Welcome to the Hall, Chairman
Adm. Mullen Inducted into NPS Hall of Fame

Inside:
Centennial Celebrations On Campus and Off
Field Experimentation Rapidly Deploys New Technologies
Legendary Graduate Wayne Meyer Remembered
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 through 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.
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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.
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 integrated 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. For additional information on all NPS DL programs, visit 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
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, Director 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 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 stovepipe, 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.

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 newfound 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.

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.

Naval Postgraduate School
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Fulbright Scholarship

In 1946, the program was created by Arkansas Senator J. William Fulbright, and approved. 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 joined 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 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 by Arkansas Senator J. William Fulbright, and approved.

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 Wilkes 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, 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.

Jomana H. Amara

Dr. Amara joined the DRMI faculty in August 2004. She also received her M.A. and Ph.D. degrees in Economics also from the University of Houston. 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.

Donald R. Gaver

Peter Chu

Marcello Romano

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 development 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 CENTCOM 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.”
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-
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Adm. Mike Mullen
NPS ’85 Operations Research
Chairman of the
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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.

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.

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.

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Naval Postgraduate School
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-
exercises, 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 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.

“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.

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For the summer quarter, the Field Experimentation Program sponsored a 10-day research event that drew hundreds of participants and observers. Attendee 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, and six representatives from three foreign countries.

For more information about the NPS Field Experimentation Program, contact Ray Buettner rrbuettn@nps.edu.
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.

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

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
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 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 personnel 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.
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 invisible [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.”
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 … 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

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.
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 projectiles 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.
The 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 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.”

“A great part of Admiral Meyer’s legacy 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.”
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 sea-going 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.

One of Adm. Meyer’s long time dreams finally came to fruition on October 10, 2009 when Adm. Mike Mullen commissioned DDG-108, the Wayne E. Meyer, during a ceremony at Penn’s Landing in Philadelphia, Pa. Coincidentally, the ship’s inaugural Commanding Officer, Cmdr. Nick Sarap, Jr., is also a fellow NPS graduate. U.S. Navy photo by MC1 Tiffini Jones Vanderwyst.
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 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.
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 exact 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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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.
Network. This greatly increased the number of participants. "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 our 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.

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 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 architec-

Senior Lecturer of Management Don Besper 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.
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
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 testaments 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.