programs highlighted during the two-day event covered every corner of campus, ensuring all four schools were well represented. Senior officials across the D.C. landscape were introduced to everything from rail guns to CubeSats, from arctic ice modeling to improvements in defense acquisition. According to NPS Provost Dr. Leonard Ferrari, the university was indeed well represented.

"Our students and faculty are some of the most talented researchers this country has to offer," said NPS Provost Leonard Ferrari. "And we want to ensure that leaders from the Department of Defense and other government agencies and institutions gain a better understanding of their extraordinary work, which is directly advancing the security and freedom of our country, our international allies, and friends from around the globe."

NPS President Dan Oliver said the showcase was designed to not only highlight the education and research programs at NPS, but to help defense leaders forge new partnerships with the school.

During the opening event on Sept. 9, NPS students and faculty presented several current projects at ONR headquarters.

Dr. Karl van Bibber, NPS Vice President and Dean of Research, said he was very pleased with the depth of engagement between the attendees and students. "Our students are really impressive; their operational experience is most often the inspiration for their thesis research here at the Naval Postgraduate School, and I think the attendees

took away how vertically integrated NPS research is," he said. "It's the whole chain of innovation from basic and applied science through technology, prototyping and field experimentation."

On Sept. 10, the Chief of Naval Operations (CNO) Adm. Gary Roughead hosted a research showcase reception at the Army Navy Country Club in honor of the school's 100th year of academic excellence.

Vice CNO Adm. Jonathan Greenert spoke to attendees and lauded the quality education NPS provides, saying, "the best that I've worked with [in financial management] are graduates of this institution."

Greenert also emphasized the need for DoD to grow more "cyber warriors," and called NPS the Navy's "greatest resource" for developing the country's future cyber leaders.

"NPS is playing a leading role worldwide in establishing joint education training programs, research partnerships, and international forums that bring leading experts and complex problem-solvers together to discuss and develop solutions to the most pressing and urgent global challenges," Oliver stated.

"In this era of the 21st Century Cooperative Maritime Strategy, I believe that the closer you look, the more you will realize that NPS is an extremely effective institution of soft power and support of this strategy."

For more information about NPS research programs, visit [www.nps.edu/Research](http://www.nps.edu/Research).

*"Our students and faculty are some of the most talented researchers this country has to offer, and we want to ensure that leaders from the Department of Defense and other government agencies and institutions gain a better understanding of their extraordinary work."*

*Dr. Leonard A. Ferrari  
Provost, Naval Postgraduate School*



**Above: Following the fall Board of Advisors meeting, members of the board, from left to right, Rear Adm. Nevin P. Carr, Chief of Naval Research; retired Vice Adm. Lee Gunn, Chairman of the Board of Advisors; and Adm. Gary Roughead, Chief of Naval Operations, continue discussions outside the Office of Naval Research. Both Gunn and Carr are Operations Research graduates of NPS. U.S. Navy Photo by John F. Williams.**



**Chief of Naval Operations, retired Vice Adm. Lee Gunn, at a meeting.**

# inue on Campus and Beyond

in D.C., the Naval Postgraduate School's 100-year anniversary celebrations continue both on and off campus.



**Above: Vice Chief of Naval Operations Adm. Jonathan Greenert engages NPS student Air Force Maj. Louis Lussier in conversation regarding his thesis work in typhoon formation; Lussier is a student in the Meteorology department.**

**Top Left: Vice Chief of Naval Operations Adm. Jonathan Greenert stands with President Dan Oliver during the NPS Centennial Showcase reception at the Army Navy Country Club in Arlington, Va. on Thursday, September 10.**



**al Operations Adm. Gary Roughead offers remarks to board members, including the chairman, Adm. Lee Gunn, during the 52nd Semi-Annual Naval Postgraduate School Board of Advisors d at the Office of Naval Research in Arlington, Va. U.S. Navy Photo by John F. Williams.**

## Astronaut Alumni Star in Centennial Air and Space Week

By Barbara Honegger

One-third of U.S. astronauts are graduates of the Naval Postgraduate School, more than any other graduate university in the world, and a large number returned to their alma mater in August for a Centennial Salute to Aeronautics and Astronautics. Astronaut Week, part of the university's yearlong 100th anniversary celebration, honors the history and heritage of NPS contributions to aviation and space exploration.

Joining former astronaut faculty members National Reconnaissance Office Aerospace Chair retired Navy Capt. Dan Bursch and Space Systems Professor Dr. Jim Newman for a star-studded week of seminars, lectures and special events were current astronauts Navy Capts. Alan Poindexter and Steve Frick; and former astronauts retired Navy Capts. Winston Scott and Ken Reightler, Jr.; retired Navy Cmdr. and former NPS meteorology laboratory instructor Mario Runco; retired Marine Corps Col. Dave Hilmers, M.D.; retired Marine Corps Lt. Col. Carlos Noriega; and the group's senior astronaut, Rusty Schweickart. Former astronaut Tom Jones, Ph.D., joined the group one of the days by teleconference.

Frick and Poindexter are active astronauts, with the latter slated to command STS-131 next March; and both Runco and his wife Susan, who accompanied him and is the NPS alumnus of the dual-meteorologist team, work at NASA Headquarters in Houston.

"Director of the Space Systems Academic Group Professor Rudy Panholzer has been trying to do this for 10 years, and it's fantastic he's finally been able to fulfill his dream of inviting all of us astronaut grads back to NPS," said Poindexter.

"This is a wonderful opportunity to come back," agreed Frick, who was Poindexter's commander on STS-122. "This is a great school that really allows you to expand your horizons ... and that means a lot coming from an astronaut."

--continued on page 14

## Centennial Celebrations Continue on Campus and Beyond

--continued from page 13

The historic and information-packed week kicked off with a "Wear Your Flight Suit to Work" Day, Aug. 4. A special guest lecture by former Lockheed "Skunk Works" Chief Engineer Alan Brown on the history of the company's Stealth aircraft design program, and an Astronaut reception on the Quarterdeck followed on Aug. 5. The NPS Astronaut Symposium was held Aug. 6 where Schweickart and guest former astronaut Tom Jones detailed their efforts to protect the Earth from devastating impacts of asteroids like the one that wiped out the dinosaurs 65 million years ago, and a spacecraft survivability panel featuring the pioneering research of retired NPS Prof. Emeritus Robert Ball. A candid and lively exchange by astronaut spouses on the common challenges of astronaut and military families followed. At "Breakfast with the Astronauts," the

"This was a wonderful opportunity to come back. This is a great school that really allows you to expand your horizons ... and that means a lot coming from an astronaut."

*Capt. Steve Frick, USN  
NPS '94*



special guests shared their experiences living and working in space and projected photos taken from the Space Shuttle and International Space Station onto the walls of the Barbara McNitt Ballroom for NPS person-

nel and their families. A gala California International Air Show dinner that evening had the Astronauts joined by 14 members of the Navy's Blue Angels flight demonstration team, and a number of the astronaut alums were honored at the Air Show, Aug. 9.

Hilmers received a master's degree in electrical engineering from NPS in 1978; Reightler, Scott, Frick and Poindexter all earned master's degrees in aeronautical engineering, in 1984, 1980, 1994 and 1995, respectively. Noriega was awarded an M.S. in computer science in 1990, and Bursch received his master's degree in engineering science in 1991.

Until recently, Bursch held the record for the longest continuous duration in space by an American astronaut, of over 226 days. Other U.S. Space Program alumni include the second American to orbit the Earth, Mercury 7 astronaut retired Navy Cmdr. M. Scott Carpenter and retired Navy Capt. Eugene Cernan, commander of Apollo 17 and the last man to walk on the Moon.

As Carpenter said during a recent teleconference with NPS leadership and Space Systems Academic Group faculty and students, "It's wonderful that the Naval Postgraduate School has such a strong space program, for both engineers and operational students, and that the magic of space flight has caught on here."

"NPS continues to be on the forefront of educating America's astronauts," said Alumni Relations Office and Centennial Planning Headquarters Director Kari Miglaw. "As a leader in space education and research, NPS paves the way for future astronauts to pursue their dreams."

For more information about NPS Air and Space Week and other Centennial events, go to [www.nps.edu/100](http://www.nps.edu/100).

*To the faculty and staff of the Naval Postgraduate School*

*Returning to NPS for the Centennial Salute to Aeronautics and Astronautics has caused me to reflect upon the tremendous impact that the school, its faculty and staff have had on the course of my life. During my stay here, I was exposed to an environment that encouraged creative thinking, scientific curiosity, and teamwork. Shortly after NPS, the training and degrees that I received allowed me to successfully compete for a position in NASA's astronaut corps. During my 12 years as an astronaut, the rigorous thought process instilled in me at NPS was often needed while trying to assimilate the technical aspects of diverse experiments, flight procedures, and shuttle systems. On several of my space flights, in-flight maintenance was required for unforeseen system failures. The ability to interpret schematics and repair electrical equipment, which was honed in the labs at NPS, was an extraordinarily important skill.*

*After leaving the Marine Corps and NASA, I pursued a new career in medicine and after finishing medical school and residency, I have continued to utilize the training I received at NPS. I am now involved in international research and humanitarian relief as well as teaching at the Baylor College of Medicine. Once again, the same principles of logical thought have been used as I teach students and resident-physicians to treat the sick and better the lives of those less fortunate. I owe a great debt to the many professors and staff at NPS who gave me the tools to contribute at NASA and the Baylor College of Medicine to the betterment of an increasingly more technologically complex world.*

*I salute each one of you and wish you another 100 years of success.*

*With great regard,*

*David C. Hilmers, MD, EE, MPH*

*Degree of Electrical Engineer, NPS, 1978*

*Master of Science in Electrical Engineering, NPS, 1977*



ASTRONAUT SYMPOSIUM  
6 AUGUST 2009





**Above:** An aspiring astronaut shows off his newly signed collector card to his father while Navy Capt. Alan Poindexter (left) signs a poster for the family. Poindexter, a 1995 graduate of NPS, is an active astronaut, and will be commander of the Space Shuttle Atlantis mission, STS-131, slated for launch in March of 2010.



**Right:** Former NASA astronaut and NPS alumnus retired Navy Cmdr. Mario Runco shares his experiences living and working in space with kids at the fun-filled and informative “Reach for the Stars” Astronaut Breakfast during NPS’ Centennial Salute to Aeronautics and Astronautics Week.

*“NPS continues to be on the forefront of educating America’s astronauts. As a leader in space education and research, NPS paves the way for future astronauts to pursue their dreams.”*

*Kari Miglaw  
Director, NPS Alumni Relations*

## Stealth Pioneer Shares the Story of ‘Skunk Works’

By Barbara Honegger

The Naval Postgraduate School turned a spotlight on a now declassified deep corner of the “dark side” with a special keynote lecture by Stealth pioneer Alan Brown as part of the university’s Centennial Salute to Aeronautics and Astronautics during Air and Space Week. The dapper gentleman with a British accent probably wasn’t what the audience expected for the founding chief engineer of America’s secret Stealth program, but the fast-paced, information-packed talk quickly put any doubts to rest.

Sporting a cartoon-skunk tie and matching wristwatch – bearing the logo of Lockheed’s famous “Skunk Works,” the unofficial name for the company’s Advanced Development Projects – Brown served as deputy program manager for the pioneering low-observable “Have Blue” research aircraft and then program manager and chief engineer for the F-117A Stealth Fighter jet through production of the first aircraft. In 1982, he was elevated to Director of Low Observable Technology, a real life incarnation of James

Bond’s technology genius Q.

Brown reviewed the history of the nation’s first radar-invisible aircraft, noting that the thrust and origin of the program came from the need for U.S. bombers to be able penetrate the defensive radar systems of the Soviet Union undetected.

“The philosophy and guiding light of the early spy plane program – which was completely ‘in the black’ up to 1971, even to DARPA [the Defense Advanced Research Projects Agency] – was to get [an aircraft with] a low radar cross-section combined with high speed and altitude,” he explained. “The original U-2 spy planes weren’t at all stealthy and were quickly followed in the mid ‘60s with a definite attempt to reduce the radar cross-section in a new high-speed, high-altitude design. This resulted in the SR-71, on which we secretly worked under CIA auspices.

“In 1971, DARPA realized our planes weren’t able to penetrate Soviet defenses and that something drastic needed to be done, such as coming up with an essentially invis-

ible [to radar] aircraft ... The goal was to prove that a real, manned, jet-powered aircraft with tactical operational and weapons delivery capabilities could have a very low radar cross-section. And we did,” Brown noted, proudly. “When we were done, the F-117 Stealth fighter looked the size of an insect or a bird [on enemy radar].

“The solution was to consciously sacrifice aerodynamic performance and speed ... for low radar visibility, resulting in the now-famous dark and angular craft that look like they’re straight out of an episode of ‘Star Wars.’ We ended up actually designing it to be unstable but under the absolute, redundant control of the flight control system,” he continued.

“This was also probably the last military aircraft to be designed completely using pencil and paper,” Brown recalled with a hearty laugh. “Looking back from the perspective of today’s computer world, I’m not sure how we did it – but we did.”

# NPS Enters an Era of **New Discovery** in Future Weapon Systems

By MC2 Kellie Arakawa

**“Hypersonic and directed energy weapons have the potential to profoundly influence future maritime operations ... They will likely change the Navy’s contributions to joint forces at the tactical and operational levels of warfare.”**

*Adm. Gary Roughead  
Chief of Naval Operations*

Throughout the history of military service, there are few, perhaps only a handful of discoveries and new inventions that completely changed the way forces operate, strategically and operationally. When the musket became part of the infantryman’s standard issue, common sense dictated what impact it had on the sword. As cruise missiles became an integral part of the naval fleet, strategies and concepts of operations of how a ship can support conflict completely changed. Delivering energy fast, accurately, and at a safe distance has been a continuing theme in weapons development.

The next discovery just may be upon us. Directed energy and hypersonic weapons could very well be the next era of naval armaments – at least that’s what Chief of Naval Operations Adm. Gary Roughead thinks.

“Hypersonic and directed energy weapons have the potential to profoundly influence future maritime operations,” he noted. “They will likely change the Navy’s contributions to joint forces at the tactical and operational levels of warfare.”

Two professors at the Naval Postgraduate School would probably agree with Roughead’s assessment, and with the help of several students and researchers, are examining advanced high-energy technologies that would revolutionize maritime warfare over the next few decades.

Physics Professor Bill Colson and Senior Lecturer Bill Maier are working on directed-energy research, bringing two futuristic weapons to fruition – the free electron laser (FEL) and electromagnetic rail gun (EMG), two ground-breaking systems that could very well be integral components of future naval vessels.

“These are futuristic weapons,” said Colson. “But if these work as we think they will, they

are going to revolutionize the way ships defend themselves ... as revolutionary as guns were to swords.”

Colson is referring to a concept he has been working on for several years, utilizing a high-energy free electron laser for shipboard defense.

“The FEL is a speed of light weapon,” Colson explained. “We can ‘see’ threats at the speed of light thanks to advanced radar systems; directed energy will deliver lethal power to destroy those threats also at the speed of light ... there will be no effective evasive maneuvers.”

In addition to the speed of the system, it’s accuracy is quite impressive. “The FEL is a ‘surgical’ weapon,” said Colson. “We don’t just track and hit an incoming missile in flight,

we hit a specific part of that missile that most readily leads to its destruction.”

And Colson’s research is about to enter a new era at NPS. Colson, who has been conducting studies on free electron lasers for more than 20 years, recently led the NPS acquisition of Stanford University’s FEL. With an actual FEL on campus, Colson, his students and other researchers can test their ideas using actual cutting-edge technology on campus, in addition to leading collaborations with other laboratories and industry.

Earlier this year, FEL researchers successfully demonstrated the first test firing of the injector cathode of the Stanford FEL. NPS President Dan Oliver fired the first official test shot with Provost Leonard Ferrari and the Dean of



*It may look like a small and simple collection of bolts and metal, but NPS researchers use this futuristic electromagnetic rail gun to accelerate a projectile to velocities several times the speed of sound. A high-speed camera caught a recent test firing, shown inset.*



**Students and faculty review the recently acquired free electron laser prior to a test firing in its new dedicated directed energy laboratory. NPS faculty expect the FEL to be placed into the Innovative Naval Prototype (INP) program, an endeavor where the Office of Naval Research dedicates 10 percent of its annual budget to advanced research on futuristic technologies.**

the Graduate School of Engineering and Applied Sciences also in attendance.

Equally advanced, and equally revolutionary, is Bill Maier's research into the electromagnetic rail gun. With an EMG, projectiles slide along two fixed rails and are accelerated by passing a high current down one rail, through the projectile, and back down the other rail.

Navy rail gun systems in development nominally use currents as high as six million amperes to produce 35,000Gs of acceleration over 10 meters. In Maier's lab on the NPS campus, a current of about 300,000 amperes produces a projectile acceleration of about 500,000Gs over a distance of less than one foot, to velocities several times the speed of sound.

Unlike the FEL, which is primarily a defensive weapon, this futuristic, hypersonic weapon has the real possibility of replacing medium range offensive cruise missiles for some DoD applications.

"The rail gun is designed for targets within the range of approximately 200-300 nautical miles," explained Maier. "It might take 15 to 20 minutes for a cruise missile to reach a target at this distance, whereas a rail gun projectile might only take six minutes or so to reach the target. And, as opposed to just one cruise missile, you could launch maybe 10 rail gun pro-

jectiles in a very short time."

Rail gun projectiles require no explosives, the energy of the projectile's impact at hypersonic speeds is enough to cause sufficient damage to the target. Projectiles will, however, require some sort of self-guidance system incorporated given the long distance they will travel.

Although rail gun research is conducted at several labs and universities, Maier and his students are conducting what he described as "innovative research" on ideas and designs for the futuristic weapon. This past summer, Maier and his team tested the design of a round barrel, which would be much cheaper to both construct and maintain.

Also, another benefit both proposed weapons share is that neither one requires chemical propellants of any kind. Instead, as Maier notes, the ship's existing fuel is used to power the generators for both the rail gun and FEL, making it safer for the sailors onboard, who are at greater risk if a ship with a high volume of explosives is hit by an incoming target.

And the potential cost savings for these new breakthrough weapons is extraordinary. A medium range cruise missile can cost anywhere from \$500,000 to \$1 million, each – while a rail gun projectile would cost on the order of about \$10,000. And given their smaller size, ships can

easily store and manage a large amount of rail gun ammunition.

With the free electron laser, the cost savings are even more incredible. As Colson notes, since the ship's usual fuel source powers the generators for the FEL, the cost for firing the laser equates to maybe, "a couple of gallons of the ship's fuel."

In support of directed-energy research, the Naval Postgraduate School will be opening a new dedicated laboratory designed to support the FEL program later this year. Currently, more than a dozen students are conducting their thesis work on the FEL and rail gun.

In 2008, the rail gun was officially named an Innovative Naval Prototype (INP) by the Office of Naval Research, and by 2010, the FEL will also be named an INP. These designations are a testament to the priority the Navy has placed on these new systems. Colson and Maier, who teach one of the only classes dedicated to FEL and rail gun technology anywhere, hope to see their respective research ready for shipboard testing by 2020.

For more information about the FEL and rail gun programs, visit [www.nps.edu/academics/gseas/physics/weapons.html](http://www.nps.edu/academics/gseas/physics/weapons.html).

# Historic Legacy of Hall of Fame Alumnus **Adm. Wayne E. Meyer Lives On**

By Barbara Honegger

**T**he Naval Postgraduate School mourned the passing of one of its greatest Hall of Fame Alumni, “Father of Aegis” Rear Admiral Wayne E. Meyer, Sept. 1.

The Aegis is the Navy’s primary ship air-defense weapon system that revolutionized how it performs air defense. As founding manager of the Aegis Shipbuilding Project, Meyer was responsible for the construction of all of the Navy’s current ballistic-missile defense cruisers and destroyers – 89 ships built or in construction with more in planning – one of the largest and longest shipbuilding programs in naval history.

“I am deeply saddened by a great loss to our Navy family,” Chief of Naval Operations Adm. Gary Roughead said in hearing of Meyer’s passing. “Rear Admiral Meyer’s passion, technical acumen and warfighting expertise serve as the foundation of our Navy combatant fleet today. His legacy will remain in the Navy forever.”

Indeed, had he lived but another two weeks, Meyer would have witnessed the world-historic announcement by President Obama of his new missile defense system for Europe whose very heart is the Aegis. On Sept. 17, the President said the initial stage of his new sea-based plan would use Aegis ships armed with interceptors stationed near Europe, and ten days later Vice Chairman of the Joint Chiefs of Staff Marine Corps Gen. James Cartwright confirmed the Navy was studying a plan to use up to six Aegis-armed vessels as the foundation of the system.

“In addition to being the ‘Father of Aegis,’ Wayne Meyer was also an intellectual of great



**Rear Adm. Wayne E. Meyer dons his Hall of Fame medal during his induction ceremony on February 23, 2006. Meyer, a baccalaureate graduate from NPS in electrical engineering, is widely recognized as the “Father of Aegis,” a revolutionary air-defense system carried on now 100 naval vessels.**

force and a strong supporter of graduate education for naval officers,” said NPS President Dan Oliver. “We are all very proud to have his name on our Wayne E. Meyer Institute of Systems Engineering and to have him as a member of the NPS Hall of Fame.”

“Admiral Meyer was keenly interested in the role the Naval Postgraduate School has played and continues to play in the technical

education of our young naval officers,” said Meyer Institute Director retired Rear Adm. Paul Shebalin. “He felt strongly that by understanding the underlying science and engineering, NPS-educated officers could make a real difference in the design, acquisition, maintenance and operation of effective Naval warfare systems.”

“A great part of Admiral Meyer’s legacy

was inculcating an enduring tradition of systems engineering at the Naval Postgraduate School,” recalled NPS Vice President and Dean of Research Karl van Bibber. “My hope is that, from among the ranks of our students today – many of whose research is affiliated with his namesake Meyer Institute – will arise visionaries like Wayne E. Meyer who will effect similar transformational changes for our future naval systems.”

“Wayne Meyer was a model of effective warship and system design for us all to emulate,” agreed NPS Senior Lecturer and renowned naval warfare expert Wayne Hughes. “He recognized the value of the Naval Postgraduate School in preparing both our seagoing officers and engineering duty community officers for service in what he saw as ‘his’ Navy.”

After the ceremony inducting him into the NPS Hall of Fame on Feb. 23, 2006, Meyer did a videotaped interview in which he looked back on his time at the Naval Postgraduate School and its importance for his career.

“There’s no doubt in my mind that NPS

helped shape me a lot,” Meyer. “The Navy needs to create and nurture its intellectual capital, and that’s exactly the purpose of the [Wayne E. Meyer] Institute here at NPS.”

Meyer was born in Brunswick, Mo., on April 21, 1926. He graduated from the University of Kansas with a bachelor’s degree in electrical engineering in 1946. In addition to his degree in electrical engineering from the Naval Postgraduate School and attendance at the Naval Line School in Monterey, Calif., Meyer earned a master’s degree in astronautics and aeronautics from the Massachusetts Institute of Technology.

As part of a distinguished naval career, in 1970 the Navy chose then Capt. Meyer to lead the development of the new Aegis Weapon System at the Naval Ordnance Systems Command. In Jan. 1975, he was promoted to rear admiral and in two years assumed duties as founding project manager of the Aegis Shipbuilding Project.

In 1977, Meyer was designated a Pioneer in the Navy’s Acquisition Hall of Fame at the Pentagon. In 2008, he was the recipient of the

sixth annual Ronald W. Reagan Missile Defense Award.

But the ultimate honor was to have a ship of “his” Navy named after him.

In Nov. 2006, the Secretary of the Navy announced that DDG 108, an Arleigh Burke class destroyer, would bear his name. Christened last Oct. 18, it utilizes the same Aegis combat system he had shepherded through development, including a SPY-ID multifunction phased array radar. When the ship was commissioned on Oct. 10 in Philadelphia, the Navy gained a proud, state-of-the-art, multi-mission warship capable of leading the Navy into the future.

Meyer will be on board in spirit. Were he able to be there in the flesh, he would surely repeat what he said at the christening: “This is one of the proudest moments in my life. You can do whatever you want to with this ship, but remember – I’m still alive!”

Indeed, Rear Adm. Wayne E. Meyer’s legacy – not just to the nation, the Navy or the Naval Postgraduate School, but to the world – lives on.



# Marine Air Wing Commander Congratulates Summer Grads

By Barbara Honegger

Commanding General of the 3rd Marine Aircraft Wing Maj. Gen. Thomas Conant rallied 255 Naval Postgraduate School graduates to use their intellectual capital to the fullest in their continued careers at commencement ceremonies in King Hall, Sept. 25.

“I’m honored to be here on behalf of [Marine Corps Commandant] General Conway [who succeeded NPS Hall of Fame alumnus Michael Hagee],” said Conant, himself a graduate of the Aviation Safety School, then located at NPS. “Not only does the future reside in education, but the highest and best use of the present resides in education as well.”

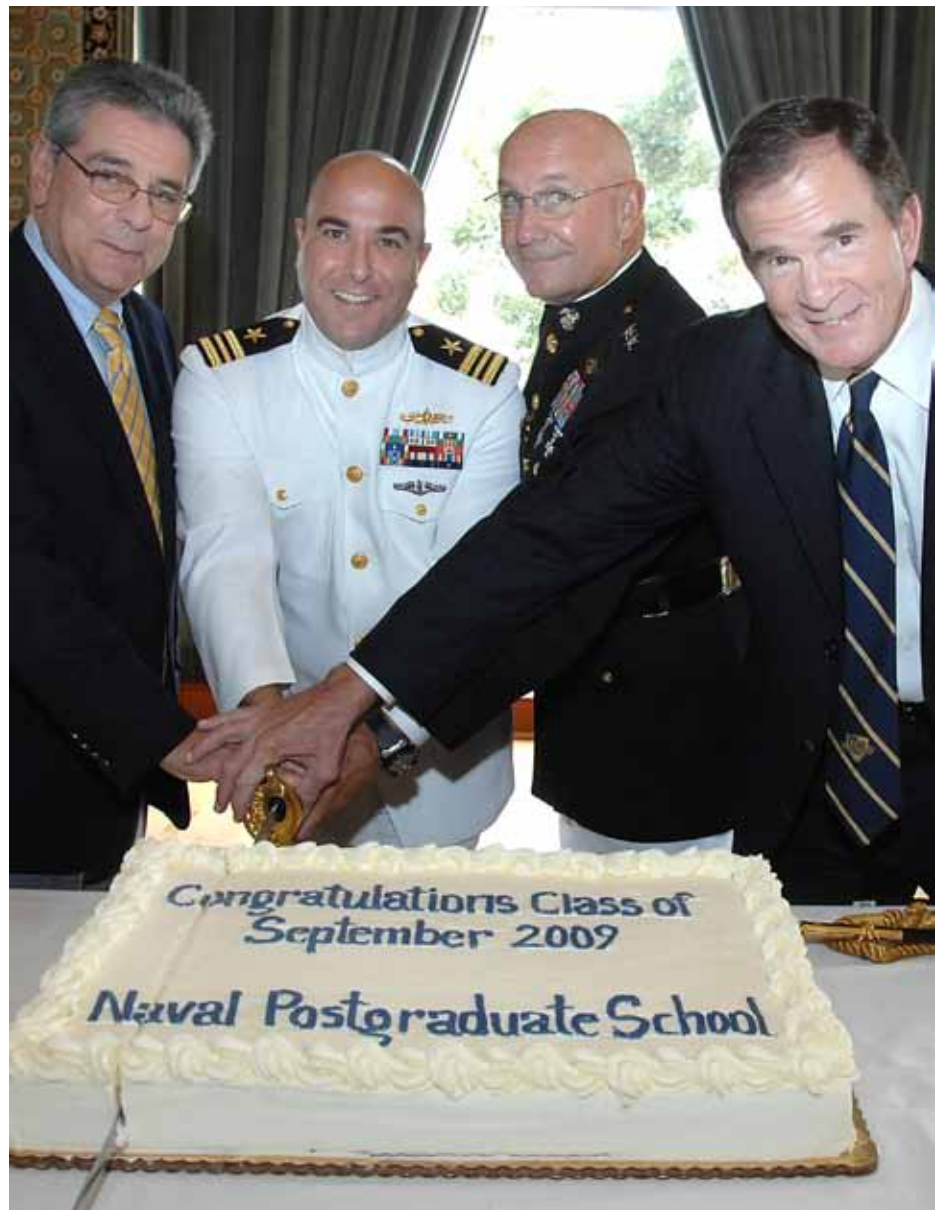
Conant called upon the graduates to “rise to the moral imperative to continue to find new and innovative ways to provide the resources needed by our fighting forces engaged in combat. Who among you will find the solution to lighten the load of our infantrymen, so they will no longer have to rely on the standard, heavy battery pack? Who among you will find a counter to the IEDs [improvised explosive devices] that threaten their lives and limbs? Finding solutions to such simple but challenging questions is and remains all of our responsibility.

“May we continue to be blessed with the intellectual capital that you represent as you walk across the stage today,” Conant concluded.

The Summer 2009 graduating class included 147 officers from the Navy, 29 from the Marine Corps, one from the Marine Corps Reserve, 38 from the Air Force, six from the Army, two from the Coast Guard, and 22 from allied and coalition partner nations; as well as 93 Department of Defense civilians. Three hundred forty-five degrees were conferred, including eight Ph.D.s, 211 Masters of Science, 58 Masters of Arts, 65 Executive Masters of Business Administration, two Master of Business Administration, one Electrical Engineer, one Mechanical Engineer, and eight dual degrees. Eighty two students – a growing number in distance learning programs – received their degrees in absentia.

Following the ceremony, the graduates and their family members gathered in the Barbara

--continued on page 22



Lt. Cmdr. Jon Letourneau (second from left), a rare recipient of four class awards for highest academic achievement, cuts the ceremonial cake at a reception in the Barbara McNitt Ballroom following graduation ceremonies. He was joined, left to right, by Provost Dr. Leonard Ferrari, keynote speaker Marine Corps Maj. Gen. Thomas Conant and President Dan Oliver.

# Professor Honored for His Role in Creating the Modern Internet

By Monica Guzman

It all started as an effort to provide affordable network resources to research universities. Four professors from different universities, including NPS Computer Science department Chair Peter Denning, fervently believed that the quality of their education would multiply manifold if all the CS departments were connected. Little did they know it at the time, but the result of their efforts, the Computer Science Network or CSNET, would prove to be one of the first building blocks to what is now the modern-day Internet.

“It was the first step of the journey. We pulled it off and it was done well,” Denning said, who was chair of Purdue University’s Computer Science department at the time. “It feels nice to be recognized for all that work, but we weren’t looking for recognition, just a good network.”

That recognition came this past July 29, when the four principal investigators of CSNET, including Denning, were honored with the 2009 Internet Society’s Postel Award. The award, a crystal engraved globe, is named after Internet pioneer Jonathan B. Postel and recognizes those who have made outstanding contributions in service to the data communications community.

Before CSNET there were few networks. ARPANET, the defense-based network that started the Internet, was the gold standard according to Denning; it was the most advanced and dependable. A runner up was the Usenet, an ad hoc network that copied mail and news among UNIX computers, which Denning described as “flaky.” Unlike ARPANET, which automatically routed packets to their destinations, Usenet required users to spell out the ex-



**Computer Science department Chair Peter Denning, along with several colleagues, was honored with the Internet Society’s 2009 Postel Award for their creation of the Computer Science Network or CSNET, one of the early building blocks to the modern day Internet.**

act path for a message to reach its destination. Errors in path names and broken computers connecting them resulted in frequent disconnections and lost messages.

ARPANET was coveted by many CS research universities, but it was an exclusive club. According to Denning, a university needed a DoD contract and \$120,000 annually to connect ARPANET. “Not only was it hard to get a DoD contract, the connection price was nearly one million in today’s dollars,” said Denning.

In 1979, a handful of computer science department chairs from different universities brainstormed on how to get ARPANET access to their own universities, but the effort seemed hopeless since many lacked the funds.

“We didn’t like the advantage enjoyed by the few ARPANET universities and we wanted

to change that,” Denning said. “We hatched the idea of building our own network. Kent Curtis, the National Science Foundation (NSF) representative at the brainstorming meeting, said that the NSF would be open to considering a proposal from us. This started the CSNET idea.”

It took two years for the four PIs to create a thorough and convincing proposal, finally accepted by the NSF Board in 1981. The NSF board approved \$5 million on a five-year contract and stipulated that CSNET must attain self-sufficiency by the end of the five-year term.

CSNET launched, offering two options for connectivity. The cheap connection was through an ordinary phone line, which was

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McNitt Ballroom for the cutting of the class cake. Joining President Dan Oliver, Provost Leonard Ferrari and Conant for the honors was the recipient of four top awards for academic achievement and excellence in engineering, Lt. Cmdr. Jon Letourneau.

Letourneau received the prestigious Monterey Council of the Navy League Award for Highest Academic Achievement, Naval Postgraduate School Outstanding Academic Achievement Award for Department of Defense Student, Naval Sea Systems Command Award in Naval/Mechanical Engineering, and the Northrop Grumman Student Award for Excellence in Systems Engineering.

The previous week, NPS' leadership recognized four faculty members and 35 students for exceptional instructional and academic achievement at the university's Summer Quarter 2009 Awards Ceremony officiated by Dean of Students Capt. Janice Wynn, also in King Hall.

Operations Research Associate Professor Thomas Lucas received the prestigious Richard W. Hamming Teaching Award, presented to a faculty member whose contribution to student learning has been demonstrated both in and out of the classroom through excellence in instruction and thesis advising. Lucas routinely ranks among the highest-rated professors in student classroom teaching evaluations and has won numerous other teaching awards at



**Several of the summer quarter's award winners gather following the presentation ceremony on September 15. A total of 35 students and four faculty were highlighted for academic and teaching excellence during the proceeding. For a complete list of summer quarter award winners, visit the NPS Web site at [www.nps.edu](http://www.nps.edu).**

both NPS and the National University of Singapore (NUS), where he regularly teaches as part of a joint NPS-NUS program. He also co-directs the NPS SEED Center for Data Farming, which he helped form to support and mentor student thesis research.

The Rear Admiral Wayne E. Meyer Award for Teaching Excellence in Systems Engineering (Distance Learning) went to two faculty members – Research Associate Professor of Information Systems John Osmundson and Systems Engineering Lecturer Gregory Miller.

Osmundson has published more than 35 refereed journal articles, book chapters and conference papers in the past five years. His most recent research is on emergent behavior

in the North American power grid and the collateralized debt obligation market. Miller has published over 10 papers in the fields of command and control and systems engineering. He teaches courses in C4I, weapons and sensor systems, software engineering, and architecting.

Senior Lecturer of Management Don Bonasper received the Lieutenant Commander David L. Williams Outstanding Professor Award of the School of International Graduate Studies (SIGS). The award is presented to the SIGS faculty member who has demonstrated the greatest dedication, and therefore had the greatest impact, on the intellectual growth and learning of students, both in residence and abroad.

--continued from page 21

quite slow but cost only a monthly phone bill and a mail relay computer.

The more expensive connection provided the ARPANET protocol, TCP/IP, on top of a commercial data network, GTE Telenet. The basic connection cost for Telenet was about \$5,000. Packet charges for a moderately busy university brought the annual total to about \$20,000, still far cheaper than the ARPANET connection cost.

The CSNET team continued its build-up and indeed achieved that self-sufficiency in 1986, the end of the original contract. And by that time, CSNET served about 50,000 faculty and students at 165 universities and research labs. "This was a remarkable achievement," said Denning, "Since we had to organize a consortium, collect annual dues, provide a coordination center, work out bridging agreements with ARPA, and work out operating policies – in addition to the technical work. At the beginning, we didn't even know if we could accomplish all that. But we did."

In 1988, CSNET merged with BITNET, a network connecting IBM computer installations. This greatly increased the number of participat-

ing universities, many of which had IBM machines in their computing centers.

Its confidence buoyed by the success of CSNET, NSF in 1986 started its own network, NSFNET, to connect its supercomputing centers and their regional networks – many CSNET alumni helped. By 1990 all the members of CSNET were integrated into NSFNET, and CSNET was disbanded, less than one year after the ARPANET was disbanded for the same reason.

But according to Denning, this was a quiet and appropriate transition. "We served our purpose. We created a good, self-sustaining community network, and from that came along an even better network," he said.

Nearly 30 years later, the founders are still dedicated to advancing the Internet, choosing to donate the prize money to charitable organizations including the Electronic Frontier Foundation, the Electronic Privacy Information Center, and the Central Asia Institute.



# NPS CENTENNIAL YEAR

The Celebration Continues

May 2009 - May 2010

**CENTENNIAL YEAR  
AT NPS**  
• • •  
**Time Capsule Dedication**  
January 2010  
**Centennial Park Dedication**  
April 24, 2010  
**Centennial Finale Celebration  
and Alumni Reunion**  
May 27 - 31, 2010

**CENTENNIAL FINALE**  
*Celebrating the Past, Defining the Future*

**Thursday, May 27**  
Education Review: *The Future of Aeronautics and Astronautics*

**Friday, May 28**  
Alumni Reunion, campus activities and tours  
Evening wine and beer tasting event

**Saturday, May 29**  
Centennial Finale Gala: *The Best is Yet to Come*

**Sunday, May 30**  
Champagne Brunch

**Monday, May 31 - Memorial Day**  
Service of Remembrance  
Concert on the Lawn and Community Non-Profit Fair



For more information and event registration visit  
[www.nps.edu/100](http://www.nps.edu/100)  
(831) 656-2077      [alumni@nps.edu](mailto:alumni@nps.edu)



## A Legend Remembered

On September 1, 2009, the Naval Postgraduate School joined the Navy, and much of the seafaring world, in mourning the passing of a true legend, Rear Adm. Wayne E. Meyer.

There are many pioneers throughout the history of the naval service, but few can rival the lasting legacy of Adm. Meyer. Widely recognized as the “Father of Aegis,” Meyer spent years shepherding the revolutionary air-defense weapons system through the murky waters of Pentagon acquisitions.

He masterfully led the Aegis Shipbuilding Project, directing the construction of all of the Navy’s current ballistic missile defense cruisers and destroyers, an astounding 89 ships in total and still growing.

Leadership across the Navy offered their own testimonials to the lasting impact of Adm. Meyer. “I am deeply saddened by a great loss to our Navy family,” Chief of Naval Operations Adm. Gary Roughead said in hearing of Meyer’s passing. “Rear Admiral Meyer’s passion, technical acumen and warfighting expertise serve as the foundation of our Navy combatant fleet today. His legacy will remain in the Navy forever.”

Indeed it will live on forever, for an honor Meyer had always hoped for, a ship in ‘his’ Navy bearing his name, has become a reality. The Wayne E. Meyer, DDG 108, is the 58th Arleigh Burke class destroyer, and remarkably, carries the 100th Aegis Combat System built. Its inaugural Commanding Officer, Cmdr. Nick Sarap, Jr., is coincidentally also an NPS graduate in both physics and physical oceanography.

The USS Wayne E. Meyer was commissioned just this month on Saturday, October 10, 2009 with Meyer’s bride, Anna Mae Meyer, serving as ship sponsor.