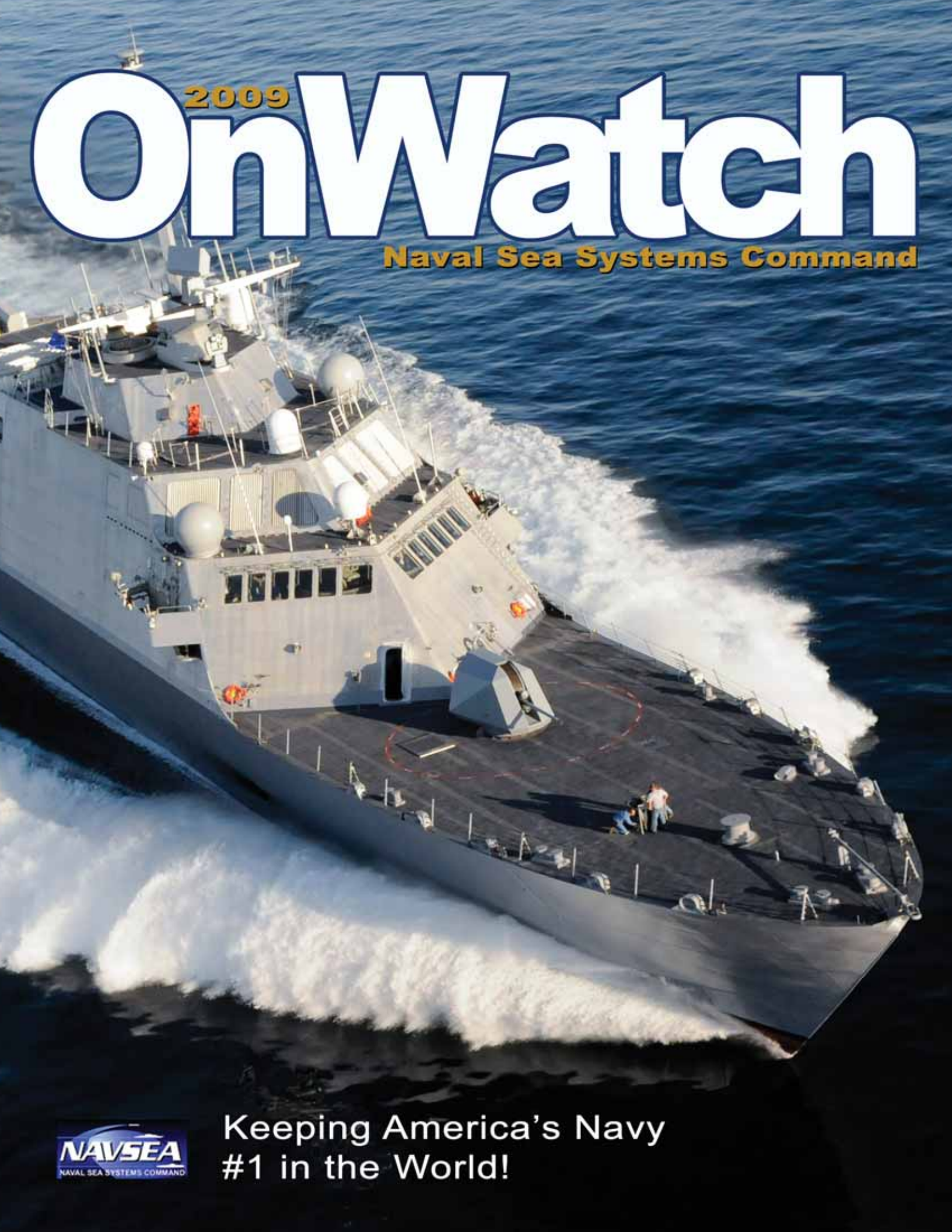
2009
OnWatch
Naval Sea Systems Command
NAVSEA
NAVAL SEA SYSTEMS COMMAND
Keeping America's Navy
#1 in the World!

ON WATCH 2009

SUSTAIN THE CURRENT FLEET

CONTENTS

Welcome

Welcome to the 2009 edition of On Watch! Last year, NAVSEA released our Strategic Business Plan that charts our way ahead through fiscal year 2011. I hope you will find the enclosed articles, pocket guide and fact charts to be useful informational resources about NAVSEA's top three Strategic Business Plan goals: Sustaining our current Fleet, Building an affordable future Fleet and Enabling our People. Whether you are a member of the NAVSEA or Navy Team, industry, Congress or the American public, it is important to understand the direction NAVSEA is heading in, to ensure every single tax dollar we execute goes to support our #1 customer – our warfighters.

Together, in the past year, we've accomplished some major milestones in building an affordable future Fleet. Namely, we delivered the first Littoral Combat Ship coupled with three highly capable mission packages to the operational Fleet. For the first time in the past 12 years, we commissioned two submarines of the same class within a year and christened our sixth *Virginia*-class submarine, USS *New Mexico* (SSN 779). And seven years under construction, we've commissioned the Navy's 10th *Nimitz*-class aircraft carrier, USS *George H.W. Bush* (CVN 77).

Equally as significant, we've taken great strides in sustaining our current Fleet, which consists of 75 percent of the CNO's plan for a 313-ship Navy. For example, we are realigning operational control of our Regional Maintenance Centers under NAVSEA, which will help standardize and maximize efficiencies in our maintenance processes. We are standing up the Surface Ship Lifecycle Management (SSLCM) Activity, a dedicated group of engineers whose sole purpose will be to support, track and implement class maintenance plans for our surface Fleet. And USS *Bunker Hill* (CG 52), the first of 22 *Aegis*-class cruisers to undergo an extensive modernization overhaul, recently completed sea trials successfully, which will ensure combat relevance throughout the ship's expected 35-year service life.





But building and modernizing the Fleet would be absolutely impossible without truly Enabling our People with the best opportunities for career success. With about 50 percent of the NAVSEA civilian workforce eligible for retirement in the coming decade, the need to focus on recruiting and hiring and developing an executable Total Force Strategy is imperative. As a Competency-Aligned Organization, we need to become better at predicting our future workload and ensuring we have the right people in the right places to handle the work. And finally, we are preparing for a 2010 deployment of the Navy's Enterprise Resource Planning system, which will optimize financial, program and workforce management processes.

In the fall of 2008, CNO approved our Agenda for Change – how we are EXECUTING our Strategic Business Plan top priorities. Instead of taking on the entire world all at one time, we are focusing our efforts on a handful of "bite-size pieces," allowing us to effect the most immediate and positive change. As we complete an action item, we move on to tackle the next challenge. I hope you will find the articles featured in the 2009 issue of *On Watch* informative. They emphasize some of NAVSEA's most immediate focus areas in the year ahead. I thank you in advance for your time and interest in understanding NAVSEA's strategic vision. Our success is dependent upon our ability to work as a team in providing the very best for our warfighters and I look forward to the journey ahead!

KEVIN M. MCCOY
VICE ADMIRAL, U.S. NAVY
COMMANDER, NAVAL SEA SYSTEMS COMMAND

SUSTAIN
THE CURRENT FLEET


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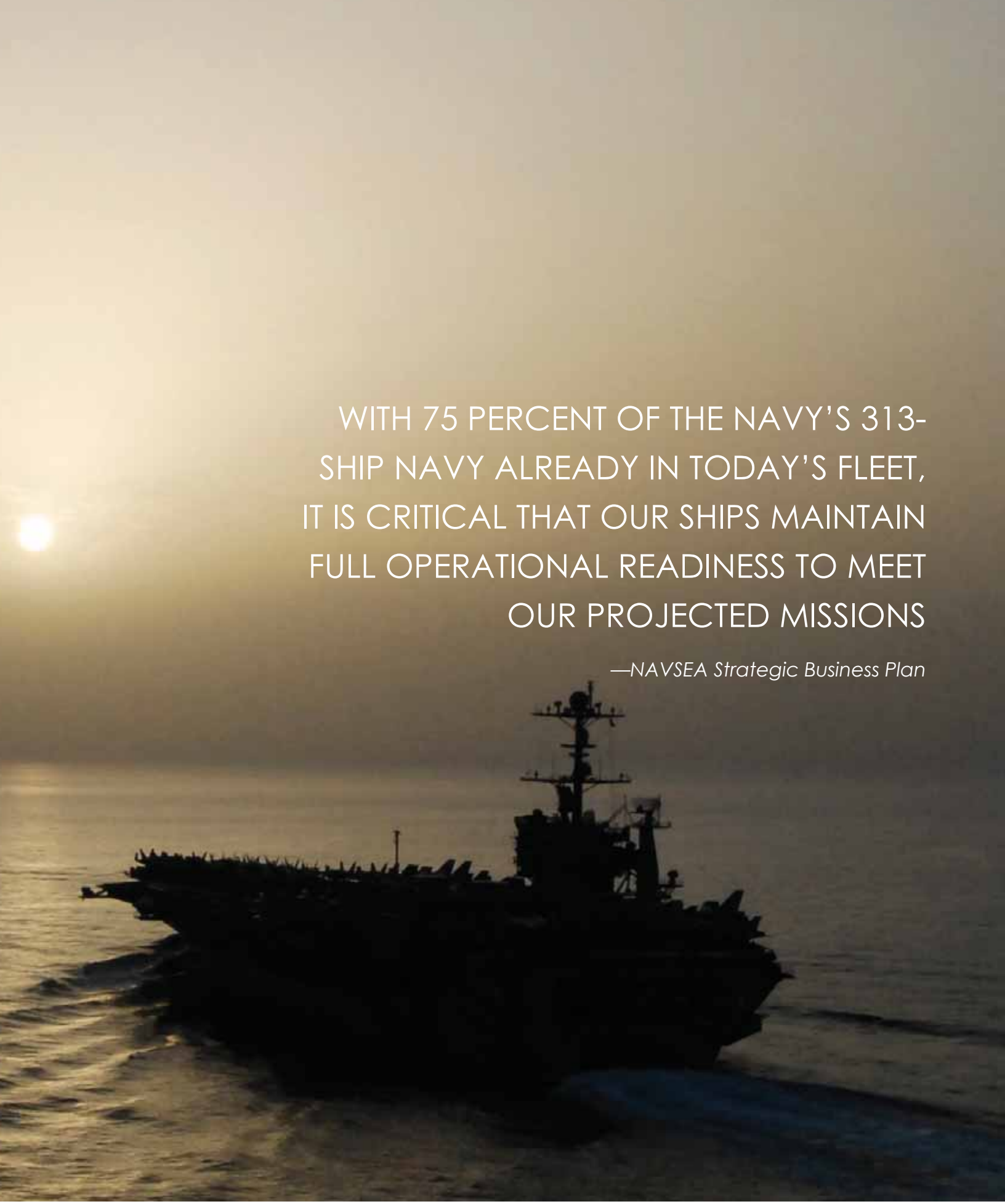


WITH 75 PERCENT OF THE NAVY'S 313-SHIP NAVY ALREADY IN TODAY'S FLEET, IT IS CRITICAL THAT OUR SHIPS MAINTAIN FULL OPERATIONAL READINESS TO MEET OUR PROJECTED MISSIONS

—NAVSEA Strategic Business Plan

"WE CAN DO THAT"

A Navy Diver walks across the seabed with a pipe wrench during a dive supporting Navy Dive Global Fleet Station 2008. Photo by MCCS Andrew McKaskle

Four simple words – when combined – express the breadth and depth of support the Director of Ocean Engineering, Supervisor of Salvage and Diving (SUPSALV) provides to the Fleet. This includes all aspects of ocean engineering, including deep ocean search, marine salvage, in-water ship repair, towing and heavy lift operations, oil spill response, diving safety, and equipment maintenance and procurement.

With only 42 full-time military and civilian personnel plus contractor support, SUPSALV does their part and more in supporting our Fleet. SUPSALV has implemented several changes to the Navy's diving program during the past year, and conducted several deep ocean searches, salvage and pollution abatement and in-water ship repair operations.

One of the biggest accomplishments this year was SUPSALV's April 14 revision to the U.S. Navy Diving Manual. "This is the sixth and most comprehensive change to diving procedures in its 52-year history. The manual serves as the internationally recognized standard for diving safety and diver decompression," said Michael Dean, SUPSALV's deputy director of Ocean Engineering.

While the dive manual changes are widespread, the most sweeping manual changes were in the fields of air decompression; surface-supplied mixed gas diving procedures; MK16 Mod 0 closed circuit mixed-gas Underwater Breathing Apparatus (UBA) diving; MK16 Mod 1 closed circuit mixed-gas UBA diving; diagnosis and treatment of decompression sickness and arterial gas embolism; and recompression chamber cooperation.

The extensive dive manual changes were made possible due to the technical expertise of the Navy Experimental Diving Unit (NEDU), a SUPSALV field activity. NEDU tested and evaluated diving, hyperbaric, and other life-support systems and procedures,

and conducted research and development in biomedical and environmental physiology that supported the dive manual changes.

SUPSALV also led 16 salvage and pollution abatement operations. These spanned the globe, ranging from Portsmouth, R.I., to Guam. Some of the more notable operations included refloating a Russian submarine, dredging to support the ex-Intrepid's return to New York City and an EA-6B "Prowler" aircraft components recovery. Perhaps the most noteworthy was the search and recovery of a B-52H *Stratofortress* bomber in 12,000 feet of sea water off the coast of Guam.

Continuing SUPSALV's spirit of "We Can Do That," the B-52H recovery team re-engineered the Remotely Operated Vehicle CURV21, making it even more efficient for the operating environment. The field engineering efforts really paid off; as a result, the U.S. Air Force Accident Investigation Board was able to complete its investigation into the cause of the crash.

Closer to the ocean's surface, SUPSALV's Underwater Ship's Husbandry (UWSH) Division provided cost effective repair solutions to avoid drydocking, enabling ships to return to the Fleet sooner by using Navy divers to make underwater repairs. Returning ships to the Fleet sooner increases current readiness, providing an agile, adaptable and surge-ready force.

"On any given day, SUPSALV may provide direct technical support to 10 percent of the Navy's Fleet," said Capt. Patrick Keenan, director of Ocean Engineering and Supervisor of Salvage and Diving.

"U.S. Navy divers executing UWSH repair operations – and Navy divers in general – accomplish extraordinary feats," said Bill Reid, director of SUPSALV's UWSH Division, a directorate of NAVSEA. "Divers conduct repairs that run the gamut from simple cofferdam installations to complex underwater welding repairs. They are highly dedicated men and women who put in long hours in an arduous environment to sustain the Fleet at home, on deployment, on holidays and weekends without complaint."

During calendar year 2008, NAVSEA's UWSH repaired 125 ships. This provided a combined 543 days to the Fleet as these ships were able to return to sea and to deployments. These efforts saved the Navy more than $76 million compared to placing the ships in drydock. When UWSH isn't returning ships to the Fleet, they're developing new techniques, procedures, and equipment to perform ship repairs while waterborne.

Whether ocean engineering is defined through diving safety, salvage, or underwater ship repair, SUPSALV continues to improve readiness, safety and capability for the nation's Navy, above and below the waterline, and stands ready to respond to national missions when called upon. ■

Navy divers use a pipe wrench to remove a damaged propeller on a small patrol boat. Photo by MCCS Andrew McKaskle

OPEN ARCHITECTURE

EXPEDITING DELIVERY TO THE WARFIGHTER

USS *Bunker Hill* (CG 52) is the first guided-missile cruiser to be modernized with an Open Architecture upgrade to the Aegis Weapon System. Photo by MCSN Charles Whetstine

Rear Adm. Terry Benedict, Program Executive Officer for Integrated Warfare Systems (PEO IWS), is leading the Navy's transition to Open Architecture (OA). Instead of a single, large company producing separate and unique combat systems for each ship or platform, and then maintaining and upgrading each system over its life cycle, the Navy is moving towards a competitive environment where many participants – including small businesses, academia, government labs and non-traditional companies – have opportunities to contribute capabilities and collaboratively deliver the right products for the best value.

"Naval combat systems must be more affordable," said Benedict. "By shortening the development timeline, using full and open competition to leverage non-developmental software, and focusing on Fleet-identified problems, the Navy will obtain more capable and effective combat systems."

The Navy highlighted in its November 2008 Open Architecture Report to Congress the steady progress it is making to evolve its business and technical processes and those of its industry partners. One step in evolving the way the Navy does business is the continued use of its SHARE (Software, Hardware Asset Reuse Enterprise) repository, a library of non-proprietary system design artifacts available to Navy vendors.

PEO IWS recently posted in SHARE the draft Architecture Design Document to begin the process of defining the future surface ship combat systems architecture to a level sufficient to guide the transformation of in-service combat systems into a single product line.

The Navy's acquisition community is also using the Naval Open Architecture Contract Guidebook, which provides Navy Program Managers and its industry partners examples of contract language that is supportive of Open Architecture principles and processes. The guidebook is being used across the Naval Enterprise – including Aviation, Marine Corps ground systems, and C4I programs.

"These are standard contract clauses that program managers are required to include in their contracts to ensure that new systems and programs are developed with OA in mind to an executable OA philosophy," said Benedict.

In addition to giving acquisition professionals the tools they need to incorporate OA into contracts, PEO IWS developed and posted on the Naval OA Web site (https:\\acc.dau.mil/oa) an updated OA Assessment Tool to help determine how open a system is and then decide how open it needs to be.

"We can determine how 'open' a system is using the OA Assessment Tool," said Nick Guertin, deputy director of Open Architecture. "Once a program manager has a handle on his current 'open status,' a decision

must be made that takes into account the projected life of the systems, the trajectory of the supporting technologies and the performance drivers that best match the warfighter needs in an affordable way."

Several programs conducted assessments in 2008, including the SPS-74 Carrier Periscope Detection System, Littoral Combat Ship Mission Modules, the Multifunction Electronic Warfare Program, the Surface Electronic Warfare Improvement Program, and two torpedo programs.

The Navy has also integrated OA into the "gate review" process that ensures programs mature properly.

"To implement OA, I believe that we have to change not only our business and technical practices, but our culture," Benedict said. "To do that, we've established a senior OA Enterprise Team comprised of the leaders in Navy Program Executive Offices, Systems Commands and Office of the Chief of Naval Operations codes. This team met three times in 2008 to collaborate and reach agreement on how to achieve OA in the Navy's acquisition processes."

"OA is not only about cost avoidance, it is about much more than that," said Benedict. "We also seek to increase interoperability, reduce cycle time, increase performance, reduce risk and incrementally field warfighting improvements across the Fleet at a faster rate." ■

Sailors evaluate a tactical image in the Combat Information Center aboard USS *Kauffman* (FFG 59) during an anti-submarine warfare exercise. Photos by MC2 J.T. Bolestridge

OA ACHIEVEMENTS IN 2008

The Navy accomplished two significant milestones in 2008 as it commenced the modernization of an Aegis combat system, USS *Bunker Hill* (CG 52), and the Ship Self Defense System (SSDS) in USS *Nimitz* (CVN 68). One aspect of the Surface Navy's implementation of OA is to install a COTS computing environment using a standards-based common technical architecture.

Aegis was designed as an integrated and tightly coupled hardware and software combat system. *Bunker Hill* achieved a successful combat systems light-off with a decoupled (hardware from software) combat management system. This decoupling allows software upgrades to be driven independently of the COTS refresh cycle. All cruisers will transition to a network-based OA environment by 2016. Destroyers will be modernized similarly as budget and Fleet availability allows.

Another aspect of the Surface Navy's OA implementation is to define a common component architecture with standardized interfaces between application components that run on the standard technical architecture. Future combat systems component software development will facilitate competition for other Aegis combat systems components. SSDS used the modular design and development approach to fulfill self defense requirements across multiple ship types with existing combat system elements. However, *Nimitz's* SSDS MK 2 provides added flexibility to accommodate future changes. ■

Future USS *George H.W. Bush* (CVN 77) transits from Northrop Grumman Shipbuilding-Newport News to Norfolk Naval Station Dec. 23, 2008, to prepare for commissioning. Photo courtesy of Northrop Grumman Shipbuilding

CVN 77 COMMISSIONING A LEGACY IN LEADERSHIP

During World War II, the then youngest pilot in the Navy flew combat missions from the flight deck of USS *San Jacinto* (CVL 30). Sixty-seven years later, that same pilot, former President George H.W. Bush, walked the decks of USS *George H.W. Bush* (CVN 77) at his namesake's commissioning ceremony Jan. 10, 2009.

This evolutionary ship, whose keel was laid Sept. 6, 2003, features numerous improvements and modernizations from previous *Nimitz*-class carriers. Many of these enhancements will also be incorporated into the new *Gerald R. Ford* class of aircraft carriers currently under construction at Northrop Grumman Shipbuilding Newport News.

"The *George H. W. Bush* will be the most modern aircraft carrier in the Fleet. These changes will increase the ship's effectiveness while decreasing operating costs," said Capt. Frank Simei, the Navy's program manager for In-Service Carriers.

Instead of having a standard 'V' shaped bow like the first eight *Nimitz*-class carriers, USS *George H.W. Bush* has a bulbous bow. Like USS *Ronald Reagan* (CVN 76), USS *George H.W. Bush's* 722-ton bow is larger than the bows of its predecessors.

USS *George H.W. Bush* also includes a composite main mast atop a modernized island that reduces topside weight and reduces maintenance. Navy and shipbuilder designers and engineers designed the island using a 3D product model computer tool. The 3D product model enables designers and engineers to see the arrangement of the island's various systems and locate potential interferences during the design process. For example, the main mast pole atop

the island is a tapered square pole in lieu of a round mast pole. This design keeps electrical and piping systems enclosed to improve performance and increase survivability. The power systems in the island have also been upgraded to support future antennas. The larger size also allows for waist-high safety rails and easy access to all areas by internal ladders. Additionally, the aft mast was relocated from the flight deck to the island to put it in proximity to other radar systems.

Changing from a four- to three-wire arresting gear system represents another change that was first incorporated on *Ronald Reagan* and now in USS *George H.W. Bush*. The new arresting gear control system, the Advanced Recovery Control System, replaces the mechanical systems and controls used today with state-of-the-art arresting gear digital control system technology.

But the improvements don't stop there. Several other systems were also improved, including the reconfiguration of the JP-5 fuel system, which improves storage and handling of aircraft fuel. Several compartments have also been upgraded below the flightdeck, including a new F/A-18 *Hornet* complex, television studio, and self-service laundry. The ship has modernized deck coverings which reduced her weight by about 100 tons, and the Integrated Display Screens in Damage Control Central enhance data display for the Sailors. Electronics in communication and navigation systems have been upgraded with the latest technology. Medical and dental equipment have also been upgraded for improved medical care.

Improvements can also be found outside the skin of the ship and below the waterline.

Edge retentive coatings have also been applied to seawater and ventilation tanks, saving thousands of dollars in labor and maintenance costs. A new paint system has also been applied to the ship's hull, extending the period required for repainting from eight to 12 years.

With all of these enhancements, one may think USS *George H.W. Bush* symbolizes a new class of aircraft carrier. Instead, USS *George H.W. Bush* represents five decades of aircraft carrier design and construction, culminating in the most powerful warship in the world and a bridge to the future of naval technology. ■

Former President George H.W. Bush delivers his remarks at the commissioning ceremony for the aircraft carrier USS *George H.W. Bush* (CVN 77). Photos by MC3 Micah P. Blechner, MC1 Chad J. McNeely and MC1 Susan Caraballo

USS *Carl Vinson* (CVN 70) undergoes a refueling and complex overhaul alongside CVN 77. Photo courtesy of Northrop Grumman Shipbuilding

DEPLOYING AN AIRCRAFT CARRIER REQUIRES INVESTMENTS IN MAINTENANCE, TRAINING AND OPERATIONAL EQUIPMENT. OF THIS TRIAD, MANY CONSIDER MAINTENANCE THE CORNERSTONE OF A CARRIER'S SUCCESS.

RCOH LAUNCHES NEW ERA FOR CARRIERS

While aircraft carrier maintenance continues throughout its service life, one time is set aside to refuel the ship, and conduct extensive maintenance and modernization. That time is known as RCOH, or Refueling and Complex Overhaul, and is conducted at Northrop Grumman Shipbuilding Newport News. A RCOH is integral in maintaining a *Nimitz*-class aircraft carrier for its 50-year service life — longer than any other class of ships in the Navy.

This year, USS *Carl Vinson* (CVN 70) expects to complete her RCOH; the third *Nimitz*-class aircraft carrier to undergo an RCOH. The carrier's CO and crew have labeled her RCOH as 'Building *Carl Vinson's* New Era.'

"OUR CARRIERS ARE EXTRAORDINARILY BUSY. THEY'RE DEPLOYED GLOBALLY AND ARE VERY, VERY EFFECTIVE IN THEIR ABILITY TO SUPPORT OUR MISSION."
— CHIEF OF NAVAL OPERATIONS ADM. GARY ROUGHEAD

"The *Carl Vinson* is tracking on budget," said Capt. Frank Simei, program manager, In-Service Carriers. "The $3.2 billion project includes refueling the carrier's two nuclear reactors, repair and replacement of ship systems and components, and updates to technology and other critical systems, ensuring the ship remains combat capable well into the 21st century."

USS *Theodore Roosevelt* (CVN 71) will follow with its own RCOH in September 2009. *Theodore Roosevelt's* will be the first RCOH designed for a 39-month period. This approach will eliminate the typical follow-on Selective Restrictive Availability (SRA) and will incorporate the work and modernization associated with the SRA within the RCOH. This change to the Aircraft Carrier Class Maintenance Plan will provide five months of additional operational availability to the carrier.

"Whether we're conducting refueling operations or upgrading the ship's communications systems, investments in aircraft carrier maintenance and modernization will enable our carriers to execute our nation's maritime strategy for years to come," said Simei. ■

A Sailor rewinds and calibrates a ventilation motor at USS *Carl Vinson's* (CVN 70) Light Industrial Facility during the ship's refueling and complex overhaul. Photo by MCSA Roderick Barclay

REACHING THE NAVY'S GOAL OF A 313-SHIP FLEET WILL REQUIRE MORE THAN JUST THE ACQUISITION OF NEW SHIPS. IT IS IMPERATIVE THAT THE NAVY MAINTAIN ITS FLEET OF IN-SERVICE SHIPS IN ORDER TO MEET PROJECTED SERVICE LIVES.

SSLCM MAINTAINING THE NEEDS OF THE SURFACE FLEET

To oversee management of the wide variety of in-service ship maintenance, the Navy has established the Surface Ship Life Cycle Management (SSLCM) Activity.

The SSLCM Activity is a NAVSEA activity, aligned under the Surface Warfare Directorate (SEA 21). It will provide centralized life-cycle support and management for U.S. Navy surface ships to assess and manage the maintenance requirements throughout the life cycle of ships in the surface Fleet, in order to better plan and budget for long-term maintenance needs.

"I am excited to stand up a program office that will focus on maintaining our entire surface Fleet," said Rear Adm. Jim McManamon, Deputy Commander for Surface Warfare (SEA 21). "The SSLCM Activity will develop new strategies to ensure ship maintenance is a timely and cost-efficient process."

Surface ships underway in the U.S. 7th Fleet area of responsibility. Photo by MC3 Ronald A. Dallatorre

The activity will maintain, monitor and refine Class Maintenance Plans for all non-nuclear surface ships to ensure material readiness for the projected service life, develop lifecycle strategies to address system upgrades, and fully implement the Integrated Class Maintenance Plan into each surface ship's maintenance schedule and availability planning process.

By analyzing and weighing the cost and risks of maintenance tasks, the activity will improve the accuracy of future Baseline Availability Work Package development and will validate existing maintenance strategies. This effort will provide long term value for surface ship life cycle sustainment efforts and ensure an effective means to achieve full service life.

"Effective ship maintenance is vital to reach the Navy's 313 ship Fleet," McManamon continued. "The SSLCM Activity will provide invaluable oversight and management to streamline processes to help us reach this goal."

The SSLCM Activity is expected to formally stand up in May 2009. ■

Portsmouth Naval Shipyard workers successfully undocked USS *Greeneville* (SSN 772) one week early by returning to "back to basics" work practices. Photo by Jeremy Lambert

NAVAL SHIPYARDS: SUSTAINING TODAY'S FLEET

Whether they are performing scheduled maintenance planned two years in advance or surging to answer emergent repair calls within 48 hours, the nation's four public shipyards – Portsmouth Naval Shipyard (PNSY) in Maine, Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) in Washington state, Norfolk Naval Shipyard (NNSY) in Virginia, and Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) in Hawaii – play a crucial role in the care and sustainment of the U.S. Navy Fleet.

And although geographically separated by thousands of miles, the four shipyards share both similar resources and a common vision when it comes to getting the job done. This vision, known as the One Shipyard concept, continues to maximize Navy dollars by pooling a 25,000-member national workforce possessing unique skill sets and ready to answer the Fleet's call – whenever and wherever it may be.

Emergent Needs

When a fire broke out May 22, 2008, aboard USS *George Washington* (CVN 73) that threatened the carrier's scheduled move to Japan, PSNS & IMF employees surged to San Diego to restore the ship. With PSNS & IMF assigned as the lead mainte-

nance activity, NAVSEA was tasked to repair the extensive damage by Aug. 21, 2008. The workforce took on a constant three-month challenge that would require more than 4,630 individual jobs. The One Shipyard concept went into action, enlisting the skills of nearly 90 Norfolk Naval Shipyard employees and contracting out to the privately-owned Northrop Grumman Shipbuilding Newport News. In addition to this surge requirement, the PSNS & IMF team continued to perform their regularly scheduled work, including a six-month Planned Incremental Availability on USS *Nimitz* (CVN 68) in San Diego, which required more than 600 employees daily. For exceptional performance on the important and high-visibility restoration of *George Washington*, PSNS & IMF earned the Meritorious Unit Commendation.

At PNSY, one of its biggest submarine successes of the year was the completion of collision repairs and a Selected Restricted Availability on USS *Newport News* (SSN 750). With no available drydocks at the four public shipyards, the Navy sent the submarine to Northrop Grumman Shipbuilding Newport News in Virginia. A mobilized Portsmouth team partnered with Northrop Grumman to successfully execute all emergent repairs and scheduled maintenance.

Successful Sub Avails

Each of the shipyards had success stories in 2008 when it came to submarine availabilities. PHNSY & IMF finished the USS *Key West* (SSN 722) Docking Selected Restricted Availability a full week early in mid-June, although it was the first of its kind in 18 months at the shipyard. In July, PHNSY & IMF also finished the Depot Modernization Period (DMP) of USS *Columbia* (SSN 771) in just 15 months – setting a new time record for recent DMPs by public and private shipyards.

On the West Coast, PSNS & IMF finished USS *Michigan's* (SSGN 727) five-month availability five days early while installing a new bow on USS *San Francisco* (SSN 711). Across the country, NNSY had a corporate best in completing its refueling operations of USS *Alaska* (SSBN 732) in 185 days, coming in

A Puget Sound Naval Shipyard worker cleans a section of a steam-powered catapult track aboard USS *Abraham Lincoln* (CVN 72). Photo by MC2 James R. Evans

YEAR-END HIGHLIGHTS

- Portsmouth Naval Shipyard hosted the commissioning of USS *New Hampshire* (SSN 778)
- Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility performed a rare double-docking on USS *Port Royal* (CG 73) and USS *Crommelin* (FFG 37), saving $100,000
- Puget Sound Naval Shipyard and Intermediate Maintenance Facility and Norfolk Naval Shipyard finished more than 10 days early and significantly under budget, teaming up on the USS *Emory S. Land* (AS 39) boiler overhauls
- Norfolk Naval Shipyard sent a team of 44 personnel to Bahrain to repair the lube oil system on USS *San Antonio* (LPD 17)

Darren Schmittler cleans a section of a steam-powered catapult track aboard USS *Abraham Lincoln* (CVN 72) at Puget Sound Naval Shipyard. Photo by MC2 James R. Evans

under budget and 12 days ahead of schedule.

Improving Processes to Improve Service

The public shipyards continued to emphasize the use of Continuous Process Improvement (CPI) and Lean Six Sigma to improve submarine availabilities and lower costs. For NNSY, Lean Release items and co-locating the project teams close to the submarine projects were implemented on USS *Augusta* (SSN 710), USS *Norfolk* (SSN 714) and USS *Tennessee* (SSBN 734). Rapid Improvement Events helped standardize mechanic training, eliminate unnecessary briefings, and strengthen supervisor awareness and accountability, reducing the churn-and-wait times to execute the Navy's work.

At PSNS & IMF, a successful Lean event streamlined the certification of controlled work performed during a Trident submarine's refit and resulted in reducing the number of Controlled Work Packages awaiting audit by 97 percent. In Maine, PNSY undocked USS *Greeneville* (SSN 772) one week early in November after adopting a "back to basics" work approach, eliminating bottlenecks to improve shipyard processes and ensure quality availabilities. *Greeneville* was also the beneficiary of a

A Pearl Harbor Naval Shipyard worker sprays water onto a fin stabilizer of USS *Crommelin* (FFG 37) during the dual docking of USS *Port Royal* (CG 73) and *Crommelin*. Photo by Marshall Fukuki

quick curing, one coat, high solids paint system at PNSY that improved efficiency by eliminating rework, using less paint and ensuring first-time quality. PNSY also implemented an induction coating removal process, another Lean improvement for submarines that saves time and money on exterior hull work.

New Offices, New Partnerships

PNSY set up a detachment in San Diego in February with responsibility for all non-nuclear Intermediate Level Maintenance for seven submarines in the Pacific Fleet. PNSY will ramp up to permanently establish a total of 100 PNSY employees and 180 military for the detachment over the next three years, enabling the facility to tackle a more complex range of jobs.

To support *George Washington* with annual maintenance in Japan, PSNS & IMF entered a global Pacific partnership with the establishment of a permanent detachment in Yokosuka, Japan, as well as a temporary duty force of up to 600 four months a year.

Efforts to adapt and expand to serve the Fleet's needs meant forging a partnership between NNSY and Naval Station Norfolk to consolidate the region's Intermediate and Depot (I&D) level ship repair work. Beginning April 1, NNSY gained 750 Sailors who originally worked under Mid-Atlantic Regional Maintenance Center's Production Department. This created a flexible workforce ready to shift as work required between the shipyard and naval station. With Hampton Roads now home to the Navy's largest I&D consolidation, local Navy leaders praised this venture for enhancing the quality of life and training of the Sailor workforce, improving Fleet responsiveness, and increasing material readiness of Fleet ships and submarines.

One Shipyard in Action

With the power of the One Shipyard concept, opportunities to better sustain the Navy Fleet more efficiently and effectively will continue. And as the four shipyards continue to build on their individual and collective successes of 2008, their standard for excellence will continue to better serve the Fleet's needs in the coming years. ■

Pearl Harbor Naval Shipyard Welder Dexa Manivong prepares to weld titanium piping. Photo by Clarence Freeman

ALL FOUR PUBLIC SHIPYARDS MADE GREAT STRIDES IN SAFETY IN 2008

- Portsmouth Naval Shipyard was recertified as a "Star" site in the U.S. Department of Labor's Occupational Safety and Health Administration's (OSHA) Voluntary Protection Program May 1.
- Secretary of the Navy Donald Winter named Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility as a Department of the Navy Fiscal Year 2008 Safety Excellence Award winner Aug. 19.
- At Puget Sound Naval Shipyard and Intermediate Maintenance Facility, approximately 3,000 people attended the West Sound Safety and Health Expo Sept. 17, an event under the partnership of PSNS & IMF and the city of Bremerton.
- Norfolk Naval Shipyard received first place Nov. 26 from the International Association of Chiefs of Police in the 2007-2008 Military Police Category for the most improved traffic safety program of any military installation nationwide. The shipyard was also the first NAVSEA command to receive this honor.

Portsmouth Naval Shipyard riggers handle lines while undocking USS *Memphis* (SSN 691). Photo by Jeremy Lambert

VPP: FOSTERING A CULTURE OF SAFETY

Safety has long been a focus across the NAVSEA organization, and 2008 marked NAVSEA's commitment to expand the Voluntary Protection Program (VPP) to the entire organization.

"My goal is to ensure we integrate safety in all we do to successfully accomplish our mission to design, deliver, and sustain safe and reliable ships and systems for the U.S. Navy," said NAVSEA Commander Vice Adm. Kevin McCoy. "We have chosen OSHA's Voluntary Protection Program as the Safety Management System of choice across the command at all of our sites to drive our safety culture."

VPP is a partnership between Occupational Safety and Health Administration (OSHA) and federal agencies or companies where the leadership, management and employees together take ownership of achieving exemplary occupational safety and health.

"My corporate vision for NAVSEA and affiliated Program Executive Officers is to provide a safe and healthful workplace free from all recognized hazards where everyone is committed to making safety a 24/7 priority at work, at home, while riding motorcycles and driving cars, and during recreational activities." McCoy continued. "It applies to everyone – military, civilian, contractors, and visitors, whether they work in the office, on the waterfront, or in the lab."

VPP "Star" status is the highest rating attainable under the OSHA-run programs and recognizes organizations for excellence in workplace health and safety. The rate of employee injuries and illnesses at VPP sites is typically less than half the average of their respective industries.

NAVSEA has already achieved great success with VPP. All four of NAVSEA's naval shipyards have implemented OSHA VPP principles and received Star recognition. Together, naval shipyards account for about half of the command's workforce and perform industrial work in the execution of ship and submarine maintenance, modernization, overhaul and repair.

Since 2002, when the naval shipyards began using OSHA VPP principles in their safety programs, Portsmouth Naval Shipyard reduced its lost time injury rate to less than half the national average for the shipbuilding and repair industry and earned an OSHA VPP Star Status in 18 months. Norfolk Naval Shipyard injury and illness rates decreased 24 percent from 2004-2006, and Puget Sound Naval Shipyard reduced injuries by 56 percent from 2002-2006. When Pearl Harbor Naval Shipyard earned VPP Star recognition in 2008, the shipyard's accident rates were 44 percent below the national shipbuilding and repair industry rates. The Navy's Intermediate Maintenance Facility Pacific Northwest also received OSHA Voluntary Protection Program Star Status in January 2009.

In 2008, NAVSEA headquarters in Washington, D.C., was accepted into the OSHA VPP Challenge Program and will start the process toward earning VPP "Star" recognition.

"I realize that the HQ Site is not an industrial activity; however, implementing VPP here makes sense," concluded McCoy. "Safety must be integrated and a central focus in every thing we do to accomplish our mission and protect our people on and off the job." ■

UUV

UNMANNED, UNDERWATER, UNSTOPPABLE.

Sailors carry a Remote Environmental Measuring Unit (REMUS) during the Honolulu Harbor experiment. Photo by MC2 John W Ciccarelli Jr.

For the past year, Program Executive Office Littoral and Mine Warfare (PEO LMW) has taken measures to introduce and transition unmanned maritime vehicles into the Fleet at a more efficient pace.

Most notably, PMS 403, the Unmanned Maritime Vehicle Program, consolidated a number of efforts in 2008 and expanded its unmanned undersea vehicle (UUV) program to include unmanned surface vehicles (USV).

"Expanding the program to include both undersea and surface vehicles is an operational and organizational realignment that allows us to leverage common areas of technology and capability," said Capt. Paul Siegrist, UMV program manager. "It also allows us to reduce redundancy and improve efficiencies."

The UUV program continued in step with the soon-to-be-updated 2004 UUV Master Plan and added a new partner in the Naval Oceanography Mine Warfare Center – which operates the systems in actual environments – to gain insight on tactical employment and get feedback on technical observations for subsequent improvements. The success of this partnership culminated in a variety of operational exercises during the year, showcasing UUV contributions in the areas of harbor security and maritime homeland defense.

"We took part in a number of exercises around the world, demonstrating the utility of our small UUVs," said Siegrist. "It's a real success story for our forces in getting the Sailor out of the minefield."

PEO LMW continued to deliver USVs with superior technology and Fleet efficiencies during the year with their work in support of the Littoral Combat Ship (LCS) and its mission modules.

Naval Surface Warfare Center Panama City Division scientist Dr. Gerry Dobeck inspects a UUV. Photo by David Sussman

"We continued developments of the mine countermeasure USV, the anti-submarine warfare USV, and the remote minehunting system in support of the LCS-class ships to reduce manning and improve the use of unmanned vehicles in the Fleet," Siegrist said. "All of that bridges to our objective to build the future Fleet, so we continue to support that long-term strategic goal." ■

USS *Bunker Hill* (CG 52) is the first of 22 *Ticonderoga*-class guided-missile cruisers to undergo a total capability upgrade as part of the Cruiser Modernization Program. U.S. Navy photo

CG, DDG MODERNIZATION

ACHIEVING 313

Achieving the full service life of surface combatants is imperative to successfully achieve the Navy's goal of a 313-ship Fleet. In addition to the Navy's aggressive surface ship acquisitions, it is necessary to implement programs aimed at maintaining and upgrading ships throughout the course of their expected service lives. The Destroyer and Cruiser Modernization Programs bridge the gap to future surface combatants, and will facilitate a more rapid and affordable capability insertion process.

"Over time, threats and technologies can render top-of-the-line ship systems obsolete," said Rear Adm. Jim McManamon, NAVSEA's Deputy Director for Surface Warfare (SEA 21). "Our challenge is to modernize our ships to keep pace with those threats and new technologies in order to keep our ships relevant, capable warfighting assets for the Fleet. The Cruiser and Destroyer Modernization Programs are part of our answer to this challenge."

Key tenets of the Modernization Programs include upgrades of the Aegis weapons system to include an Open Architecture (OA) computing environment, improved sonar and radar technologies, and hull, mechanical and engineering (HM&E) alterations to address hull strengthening, quality of life and more affordable life cycle maintenance.

USS *Bunker Hill* (CG 52) is the first guided-missile cruiser to receive a complete set of upgrades as part of the Navy's CG Modernization Program. Each of the Navy's 22 cruisers are scheduled for modernization over the next 10 years. *Bunker Hill* is the first cruiser to receive the complete combat system and HM&E modernization during a 52-week availability. All other ships in the CG and DDG modernization programs will receive the upgrades during two separate availabilities, one for the installation of HM&E systems and one for combat systems.

The first phase of modernization involves HM&E modernization availabilities that will include installing Integrated Ship Controls (ISC) and all-electric modifications on all 22 cruisers. Those cruisers with ISC previously installed will receive system upgrades developed since the original installation. The duration of this phase is projected to be less than six months and as such will

occur in the ship's homeport. The HM&E package features alterations in weight and movement correction, hull and deckhouse structural improvements, corrosion-control enhancements, hangar deck strengthening, distributive system enhancements and many quality-of-service upgrades. The initial HM&E-centric modernization availability for USS *San Jacinto* (CG 56) began in July 2006 and was completed in January 2007. Three more cruisers completed their HM&E upgrades in 2007 and two more in 2008.

The second phase involves combat systems modernization availabilities. These availabilities will involve a fully integrated combat system upgrade package along with any HM&E ship changes not previously completed. The principal feature of the combat systems is an upgrade to the Aegis Weapon System that includes Aegis Open Architecture (AOA).

The success of *Bunker Hill's* modernization will lead the way in defining the future of modernization for *Ticonderoga* cruisers, as well as the modernization of *Arleigh Burke*-class destroyers.

"Ship modernization programs are critical to the Fleet," said Capt. Robin Russell, the program manager for SEA 21's In-Service Surface Combatant Program Office. "So far, the *Bunker Hill* modernization has been a great success. We will implement the lessons learned from these upgrades on the other ships of the class, as well as for our *Arleigh Burke*-class Modernization Program."

Similar to the Cruiser Modernization Program, Destroyer Modernization will provide a comprehensive mid-life modernization strategy for the ships to ensure an expected mission-relevant service life of 35 years. The program will provide the ability to reduce total ship class ownership costs via technology upgrades that include a fully integrated bridge, improved machinery and damage control, wireless communications, digital video surveillance, quality of life improvements and an advanced galley. Commercial-off-the-shelf (COTS) computing equipment in an open architecture environment will allow future combat system upgrades to be made more affordable. Fielding of the HM&E systems will commence with two ships in fiscal year 2010 and continue with three ships in each successive year. The combat system upgrades will begin in fiscal year 2012.

A total of 62 *Arleigh Burke*-class destroyers have been commissioned or are being built. There are three "flights," or variants, of the class: DDGs 51-71 represent the original design and are designated Flight I; DDGs 72-78 are Flight II; DDG 79 and subsequent ships are built to the Flight IIA design. A plan has been developed to integrate modernization technologies during new construction of DDG 111 and 112, then backfit new construction design and technology improvements into Flight I and II DDGs.

The first DDG Modernization availability is scheduled to begin aboard USS *Arleigh Burke* (DDG 51) in fiscal year 2010. ■

Top: Vice Adm. D.C. Curtis, Commander, Naval Surface Forces, speaks to a Sailor about upgrades to the MK-45 Mod 2 light weight guns aboard USS *Bunker Hill* (CG 52). Photo by MC1 Paula M. Ludwick Right: A modified Standard Missile 2 (SM-2) Block IV interceptor launches from USS *Lake Erie* (CG 70) during a Missile Defense Agency test. Photo courtesy of Missile Defense Agency

NAVSEA CORROSION PREVENTION AND ENERGY CONSERVATION PROGRAMS

SAVE MILLIONS

On any given day, more than 100 ships and submarines are deployed worldwide. Keeping those ships operational requires the support of the entire Navy Enterprise. While the Navy Enterprise extends from training to supplies and more, few areas involve billions of dollars.

One of those areas is NAVSEA's Naval Systems Engineering Directorate (SEA05), which scored major advances in its Corrosion Prevention and Energy Conservation programs in 2008.

At an average cost of $2.4 billion annually, corrosion accounts for as much as 25 percent of the Fleet's total maintenance budget, according to Beau E. Brinckerhoff, head, Corrosion Control Branch, part of the Ship Integrity & Performance Group in SEA05. SEA05's corrosion prevention and control (CPC) efforts are focused on Fleet needs in the areas of cost reduction, schedule savings and improved materials performance. NAVSEA works with Type Commanders, Regional Maintenance Centers, Office of Naval Research (ONR) and other organizations for coordinated and synergistic results.

SEA05's CPC initiatives are projected to save millions of dollars in maintenance expenses. Promising Rust Prevention initiatives include Induction Heating Coating Removal — a labor-saving, electromagnetic paint removal system developed and transitioned by NAVSEA in cooperation with Naval Research Laboratory, ONR and Office of Secretary of Defense. The tool was piloted by Portsmouth Naval Shipyard and is now being implemented in all four naval shipyards – generating an expected savings of around $57,000 per submarine and $93,000 per aircraft carrier per major availability.

The Single Coat Preservation System initiative works to replace current three-coat painting systems with processes that use new faster-drying, high-build paints that can be applied in a single coat. The new system, developed and transitioned by NAVSEA in coordination with Type Commanders, Naval Research Laboratory and ONR, is expected to save

U.S. Navy photos

approximately $125,000 per submarine and $79,000 per carrier per major availability.

Another CPC program implemented by SEA 05P replaces a ship's metal electrical boxes with outlet boxes made from composite materials. Unlike their predecessors, these composite boxes don't require painting. This simple and effective change is projected to save more than $11.7 million per year.

Another area where the Fleet reaps substantial savings is NAVSEA's Energy Conservation (ENCON) program. NAVSEA's ENCON program is attacking the important issue of fuel conservation from two separate fronts with the Incentivized Energy Conservation (*i*-ENCON) Program and the Fleet Readiness, Research and Development (FRR&D) program.

The *i*-ENCON program, headed by Program Manager Hasan Pehlivan, provides ships' commanding officers and chief engineers energy-saving strategies and techniques along with consumption-reducing procedures and operations modifications. The program also recommends quarterly cash awards for the Fleet's top fuel conservers. In fiscal year 2008, the program helped Navy ships save more than 1.022 million barrels of oil, enough to fill the 12-gallon gas tanks of more than 3.5 million cars, resulting in a record cost avoidance of more than $136 million. Not only is the program reducing the amount of fuel used by Navy ships, it gives the Navy a tactical advantage by extending time between refuelings, which enables a ship to remain on station longer or reduces the amount of time to transit.

Formed in fiscal year 2008, the FRR&D Program examines, tests and validates new technologies that offer reduced fuel consumption. The program, which operates within the Fleet Readiness Engineering Office, sponsors initiatives that, when implemented, forecast more than $19 million in annual cost avoidance, primarily in fuel savings, according to Program Manager Petter Kristiansen.

Among FRR&D's initiatives are the Stern Flaps for Dock Landing Ships (LSDs) and Stern Flaps for Multi-Purpose Assault Ships (LHDs) initiatives, which propose installing drag-reducing stern flaps on LSDs and LHDs. Kristiansen said the initiatives should yield an annual cost avoidance of approximately $6.3 million when implemented.

"Another promising initiative is applying an advanced, foul-release underwater hull coating on DDG- and CG-class ships that is so smooth and 'slick' that fouling organisms cannot adhere to the hull," said Kristiansen. "The coating being tested by the Navy has been used on commercial ships and has been shown to reduce ship fuel consumption by 3 percent or more when the ship is underway."

Sustaining today's Fleet through corrosion prevention and energy conservation represents just two of the many NAVSEA engineering initiatives designed to support the 313-ship Navy. ■

U.S. forces in Iraq ensure all equipment is in working order. U.S. Navy photo

JCREW: PROTECTING THE WARFIGHTER IN THEATER

One of the greatest threats to our deployed men and women at war today is road-side bombs, Explosively-Formed Projectiles (EFPs) and Improvised Explosive Devices (IEDs). These weapons are extremely dangerous because they are inexpensive to make and can be remotely-triggered. However, due in large part to the efforts of Program Executive Office Littoral and Mine Warfare (PEO LMW), these hidden dangers are being neutralized before they can do any harm or damage.

To defeat radio-controlled IEDs, PEO LMW developed the Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW) program — a critical and successful component of the Department of Defense's Joint Improvised Explosive Device Defeat Organization (JIEDDO).

Under the direction of JIEDDO, the JCREW program focuses on developing technologies that prevent the remote detonation of IEDs, commonly referred to as jammers, and delivering them to front line warfighters. PEO LMW's success in improving upon current JCREW technologies and developing new counter-IED systems has significantly decreased the number of IED human casualties and increased the number of IEDs disarmed in the past year.

According to Capt. Mark Kavanaugh, JCREW program manager, PEO LMW's success with JCREW is a function of not only cutting-edge technology, but also velocity of development. From contract and acquisition to deployment to the field, the entire development and production process moves at an accelerated pace to get superior, life-saving counter-IED technology to the warfighter quickly.

"Easily, it's the fastest I've ever seen it done. We've gone from project inception to producing equipment within eight months. That equipment is going to be fielded in large numbers in theater," said Kavanaugh.

In 2008, the 10,000th CREW Vehicle Receiver/Jammer (CVRJ) device was installed on a Mine Resistant Ambush Protected Vehicle. Used by U.S. forces in Iraq, Afghanistan and Kuwait, CVRJ provides vehicle-mounted protection against ground-based electronic threats. Also this year, PEO LMW produced the 1,000th Symphony system, a vehicle-mounted, counter-IED system shared with coalition partners.

The groundbreaking speed at which JCREW systems are being produced and deployed to the theater is done without sacrificing quality. To better support JIEDDO in its mission, PEO LMW reached out to the engineers, technicians and program experts at NAVSEA's Naval Surface Warfare Center (NSWC) Naval Explosive Ordnance Disposal Technology

Division (NAVEODTECHDIV) and NSWC Crane.

NAVEODTECHDIV provided engineers and program managers with years of experience developing technologies for use by joint service EOD technicians charged with disarming radio-controlled IEDs and ordnance. Involved with JIEDDO since its inception, NAVEODTECHDIV has developed, tested and acquired technologies aimed at protecting warfighters from the threat of radio-controlled devices.

In 2008 NSWC Crane, located in Indiana, established Zubowski Flats, a new Realistic Ground Antenna (RGA) test range to combat IEDs named in honor of U.S. Marine Corps Lance Cpl. Scott Zubowski, the first Hoosier Marine killed in Iraq by an IED.

"Zubowski Flats provides a capable uniform testing environment to correctly simulate the electromagnetic waves seen launching off of antennas in theater," said Duane Embree, NSWC Crane's technical director.

Equipped with both laboratory and range testing capabilities, NSWC Crane works to not only test current JCREW systems, but provides continuing solutions to emerging IED threats.

"During the past two years, more than 200 NSWC Crane engineers and technical experts have been working to provide solutions that have significantly lowered the number of injuries and casualties by IEDs," said Embree.

The Navy's commitment to JCREW and the warfighter reaches beyond the test range. Using real-time feedback, PEO LMW works with those in theater to improve upon current JCREW systems and develop new counter-IED technologies as new threats emerge, often with a one-day turnaround.

"We have daily conversations with our counterparts in theater on how the systems are doing, and if there's a new threat, how to counter it," Kavanaugh said. "They make the call, we make the change. We're really hand in glove with the operations that are going on in Operation Iraqi Freedom and Operation Enduring Freedom."

In the case of CVRJ, the interactive relationship between PEO LMW and JCREW end users is made easier by commonality of training. Since the same JCREW system is used to protect all service members, everyone gets the same training – Sailors, Soldiers, Airmen and Marines.

PEO LMW is also successfully meeting the needs of both quality and quantity of JCREW with a move to open architecture. By requiring vendors to share equipment specifications, OA design features reduce costs while improving capabilities and result in systems that can easily be maintained and modernized.

This philosophy of combining speed and efficiency is driving the next generation of CREW systems. According to Kavanaugh, the newest JCREW system, Spiral 3.3, will be the first system designed to be a fully open architecture, global-based system. PEO LMW released the Request for Proposals for Spiral 3.3 in December 2008.

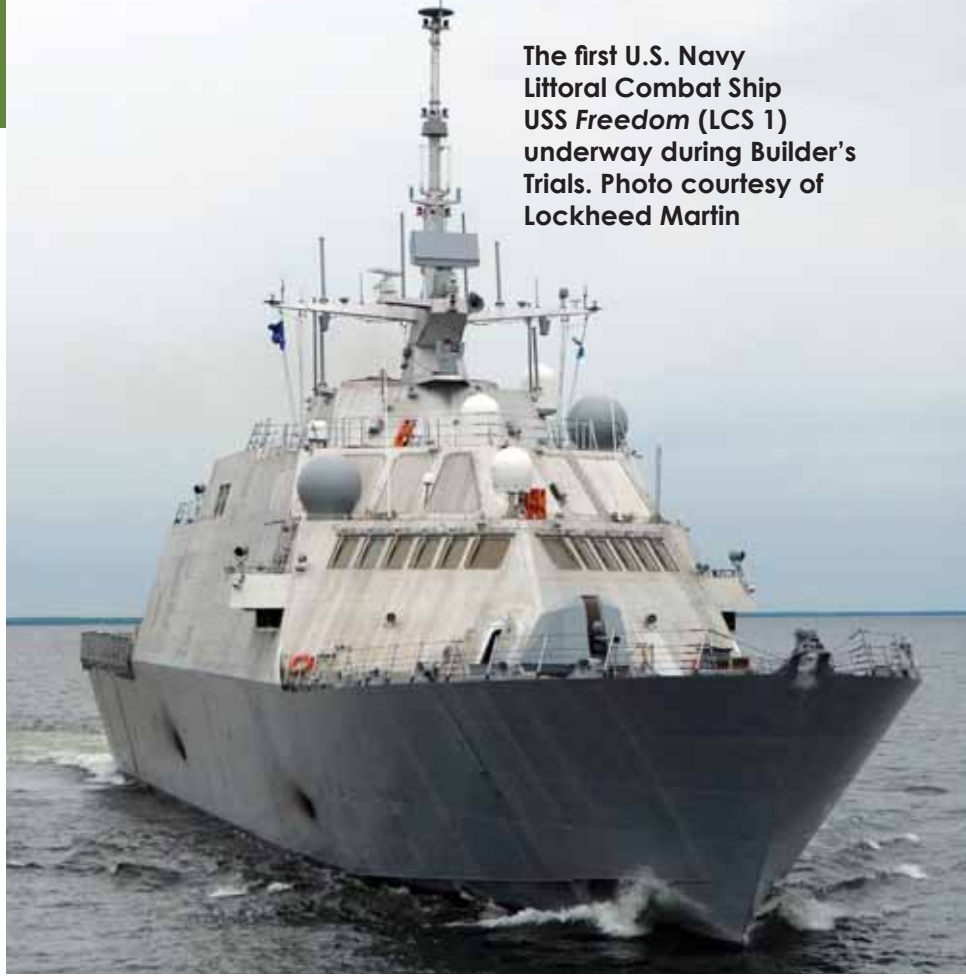
"This is a highly exciting, dynamic period as we move into the next generation of CREW systems. Spiral 3.3 is going to use the Navy's open architecture principles focused on a global, worldwide IED threat. Spiral 3.3 is going to be a family of systems, complete with fixed sites, mounted ones and dismounted ones — all working on shared technology, interoperability and compatibility." ■

Above: An explosive ordnance technician uses a miniature mine detector to search for unexploded ordnance in Tikrit, Iraq. Photo by MC2 Joan E. Kretschmer. Right: A Seabee guides a convoy during a field training exercise. Photo by MC2 Demetrius Kennon

BUILD THE **FUTURE FLEET**

WE MUST MAKE THE SHIPS AND MAJOR WARFARE SYSTEMS OF TOMORROW'S NAVY AFFORDABLE TO BUILD, EASY TO MAINTAIN AND EASY TO UPGRADE OVER THEIR SERVICE LIVES WITHOUT SACRIFICING CAPABILITY

—NAVSEA Strategic Business Plan



The first U.S. Navy Littoral Combat Ship USS *Freedom* (LCS 1) underway during Builder's Trials. Photo courtesy of Lockheed Martin

NOV. 8, 2008, WAS A SUNNY BUT CHILLY DAY IN WISCONSIN. BRATWURSTS WERE ON THE GRILL, POLKA MUSIC PLAYED AND THE CROWD WAS IN HIGH SPIRITS. NO, THEY WEREN'T TAILGATING FOR A GREEN BAY PACKERS GAME; THEY WERE PREPARING TO WITNESS THE COMMISSIONING OF THE NATION'S FIRST LITTORAL COMBAT SHIP, USS *FREEDOM* (LCS 1) IN MILWAUKEE.

LCS: FAST, AGILE, LETHAL

The commissioning was a great event. It was a chance to commemorate delivering this capability to the Fleet, as well as recognize the workers responsible for building this magnificent ship," said LCS Program Manager, Capt. James Murdoch.

LCS is an entirely new breed of U.S. Navy warship with interchangeable warfighting capabilities optimized for littoral or coastal missions. The concept provides a basic platform able to carry and employ mission packages, or modules, configured for specific missions. The first three modules are designed to meet anti-mine, anti-submarine and anti-surface warfare threats.

"The extraordinary effort exhibited to integrate the 'first-of-its-kind' capability has been exceptionally successful," said E. Anne Sandel, Program Executive Officer Littoral and Mine Warfare (PEO LMW).

The ship is designed to defeat asymmetric anti-access threats, including mines, quiet diesel submarines and fast surface craft. LCS ships will also perform missions such as self-defense, high-speed transit, maritime interdiction operations, intelligence, surveillance and reconnaissance, anti-terrorism/force protection missions, as well as support special operations forces.

Freedom (LCS 1) and *Independence* (LCS 2) have different and distinct designs. The Lockheed Martin design (LCS 1) is a high-speed semi-planing steel and aluminum monohull. The General Dynamics design (LCS 2) is an all-aluminum trimaran with a slender, stabilized monohull. Both hull forms satisfy key performance requirements.

2008 was a busy year as the LCS program achieved numerous milestones. After successful builder's and acceptance trials, *Freedom* was delivered by the Lockheed Martin team to the Navy Sept. 18. Following commissioning, LCS 1 began its journey to Norfolk, Va., from its shipyard in Marinette, Wis. The 2,300-mile transit included travel through Lakes Hu-

ron, Erie and Ontario and the St. Lawrence Seaway, passing through 15 canal locks. In 2009, LCS 1 will undergo additional tests and trials off the East Coast.

Independence is currently under construction by General Dynamics Bath Iron Works and Austal USA in Mobile, Ala. The General Dynamics team launched *Independence* during a small ceremony at Austal, April 28, 2008, and the ship was christened Oct. 4, 2008. The ship is scheduled to be delivered and commissioned in 2009.

The LCS program was initiated in response to an ever-changing threat environment and to address warfighting capability gaps in the littorals. It is the unique capability of the ship and the Mission Packages (MP) that radically change the concepts of a multi-function surface combatant.

The modular, open-systems-architected designs facilitate both rapid and cost-effective modernization. Open systems architecture also supports combat systems upgrades, necessary to maintain a ship's combat effectiveness. These design features allow the ship to avoid lengthy shipyard periods and reduce life cycle costs while increasing the ship's operational availability.

2008 saw the rollout of two of the three mission packages.

LCS 2 under construction in Mobile, Ala. Photo illustration courtesy of the General Dynamics LCS Team

Partnering with Space and Naval Warfare Systems Command and NAVSEA field activity Naval Undersea Warfare Center Newport, the LCS Mission Modules Program Office rolled out the Anti-Submarine Warfare MP, Sept. 19, 2008. This third and final MP version for LCS features Unmanned Surface Vehicles and associated sensors to detect, classify, localize and track submarines in the littoral environment.

July 11, 2008, marked the introduction of the first Surface Warfare MP at NAVSEA field activity NSWC Dahlgren, Va. The rollout included the first modularized gun system capability demonstration with the Mk 46 30mm gun.

The first MP for Mine Countermeasures was rolled out in September 2007 at NSWC Panama City. It provides organic mine countermeasures capabilities by leveraging sensors, weapons and unmanned vehicle technology to locate, identify and destroy mines while keeping Sailors out of the minefield.

The Navy will procure five more LCSs in the next two years. Two ships are expected to be awarded in fiscal year 2009, and another three in fiscal year 2010. Affordability remains a key tenet of the LCS program as the Navy works with industry to acquire the greatest capability for the lowest cost. Ultimately, the Navy plans to field 55 of these revolutionary ships. ■

Top: USS *Freedom* (LCS 1) sails under the Pont Jacques-Cartier Bridge as the ship heads to the Old Port of Montreal. Photo by MC3 Kenneth R. Hendrix.
Above: Gunner's Mate 1st Class Daniel Albright (right) explains a discrepancy between the hoist and the Bofors 57mm gun mount to Cmdr. Donald Gabrielson, commanding officer of USS *Freedom* (LCS 1).

Chief of Naval Operations Adm. Gary Roughead takes a tour of Marinette Marine Shipyard while LCS 1 is under construction. Photo by MC1 Tiffini M. Jones

NAVSEA'S FOUR SUPERVISORS OF SHIPBUILDING – BATH, GROTON, GULF COAST AND NEWPORT NEWS – AREN'T IN THE SPOTLIGHT WHEN A NEW SHIP IS COMMISSIONED INTO THE U.S. NAVY, BUT THE PROFESSIONALS OF SUPSHIP ARE HARD AT WORK BEHIND THE SCENES OF EACH NAVY SHIPBUILDING PROGRAM. THE SUPSHIPS ALSO OVERSEE NUCLEAR VESSEL REPAIRS EXECUTED IN THE PRIVATE SECTOR.

SUPSHIPS: DELIVERING THE NAVY'S FUTURE FLEET

A highly skilled workforce of 1,200 civilian and military personnel provide oversight of cost, schedule and quality for the Navy's more than $110 billion in shipbuilding contracts. When it comes to ship building, SUPSHIPs are the Navy's experts at in-yard project management, engineering and quality assurance. For the most part, SUPSHIP personnel are co-located with the shipbuilding contractor, working side-by-side on a daily basis.

A SUPSHIP Gulf Coast quality assurance specialist inspects a shell plate weld performed by a contractor. U.S. Navy photo

"Our quality assurance personnel are out in the yard evaluating the processes the contractor is using to construct the ship," said Capt. Warren Lundblad, NAVSEA's director of SUPSHIP Management. "They also spend time inspecting the ship while it is being constructed in order to note discrepancies – or things that need to be completed or fixed – and making sure that they are corrected before the ship is delivered to the Navy."

SUPSHIP engineers provide valuable oversight during design, when the contractor conducts testing, and execute NAVSEA technical authority locally. SUPSHIP personnel also execute the payments on a contract, coordinate communication between the government and the contractor, and administer other important functions.

"The United States is building new ships at an increasing rate. Over the current Future Years Defense Program, we will see a 25 percent increase in the number of vessels under our oversight." said Lundblad. "Yet at the same time, government and our defense contractors are dealing with the same rapidly aging workforce, increasing costs and many other pressures. In this environment, the SUPSHIPs are more vital to the Navy than ever before."

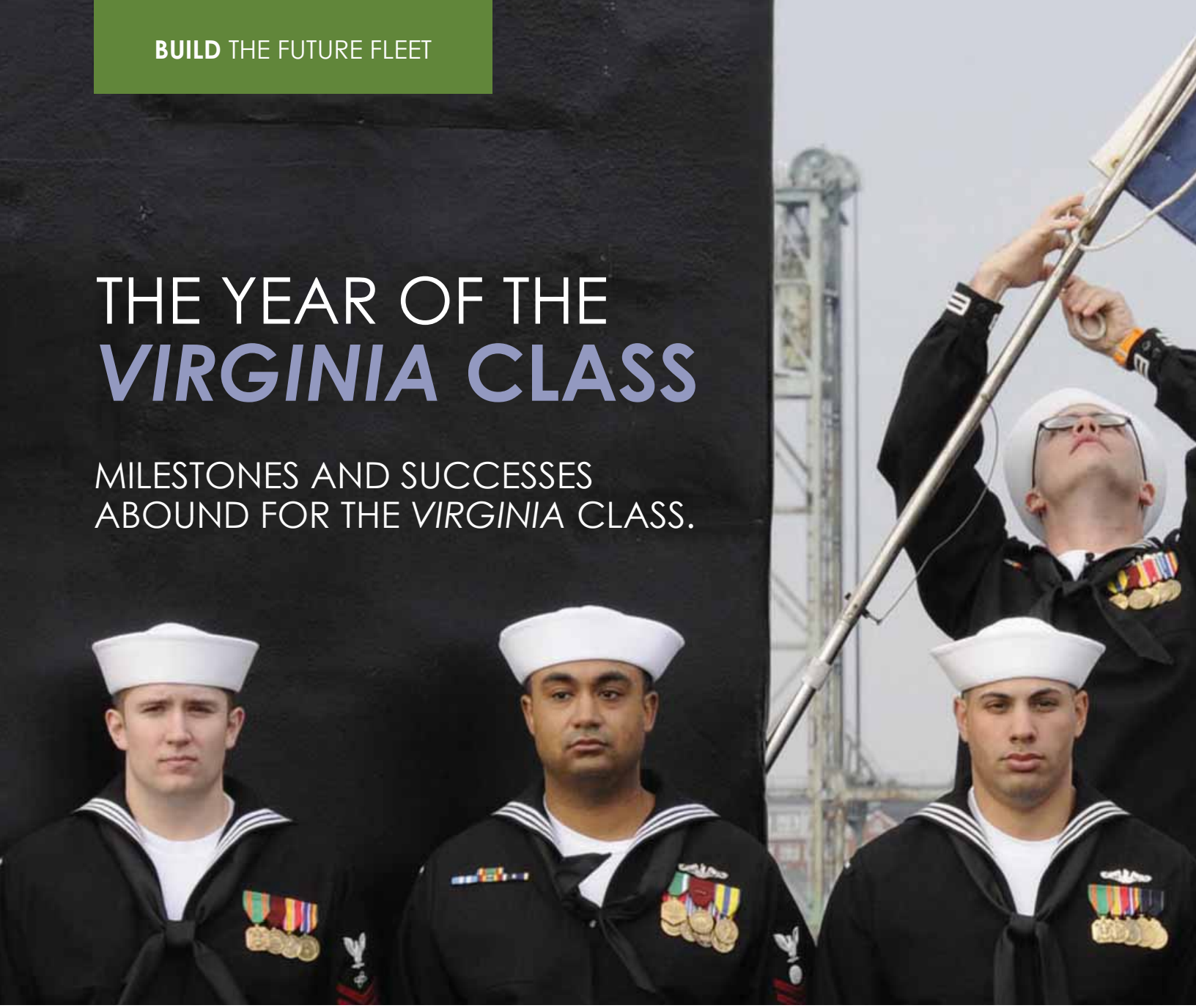
Since SUPSHIP manning is based upon workload, the Navy has halted the decrease in SUPSHIP staffing over the last 18 years by using the Navy's only validated manning model. The SUPSHIPs have been hiring employees to meet their workload-driven manning requirements.

"The next challenge is to ensure these new employees are well-trained on a set of common business practices," said Lundblad. "Our training is more than just covering general SUPSHIP operations. We are developing the training that employees need to be successful in their department. For example, a quality assurance inspector should know the industrial processes that he/she will see in the shipyard, and an engineer will know what a design review consists of, how we execute technical authority, and how to prepare for sea trials."

Although not always front-and-center, the men and women of SUPSHIP proudly play an important part in helping the Navy build an affordable future Fleet. ■

THE YEAR OF THE *VIRGINIA* CLASS

MILESTONES AND SUCCESSES ABOUND FOR THE *VIRGINIA* CLASS.



The Navy capped off the 2008 calendar year with a flourish of noteworthy events, culminating in the signing of the Block III contract Dec. 22.

"The signing of the Block III contract with our two shipyards – General Dynamics Electric Boat (GDEB) and Northrop Grumman Shipbuilding – Newport News (NGSB-NN) – is a major milestone for the *Virginia* Class Program Office," said Capt. Michael Jabaley, *Virginia* Class program manager. "The Block III contract will bring eight incredibly capable submarines to the Fleet, and it will do so at an affordable price achieved by an unprecedented cost reduction effort."

The eight-ship Block III contract Request for Proposals (RFP) was released in February 2008 and was negotiated during the summer and fall. The two ships scheduled for authorization in FY12 reflect the cost-reduction goals – $2.59 billion per ship, which is $2 billion in FY05 dollars inflated to FY12 dollars. The contract – covering hulls 784–791 – is a Multi-Year Procurement (MYP) contract for $14 billion that takes significant advantage of an increased procurement rate, increased construction performance, and design for cost reduction, the three tenets of the *Virginia* Class Cost Reduction Program.

"Getting to this point has been a tremendous team effort," said Jabaley.

A Sailor breaks the pennant of Adm. Kirkland Donald, Director of Naval Reactors, during USS *New Hampshire's* (SSN 778) commissioning ceremony. Photo by Jeremy Lambert

"Our shipbuilders, related industry team members, and Navy personnel have made significant strides over the last year to make the cost reduction effort a reality."

Virginia-class submarines are the first submarines designed to operate in today's challenging undersea environment, capable of conducting missions in both the littorals and the blue-water portions of the world's oceans. USS *Virginia* (SSN 774) and her sister ships are true multi-mission platforms, performing anti-submarine warfare; anti-surface warfare; strike; special operations; intelligence, surveillance, and reconnaissance; irregular warfare; and mine warfare missions. These core mission areas directly support five of the Navy's six Maritime Strategy core capabilities of forward presence, power projection, maritime security, sea control, and deterrence.

"*Virginia*-class submarines provide the Navy with capabilities never before seen on attack submarines," said Rear Adm. William Hilarides, Program Executive Officer for Submarines. "Our core mission areas support the CNO's [Chief of Naval Operations] Maritime Strategy while providing direct support to ongoing National Security initiatives."

Virginia Class Cost Reduction Program

The *Virginia* Class Program met several major operational and acquisition milestones in 2008. One

of the most important of these was the ongoing success of the *Virginia* Class Cost Reduction Program. In 2005, then-Chief of Naval Operations Adm. Mike Mullen issued a challenge to reduce the per-ship cost of the *Virginia* class by 20 percent by Fiscal Year 2012. At the time, that required removing $400 million (as measured in fiscal year 2005 dollars) from a $2.4 billion submarine. If this goal were met, then the Navy would increase production to two *Virginia*-class submarines a year beginning in FY 12.

To achieve this cost reduction, the *Virginia* Class Program adopted an innovative and aggressive three element cost reduction strategy consisting of an increased procurement rate, improved construction performance, and design for cost reduction. Each element of the cost reduction strategy was designed to operate as its own entity; however, the strategy worked best when implemented as a holistic plan.

The first cost reduction element – accounting for half of the *Virginia* Class Cost Reduction Program's $400 million per ship goal – was increasing procurement to two submarines per year as part of a Multi-Year Procurement contract with Economic Order Quantity (EOQ). By increasing the number of submarines procured and built per year, savings are achieved by spreading the overhead costs over twice as many submarines. By increasing the number of shipsets of components and material that can be ordered at once, EOQ enables significant savings.

The second element of the cost reduction strategy was improved construction efficiency. PMS 450 and its shipbuilding partners, General Dynamics Electric Boat and Northrop Grumman Shipbuilding – Newport News, worked together to both improve construction practices and reduce the submarines' construction span from 84 to 60 months. A key example of this construction efficiency was the move to build each submarine in larger sections. Early *Virginia*-class submarines were produced in 10 "modules," essentially large prefabricated and outfitted hull sections. Beginning with the fifth ship of the class, USS *New Hampshire* (SSN 778), each submarine is comprised of just four "super modules." The use of super modules more than halved the number of hull shipments required for each ship and allowed the shipbuilders to deliver the sections more complete than previously possible.

The strategy's third element involved redesigning portions of the ship to reduce costs and construction time. PMS 450 and the shipbuilders examined every major cost driver of the submarine looking for "capability neutral" changes, meaning that the design changes would not impact the submarines' warfighting capabilities. In total, the program implemented 135 design changes covering all major systems of the submarine. A key change included moving a Light Weight Wide Aperture Array (LWWAA) panel off of a hull butt – the point at which the hull modules are joined together. Shifting the LWWAA panel will allow it to be installed prior to the completion of the pressure hull, saving five weeks of critical path schedule and more than $1 million in unit costs savings.

The most notable and far-reaching redesign involves the ship's bow. The Block III ships will not have a traditional, air-backed, transducer-populated sonar sphere. Instead, they will have a free-flood Large Aperture Bow (LAB) Array that utilizes hydrophones. The hydrophones

Below: Attendees witness the commissioning of USS *North Carolina* (SSN 777). Photo by MC2 Roadell Hickman
Next page: USS *New Hampshire* (SSN 778) during Sea Trials. *New Hampshire* was commissioned Oct. 25, 2008. U.S. Navy photo

provide both an acquisition and life cycle cost benefit, as they are approximately half the price and last twice as long as transducers, and provide enhanced passive capability. The active "pinging" capability, however, will not be lost because the Block III and out submarines will have an active array mounted in the bow. By employing the LAB Array, these ships will have 1,000 fewer SUBSAFE hull penetrations and will save $11.1 million per ship.

Utilizing the LAB Array allows for replacing the 12 standard small-diameter Vertical Launch System (VLS) tubes with two *Virginia* Payload Tubes (VPTs). VPTs will increase *Virginia's* payload volume from 1,300 to 2,100 cubic feet and allow the carrying of 12 *Tomahawks* in Multi All-up-round Canisters (MACs). The MACs are identical to the ones currently deployed aboard the Navy's recently converted guided-missile submarines (SSGNs). As technologies develop, VPTs can serve as modular mission-configurable payload bays to accommodate a wide range of future technologies. The bow redesign, including the LAB Array and VPTs, will save the Navy $40 million per ship.

2008 MILESTONES

The Navy reached several important milestones during the course of 2008. Some of those milestones include:

> Feb. 21 – USS *New Hampshire* (SSN 778) launch; USS *North Carolina* (SSN 777) delivery

> April 12 – Future USS *New Mexico* (SSN 779) keel authentication ceremony

> May 3 – USS *North Carolina* commissioning in Wilmington, N.C.

> June 21 – USS *New Hampshire* christening

> August – Four out of the possible five *Virginia*-class submarines were at sea at the same time – a first for the class

> August – USS *Virginia* test fires *Tomahawk* cruise missiles – a first for the class

> Aug. 27 – USS *New Hampshire* delivery

> Sept. 27 – Future USS *Missouri's* (SSN 780) keel laying

> Oct. 3 - *Virginia* Class Program awarded David Packard Excellence in Acquisition Award

> Oct. 25 – USS *New Hampshire* commissioning

> Dec. 13 – USS *New Mexico* christening

> Dec. 22 – Block III contract signed

USS *New Hampshire's* commissioning Oct. 25 was also the first time since 1996 that the Navy commissioned two submarines of the same class in the same year.

"The *Virginia*-class had a spectacular 2008," said Hilarides. "We are delivering game-changing platforms to the Fleet and we're doing it early to schedule."

THE FUTURE OF U.S. SUBMARINE RESCUE SYSTEMS

Sailors prepare the Deep Submergence Rescue Vehicle Mystic (DSRV-1) for a training launch off the coast of San Diego. Photo by MC2 Jennifer S. Kimball

THE U.S. NAVY'S NEW SUBMARINE RESCUE DIVING AND RECOMPRESSION SYSTEM (SRDRS) PROVIDES RAPID RESPONSE TO DISTRESSED SUBMARINES

The U.S. Navy's Submarine Rescue Diving and Recompression System (SRDRS) made headlines this year by participating in two international submarine rescue exercises and by replacing the Deep Submergence Rescue Vehicle Mystic (DSRV-1), the Navy's deep-diving submarine rescue vehicle.

Based out of San Diego and operated by the Navy's Deep Submergence Unit, the SRDRS is a "fly-away" system that provides worldwide, rapid response rescue capability that can mate to most of the world's submarines. The entire system can be mobilized and transported via large military or civilian transport aircraft and installed aboard a variety of Vessels of Opportunity (VOO), pre-selected surface ships that operate around the world, within hours. The ability to operate from a VOO eliminates the requirement for a specially-configured host submarine. Additionally, while DSRV-1 required a two-hour battery charge between rescue cycles, the SRDRS receives its power from the host VOO via an umbilical and can operate without pause.

The SRDRS followed a unique path for acceptance into U.S. Navy service. Instead of being tested in home waters alongside familiar submarines, the SRDRS' developmental and operational testing took place during international exercises. The

system first proved its ability to rapidly deploy and rescue stranded submariners during the 2008 NATO submarine exercise Bold Monarch (BMH08) held from May 26 to June 5, 2008. Highlighting its "fly-away" capability and international mission, SRDRS was transported from San Diego to Norway for the exercise on a Russian Antonov cargo aircraft. During BMH08, SRDRS successfully operated with the international submarine community, mating and transferring personnel from a Norwegian, a Polish, and a Dutch submarine in the Baltic Sea off the southern coast of Norway. As part of BMH08, SRDRS successfully transferred 64 personnel from the Dutch submarine HrMs Dolfijn (S 808). Finally, personnel from the United Kingdom, Australia, Canada, Russia, Pakistan, India, Norway, Italy, Israel, Sweden, Spain, Singapore, the Netherlands, France, and China spent time aboard SRDRS.

"SRDRS' incredibly successful debut on the international stage during BMH08 is indicative of the tremendous capabilities of the system and hard work and dedication of our program office," said Capt. Gary Dunlap, program manager for Advanced Undersea Systems Program Office, the office responsible for SRDRS. "This rapidly deployable international asset set the standard for all submarine rescue platforms."

In September, SRDRS further demonstrated its international rescue capabilities during an exercise with the Chilean Navy submarine CS Simpson (SS 21) Sept. 17–18. With USNS *Navajo* (T-ATF 169) serving as the VOO, the SRDRS' pressurized rescue module (PRM) successfully conducted simulated rescue exercises, further validating the system's design and international capabilities.

Through these two exercises, SRDRS proved its ability to rescue Sailors from disabled submarines and demonstrated to the international community that the U.S. Navy is committed to submarine rescue. By integrating maritime rescue systems in international exercises like BMH08 and the exercise with CS Simpson, the United States and its allies sent a powerful message to the world that they are committed to fostering maritime partnerships that will strengthen global naval cooperation.

SRDRS is made up of three components. The Advanced Dive Suit 2000, the Rescue Capable System (RCS), and the Transfer-Under-Pressure (TUP) are being procured as part of a three-phase acquisition program managed by Team Submarine. The ADS 2000, an atmospheric dive suit capable of diving to depths of 2,000 feet, was delivered to the Navy in 2006 and is used to inspect bottomed submarines and clear their escape hatches.

SRDRS' second phase, the RCS, became operational Sept. 30, 2008. The RCS consists of the PRM, to be formally named Falcon in March 2009, after the name of the surface ship used during the rescue efforts of the sunken submarine USS *Squalus* (SS 192) in 1939, its launch and recovery system, and its support equipment, all of which are controlled from a VOO. Falcon can be delivered by both air or ground and can mate to a distressed submarine within 72 hours of first notification. Like ADS 2000, Falcon can operate to a depth of 2,000 feet and can mate to a disabled submarine at a list and trim of up to 45 degrees and can transfer up to 16 personnel at one time.

The final phase of the SRDRS program is the TUP capability, scheduled for delivery in late 2012. TUP will allow rescued submariners to remain under pressure during the transfer from the PRM to hyperbaric treatment chambers aboard the VOO, thereby preventing the rescued crew from suffering decompression sickness.

"2008 represents a very successful year for SRDRS, from both an operational and acquisition standpoint," said Rear Adm. Patrick Brady, Deputy Commander for Undersea Warfare. "The international submarine community gained a valuable asset that will provide for the safety of all submariners." ■

The Navy's Submarine Rescue Diving and Recompression System (SRDS) provides worldwide, rapid response rescue capability.

AUG. 28, 2008, A 25,000-TON AMPHIBIOUS TRANSPORT DOCK SHIP SLOWLY LEFT ITS BERTH AT NAVAL STATION NORFOLK, WITH MORE THAN 1,000 SAILORS AND MARINES EMBARKED ON THE FIRST DEPLOYMENT OF A *SAN ANTONIO*-CLASS SHIP.

USS *San Antonio* (LPD 17) transits through the Gulf of Oman. Photo by MC2 Jason R. Zalasky

LPD 17

PROJECTING THE SPEAR OF INFLUENCE

Deployed to the U.S. 5th Fleet area of responsibility as part of the USS *Iwo Jima* (LHD 7) Expeditionary Strike Group, USS *San Antonio* (LPD 17) is bringing greatly improved warfighting capabilities to the Navy's amphibious Fleet, including an advanced command and control suite, increased lift capacity with substantial increases in vehicle and cargo carrying capability, and advanced ship survivability features. The ship is capable of embarking a landing force of up to 800 Marines and supports the Landing Craft Air Cushion vehicle (LCAC), the Expeditionary Fighting Vehicle (EFV), and the MV-22 Osprey tilt-rotor aircraft, making the ship a critical element of today's and tomorrow's expeditionary strike groups.

"PEO Ships and the LPD 17-class Program Office are working to deliver these ships to the Fleet," said Rear Adm. Bill Landay, Program Executive Officer for Ships. "As the class reaches a steady state production, we will continue to improve efficiencies and drive down the time between delivery and maiden deployment."

In addition to *San Antonio's* maiden deployment, the LPD 17 program achieved numerous important milestones in 2008. USS *Green Bay* (LPD 20) was delivered to the Fleet Aug. 29, 2008, joining *San Antonio's* already commissioned sister ships USS *New Orleans* (LPD 18) and USS *Mesa Verde* (LPD 19). The future USS *New York* (LPD 21) was christened in March, and the class as a whole reached initial operating capability. Northrop Grumman Shipbuilding continues the construction of *San Diego* (LPD 22) and *Anchorage* (LPD 23), and both are scheduled to be christened in 2009. The future USS *Arlington's* (LPD 24) keel was laid Dec. 18, 2008, and along with USS *Somerset* (LPD 25), is under contract with Northrop Grumman Shipbuilding. The Navy received funding for the still-unnamed LPD 26 in the Fiscal Year 2009 Defense Appropriations Act.

"The LPD 17 class Program Office and our industry partners have worked through many challenges to deliver this critical warfighting asset to the Fleet," said Art Divens, the Amphibious and Auxiliary Sealift Office executive director in the Navy's Program Executive Office Ships. "Despite these first-of-class challenges, USS *San Antonio* and the rest of the class are delivering much-needed capabilities.

San Antonio-class LPDs are used to transport and land Marines, their equipment and supplies by embarked air cushion or conventional landing

craft or amphibious assault vehicles, augmented by helicopters or vertical-takeoff-and-landing aircraft. These ships support amphibious assaults, special operations or expeditionary warfare missions, and can serve as secondary aviation platforms for expeditionary strike groups. LPD 17-class ships are approximately 684 feet in length, have a crew of 360 Sailors and are able to support an embarked force of almost 800 Marines.

"The LPD 17 class represents a revolution in amphibious ship design," said Class Program Manager Capt. Bill Galinis. "These ships provide a much-needed capability for our country and our Navy-Marine Corps team. The program office and our industry partners are continuing to incorporate lessons learned from the lead ship of the class to follow on ships with a focus on improving ship performance."

The LPD 17 class was designed with the crew in mind. The Shipboard Wide Area Network provides computer and network access, linking every manned space on the ship, including berthing spaces. New sit-up berths have room for a Sailor or Marine to sleep comfortably or to sit up in the bunk for reading or writing. Even the food service spaces were redesigned to ensure better-prepared and more nutritious offerings.

As the new LPDs enter service, *Austin*-class LPDs are being de-commissioned, beginning with USS *Austin* (LPD 4), which was decommissioned in 2006. The class will functionally replace more than 41 ships with ones that are networked, survivable and built to operate with 21st century transformational platforms, such as the MV-22 Osprey and the Expeditionary Fighting Vehicle. ■

Left: Sailors and Marines man the rails aboard USS *San Antonio* (LPD 17) for the ship's maiden deployment. Photo by MC1 Erik Hoffmann
Bottom left: A Sailor guides a Landing Craft Air-Cushioned (LCAC) into the well deck of USS *San Antonio* (LPD 17). Photo by Marine Cpl. Aaron J. Rock
Bottom right: A Sailor plots a course aboard USS *San Antonio* (LPD 17) before a port visit to Marmaris, Turkey. Photo by MC3 Brian Goodwin

'TRUST, BUT VERIFY' WAS A SIGNATURE PHRASE OF THEN PRESIDENT RONALD REAGAN. WHEN REAGAN USED THIS PHRASE, HE WAS USUALLY DISCUSSING RELATIONS WITH THE FORMER UNION OF SOVIET SOCIALIST REPUBLICS AND HE ALMOST ALWAYS PRESENTED IT AS A TRANSLATION OF THE RUSSIAN PROVERB "DOVERYAI, NO PROVERYAI" (RUSSIAN: ДОВЕРЯЙ, НО ПРОВЕРЯЙ) – TRUST, BUT VERIFY.

LORENZEN REPLACES EYES OF COBRA JUDY

The spirit of 'Trust, but Verify' continues today through various military agreements, practices and programs. One program that exemplifies this approach is the Cobra Judy Replacement (CJR) acquisition program led by NAVSEA. The program funds the acquisition of a single ship and radar suite for worldwide technical data collection against ballistic missiles in flight.

The future USNS *Howard O. Lorenzen* (T-AGM 25) will replace USNS *Observation Island* (T-AGM 23) as the Navy's missile range instrumentation ship. Photo courtesy of VT Halter Marine

"This program will replace the current Cobra Judy / USNS *Observation Island* (T-AGN 23), a 50-year-old Mariner-class ship nearing the end of its useful life," said CJR Program Manager Jim Smerchansky, director for Above Water Sensors for the Program Executive Office Integrated Warfare Systems. The Navy will also leverage radar developments from this program for future acquisitions.

But the radar system is only half of the picture.

Aug. 13, 2008, a "straight and true" keel was laid in Pascagoula, Miss., for a new missile range instrumentation ship, the future USNS *Howard O. Lorenzen* (T-AGM 25). When *Howard O. Lorenzen* is delivered to the Fleet in 2010, the Navy will gain a highly capable missile range instrumentation ship that can monitor missile launches and collect data to improve missile efficiency and accuracy, monitor compliance with strategic arms treaties and support U.S. military weapons test programs.

"The proliferation of advanced ballistic missile technology around the world guarantees that this ship will be a vital asset to the United States and its allies," said Bilyana Anderson, the program manager for Auxiliary Ships, Small Boats and Craft in the U.S. Navy's Program Executive Office for Ships. "USNS *Observation Island* has ably served the Navy and the nation in this role for more than two decades, and T-AGM 25 will continue that proud tradition for years to come." ■

NAVSEA'S CHIEF ENGINEER PROJECTS CONTINUED SUCCESS

INTERVIEW WITH REAR ADM. TOM ECCLES, NAVSEA CHIEF ENGINEER AND DEPUTY COMMANDER FOR NAVAL SYSTEMS ENGINEERING (SEA 05).

On Watch: What are some of SEA 05's objectives in 2009 that directly support NAVSEA's goals of: (1) Build an Affordable Fleet; (2) Sustain today's Fleet efficiently and effectively; and (3) Enable our people?

Eccles: SEA 05 has initiatives in all three areas that really are paying off. Our Documents for Ships Cost Reduction program and our participation in the Commonality initiative are examples of how SEA 05 is helping to build an affordable future Fleet. In the Documents for Ships Cost Reduction program, SEA05's Technical Warrant Holders work closely with their industry partners to drive costs out of specifications and standards, to the benefit of acquisition programs and in-service activities. The Commonality program is contributing to reducing the cost of acquisition programs by identifying common parts and systems that can be used across many platforms, thus increasing production runs and dramatically reducing both manufacturing and logistics support costs.

In sustaining today's Fleet efficiently and effectively, we are coordinating with Fleet Class Squadrons (CLASSRONs) to improve our responsiveness to the Fleet's most pressing technical challenges, which will give us the tools and awareness needed to identify cross-platform problems. Our new Energy Efficiency effort is exploring "quick wins" by helping the Fleet to reduce its fuel consumption today.

Finally, with regard to enabling our people, we continue to refresh our workforce at the entry level through the Navy Acquisition Intern Program while leveraging competency alignment techniques in partnership with the NAVSEA Warfare Centers to ensure the right people are doing the right work at the right time and place.

On Watch: If you had to name three programs that have made a difference in 2008, what would they be?

Eccles: I'd like to recognize three programs that are helping NAVSEA reach its goals. The Cumbersome Work Practices program is identifying and attacking unnecessary workload burdens both in shipyards and aboard ships. The Critical Safety Items program is helping to maintain the health and standards of those vendors who design, build and deliver some of the Navy's most critical systems and components. Finally, the *Virginia*-Class Maintenance Reduction Program is not only driving thousands of labor hours out of the maintenance process and increasing the length of time between availabilities, but is also serving as a model for changing paradigms and saving money in other ship classes.

On Watch: What is your overall assessment of SEA 05's direction and its impact on the Fleet?

Eccles: SEA 05 has been and always will be absolutely critical to Fleet operations. With the programs and initiatives either in place or planned, momentum and energy within the workforce continues to grow. And our engineering workforce, with its laser focus on the effective application of technical authority, is no doubt the best in the world, delivering world-class products and services to our Fleet and Program Executive Office customers.

TOMORROW'S CARRIERS

The future USS *Gerald R. Ford* (CVN 78) will bring superior warfighting capability to the Fleet when it is delivered in 2015. Graphic courtesy of Northrop Grumman

Since the commissioning of USS *Langley* (CV 1) in 1922, naval air power has been a fundamental element of our national security. Aircraft carriers remain the centerpiece of the nation's maritime ability to deter, fight and win major wars. Today, carriers are also a key element of building partnerships, preventing crises and confronting low-intensity, unconventional threats.

Accordingly, more is being expected of our carriers, requiring a new and improved design over the *Nimitz* class. The Navy and its industry partners have met this challenge with the *Gerald R. Ford* class, the first major investment in aircraft carrier design in 40 years.

But "better" isn't enough. Carriers need to be cost-effective to operate. The improvements inherent in the *Gerald R. Ford* class will enable manning of 500-900 fewer personnel than required to support the *Nimitz* class. These improvements are expected to result in a total ownership cost avoidance of approximately $5 billion over the life of each ship in the class. Like the *Nimitz* class, these carriers of tomorrow have a planned 50-year service life.

"USS *Gerald R. Ford* (CVN 78) and its sister ships will bring superior warfighting capability and meaningful quality of life improvements for Sailors," said Capt. Brian Antonio, the Navy's program manager for the *Ford*-Class Carrier Program.

Advanced construction of modules is already underway in Newport News, with keel laying to take place later this year. Already more than 25 percent of the ship's construction units are complete. Approximately 1,300 modular pieces, each weighing 15 to 200 tons each, will be assembled into the 100,000 tons of steel and alumi-

num that will be the first *Ford*-class aircraft carrier.

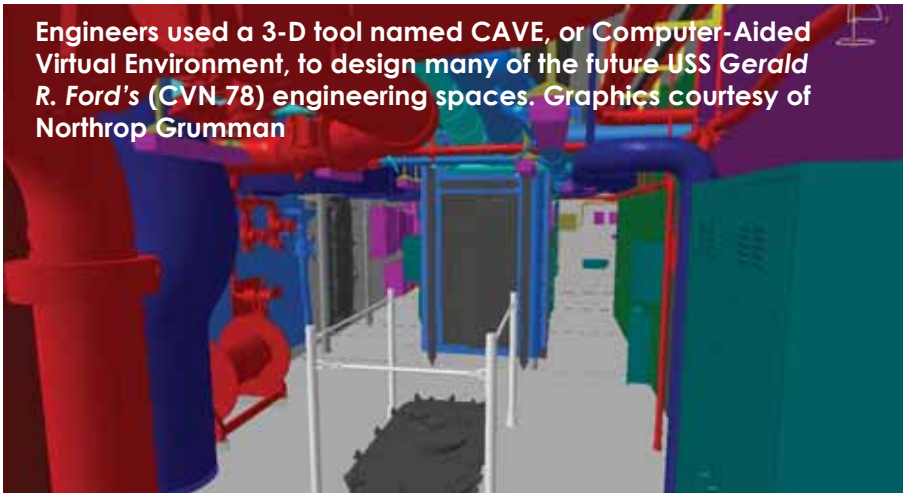
Designing tomorrow's carriers today requires a plan - actually thousands of them. In the days of wooden decks and tall sails, those plans would be individual diagrams. Plans and drawings depicting everything from the pitsword to the crow's nest were required. Fast-forward to the 21st century and you'll see the Navy and industry utilize CATIA and CAVE: two of the most advanced design systems in the shipbuilding industry.

CATIA, or Computer-Aided Three-Dimensional Interactive Application, is a software package that allows manufacturers to simulate all the industrial design processes, from the pre-project phase through detailed design, analysis, simulation, assembly and maintenance. CAVE, or Computer-Aided Virtual Environment, is a 3-D immersive environment tool for viewing certain areas of the CVN-21 CATIA product model and for refinement of the construction strategy. These 3-D systems will virtually lay the keel of a ship.

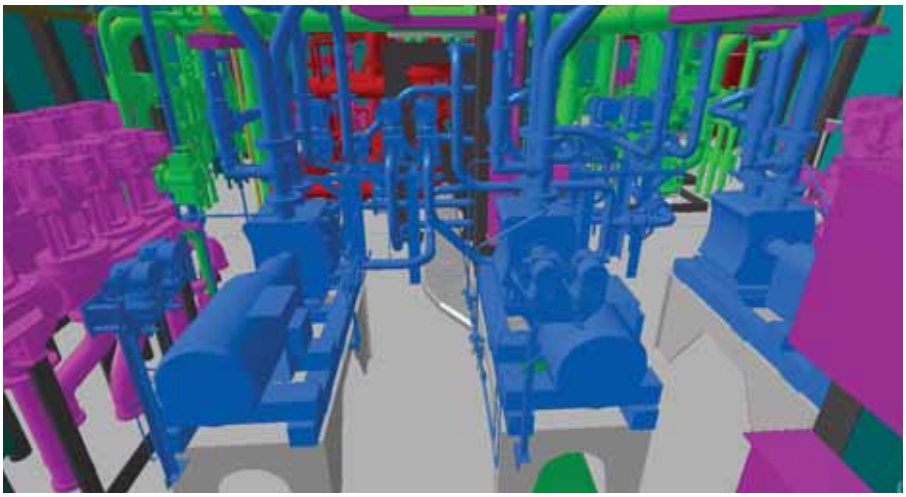
"... OUR AIRCRAFT CARRIERS ARE IMPORTANT BECAUSE THAT'S WHERE WE PROJECT OUR POWER AND THAT'S WHERE WE PUT IN THE FLEXIBILITY THAT MAKES US A GLOBAL NAVY THAT GIVES THE NAVY THE DETERRENT CAPABILITY THAT IT HAS."

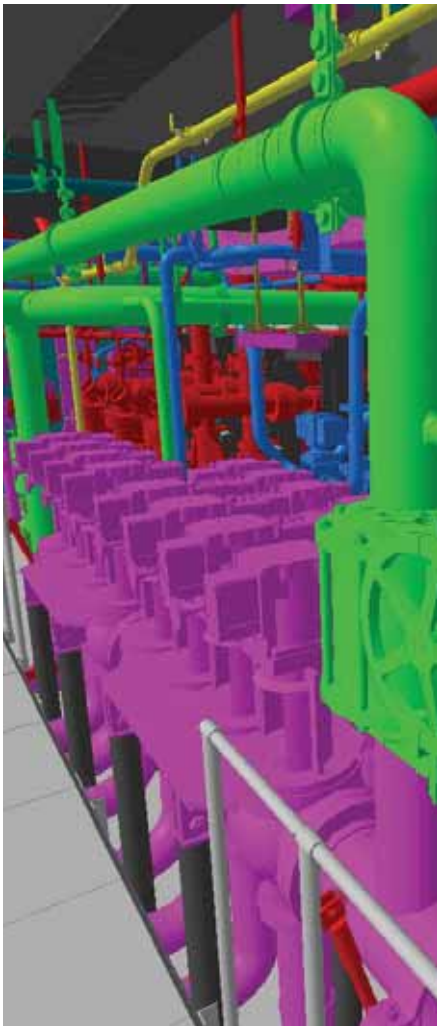
— CHIEF OF NAVAL OPERATIONS ADM. GARY ROUGHEAD

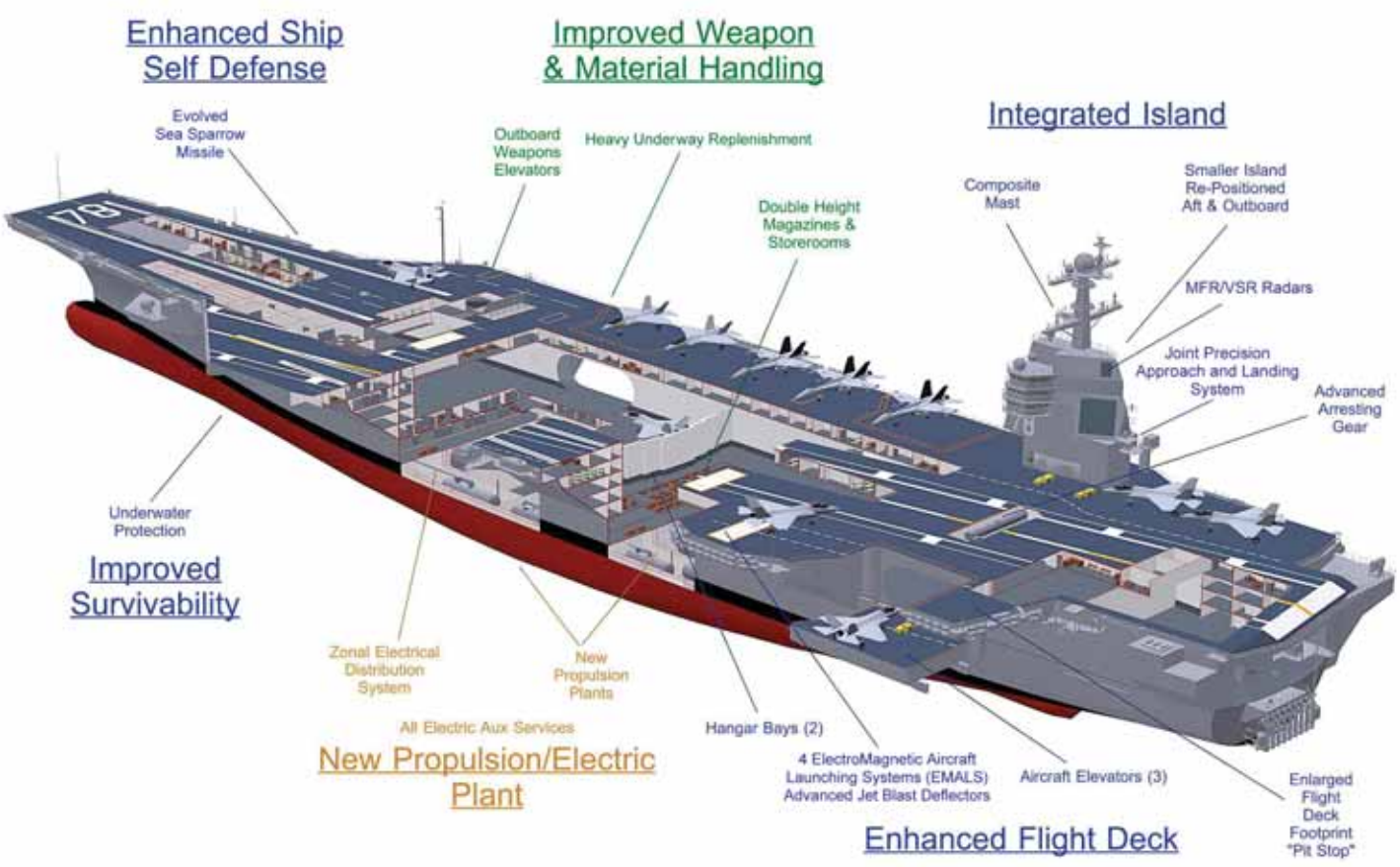
Ford is optimized to increase sortie rates and improve weapons movement for the F/A-18 *Hornets*, SH-60B *Seahawks* and E-2C *Hawkeyes* of the embarked air wing. Getting those planes on deck and in front of the plane captain is



Engineers used a 3-D tool named CAVE, or Computer-Aided Virtual Environment, to design many of the future USS *Gerald R. Ford's* (CVN 78) engineering spaces. Graphics courtesy of Northrop Grumman







The future USS *Gerald R. Ford* (CVN 78) will feature significant design improvements in the areas of warfighting and Sailor quality of life. Graphic courtesy of Northrop Grumman

achieved by three deck edge elevators, each with twice the capacity of *Nimitz*-class elevators. An advanced weapons elevator with increased capacity also gets the bombs and laser-guided munitions up to the flight deck faster than before. These design changes will enable the Navy to significantly increase the number of aircraft launches and recoveries during high-tempo operations.

The enhancements continue inside the skin of the ship. The ship's self defense system will incorporate more open architecture features, making future upgrades easier and more affordable when combating tomorrow's threats. A new nuclear power plant will deliver twice as much power as the *Nimitz* class. Significant habitability improvements will also be incorporated. Auxiliary services will be all-electric and a zonal electrical distribution system will be implemented. All-electric utilities means less maintenance and significantly easier upgrades for the ships systems.

The application of all the ship's electrical power extends from bow to stern, and reaches up and into the island. While smaller than the *Nimitz* class, this superstructure supports a powerful radar to identify friend or foe. The Dual-Band Radar (DBR) is capable of simultaneously supporting anti-air, situational awareness, ground attack, naval gunfire support, surface search, ship's navigation and even air traffic control functions. DBR even looks different when compared to the traditional-style rotating radars.

"It's a flat phased-array antenna design with fewer moving parts, so it's more reliable than the SPS-49, SPS-67 and SPQ-9B radars found on the *Nimitz* class," said Antonio.

The *Gerald R. Ford* class is combining advanced capability with increased affordability to implement our nation's maritime strategy today and tomorrow. ■

JHSV: COMBINING SPEED WITH LIFT

In 2005, the acquisition executives for the Army and Navy signed a memorandum merging the Army Theater Support Vessel (TSV) and the Navy High Speed Connector (HSC), taking advantage of the programs' inherent commonality.

The agreement was the first step in acquiring the Joint High Speed Vessel (JHSV) class, a high-speed, shallow-draft transport ship designed to support the intra-theater delivery and maneuver of personnel, supplies and equipment for the Marine Corps and Army.

On Nov. 13, 2008, the Navy awarded Austal USA a $185 million fixed-price incentive contract modification for detail design and construction of the first JHSV. The contract modification also includes options for up to nine additional ships and associated shore-based spares. The nine additional ships are expected to be awarded between 2009 and 2013.

JHSV will be capable of transporting 700 short tons of cargo and personnel up to 1,200 nautical miles at an average speed of 35 knots. Graphic courtesy of Austal USA

"Now that the contract is in place, we're excited to complete detail design and get these ships under construction," said Capt. George Sutton, program manager of the Navy's Strategic and Theater Sealift program. "JHSV will be an asset to combatant commanders, who will have the flexibility to use them in a variety of roles, including supporting the Global War on Terrorism, conducting humanitarian assistance/disaster relief, supporting special operations forces, and supporting emerging joint seabasing concepts."

JHSV will be capable of transporting 700 short tons 1,200 nautical miles at an average speed of 35 knots, and will be operational in sea state 3 and survivable in sea state 7. The ship will be equipped with a flight deck to support day and night air vehicle launch and recovery operations. JHSV will have airline-style seating for more than 300 and fixed berthing for approximately 100 more.

The Army will own and operate the Army-funded vessels after delivery and will be responsible for crew training and vessel maintenance. The Navy will have the same responsibilities for the Navy-funded vessels.

The first JHSV, an Army vessel, is scheduled to join the Fleet in 2012.

An air crewman assigned to Helicopter Anti-Submarine Squadron Two crouches in the door of an SH-60F helicopter. Photo by M. Jeremie Yoder

ASW: STALKING THE SHADOWS

During the past year, Program Executive Office Integrated Warfare Systems (PEO IWS) has supported the Navy's critical anti-submarine warfare (ASW) capabilities with innovative contracting and development strategies that maintain technical superiority, maximize efficiencies and reduce costs.

Specifically, PEO IWS's combined use of the incremental development model and peer review are leading the way in delivering top-notch technical systems to the Fleet faster and with less expense.

Through what is called an Advanced Capability Build (ACB) process, a defined set of capabilities are developed in increments, allowing refinement through each phase. Rather than having one organization as the deciding entity for technical material products, PEO IWS leverages the peer review process using a collaborative team of technical experts from government, industry, and university-affiliated research centers to provide feedback and realize efficiencies.

This proven strategy not only realizes cost efficiencies, but also accelerates the development process — shaving an eight- to 10-year development timeframe down to two years.

"The peer review process, plus the incremental development, are key to keeping our systems top of the line in terms of quality and efficiency," said Capt. Charles A. Davis, PEO IWS program manager for undersea systems. "And, that is vitally important when you're faced with the challenge of providing war-fighters with the best tools possible so they can do their jobs."

PEO IWS's new business strategies have also impacted contract and acquisition practices. For the AN/SPS-74 Carrier Periscope Detection Ra-

Sailors monitor contacts on an AN/SQQ-89V15 Surface Anti-Submarine Combat System aboard USS *Momsen* (DDG 92). Photo by MC2 James R. Evans

dar system, the program office made the move this past year to separate acquisition of the sensor from acquisition of the computing environment and signal processor. Using open architecture (OA) principles, this move dramatically reduced the cost of the system and brought together multiple contractors to provide an integrated capability to USS *George Washington* (CVN 73) quickly.

"It's a terrific example of the open architecture precepts and acquisition approach to realize more rapid capability developments," Davis continued. "Because the technologies were developed in parallel, it allowed a faster, more efficient development."

Fiscal Year 2009 will see delivery of the AN/SQQ-89A(V)15, the latest variant of the AN/SQQ-89 Surface Ship ASW Combat System. It will be the most capable and supportable surface ASW combat system in the world by design. A product of incremental development and peer review, this system builds on the submarine community's 10-year success with their advanced processing builds.

"We're building all of these systems using OA constructs, and building with common data strategies," Davis concluded. "It's a good example of where we're headed with respect to OA and implementing the IWS objective architecture — it's all about sensors and software components living in a common architecture." ■





NAVSEA WARFARE CENTERS

EFFICIENCY AND EFFECTIVENESS IN ACTION

The NAVSEA Warfare Centers have a proud heritage of providing superior products and services to the warfighter, and continued to demonstrate their tradition of excellence in 2008 as the Navy's principal research, development, test and evaluation (RDT&E) assessment activity for surface ship and submarine systems and subsystems.

Warfare Centers are the national stewards for the Navy's technical capabilities and are uniquely qualified to respond to the full range of the warfighter's needs. To ensure the right people with the right skills are available, the Naval Surface Warfare Center (NSWC) and Naval Undersea Warfare Center (NUWC) embraced the benefits of a competency aligned organization (CAO), allowing the best use of resources across the NAVSEA organization. Additionally, the ongoing management and prioritization of resources within the Warfare Centers from a "national" perspective contributed directly to the stand-up of the Surface Ship Life Cycle Management (SSLCM) Activity, a critical new NAVSEA initiative that supports a Chief of Naval Operations priority. SSLCM Activity will be comprised of a dedicated group of engineers whose sole purpose will be to focus on surface ship maintenance, fulfilling NAVSEA's dedication to provide for the care and maintenance of the surface Fleet throughout a ship's life, and meeting the challenges of sustaining a 313 ship Navy.

To ensure the ultimate customer – the warfighter – receives the most effective and efficient solutions, the

Chief of Naval Operations Adm. Gary Roughead tours Naval Undersea Warfare Center Keyport. Photo by MC1 Tiffini M. Jones

Warfare Centers have been staunchly committed to the attention and care of the technical workforce and to continuous process improvement. The result is that NAVSEA's Warfare Center divisions generated Net Operating Results (NOR) gains of $38.8 million in fiscal year 2008. This profit was returned to the divisions' customers via rate reductions on the fiscal year 2010 stabilized rates and represents real savings for the Navy. In support of Vice Adm. Kevin McCoy's 100-Day Transition tasker to reduce costs in support of warfighting enterprises, the Warfare Centers continue to develop and provide alternative technical solutions using a risk-based approach. They have been working closely with customers to identify areas in which prudent risk is acceptable – with associated cost savings – and helping customers understand what they are funding at a rolled-up level by improving and standardizing how task statements are written.

These and other efforts to invigorate new thinking provide Navy leadership with the tools to make the best decisions. In 2008, the Warfare Centers continued to actively seek fresh perspectives and challenge established ways of doing things. They re-examined efforts to identify low-value cost drivers (standards, specifications, tools, processes, etc.), questioned requirements, and subjected status quo assumptions about technical practices to rigorous assessment. The common thread throughout these endeavors is the synergy that emerges when the Warfare Centers pool resources and skills, and the result is

enhanced performance through collaboration and partnering with other government organizations, industry and academia. In a year marked by many achievements, a number of the Warfare Centers' collective successes stand out as particularly noteworthy.

Build an Affordable Future Fleet

"Improved cross-warfare center integration and collaboration have considerable advantages for the Navy warfighter," noted Rear Adm. Jim Shannon, Commander, NSWC. "An outstanding example of the level of coordination we've achieved is evident in the Warfare Centers' support for the Littoral Combat Ship (LCS)."

A number of the Warfare Center divisions made significant contributions to the LCS-class ships over the past year. NSWC Dahlgren unveiled the LCS Surface Warfare Mission Package designed to rapidly detect, track, and prosecute small boat threats. The new capability will enable on-scene commanders to protect local assets and quickly move a force through a strategic waterway. NSWC Dam Neck and Panama City devised an innovative approach for the design and development of the LCS Multiple Vehicle Communications System that lays the foundation for cost-effective RF data link upgrades by standardizing the communications network interfaces to vehicle command and control (C2) applications. NUWC Newport's LCS Anti-Submarine Warfare Mission Package team successfully demonstrated the feasibility of achieving a full suite of undersea warfare (USW) technologies in an unmanned warfighting system; in recognition of their success, the Newport team was chosen as a recipient of this year's NAVSEA Engineer of the Year Award. NSWC Carderock led the Mission System Ship Integration Team responsible for developing, managing, and verifying the Mission System to Ship HM&E interfaces, which enable the LCS to affordably support multiple, focused missions. In 2008, NSWC Carderock's efforts were concentrated on verification of Seaframe and Mission Package interfaces, ensuring compliance with Interface Control Documents, and resolving discrepancies. The Mission Package Support Facility, for mission modules used on the LCS, is located at NSWC Port Hueneme, the logistics lead for the LCS.

Chief of Naval Operations Adm. Gary Roughead tours the Office of Naval Research electromagnetic railgun (EMRG) at Naval Surface Warfare Center, Dahlgren, Va., following the successful record-setting firing. Photo by John F. Williams

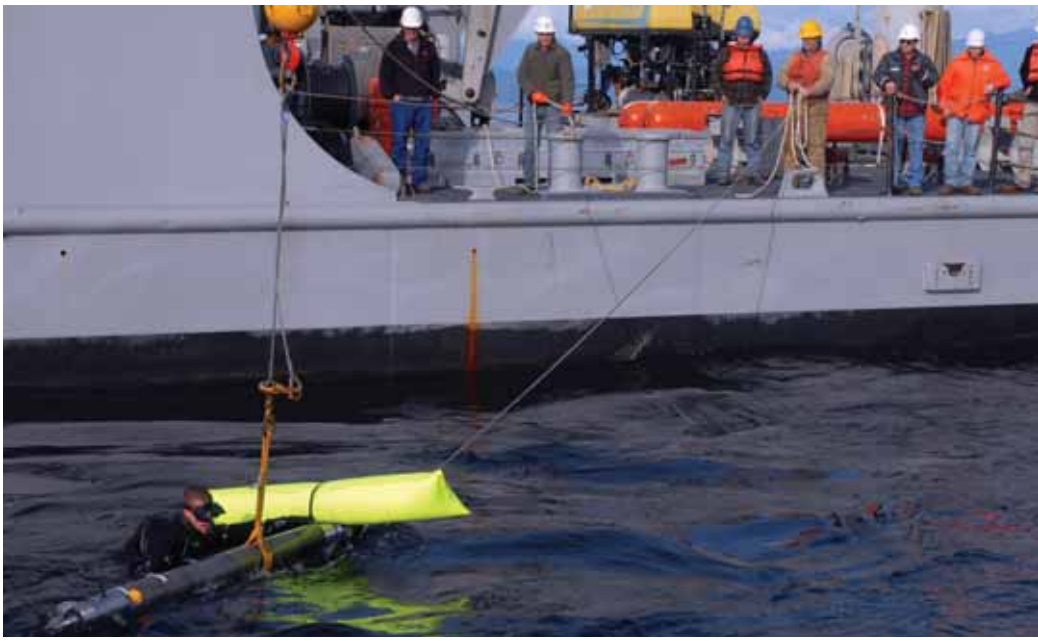
The Warfare Centers achieved several milestones in the development of unmanned systems, including unmanned undersea vehicles (UUVs), unmanned surface vehicles (USVs), and autonomous unmanned vehicles (AUVs). NUWC Newport hosted AUV Fest 2008, during which 13 AUV technologies, developed by industry, academia, NUWC, and NSWC Panama City, successfully demonstrated Navy mine countermeasure mission objectives, including mine hunting, mine neutralization, and hull inspections. In addition to the technology demonstration aspects of this significant event, a unique aspect of AUV Fest 2008 was a partnership with the National Oceanic and Atmospheric Administration that allowed marine archaeologists to use the AUVs and their onboard technologies to survey two sunken Revolutionary War-era British frigates in Rhode Island's Narragansett Bay.

"AUV Fest 2008 was a standout because of the level of collaboration across organizations and activities, and because very forward-lean-

ing, cutting-edge technologies were used," said Rear Adm. David Johnson, NUWC Commander.

Other notable contributions in unmanned systems technology were provided by NSWC Port Hueneme and NSWC Panama City. NSWC Port Hueneme converted the decommissioned destroyer ex-USS *Paul F. Foster* (DD 964) into a remote-controlled test and evaluation asset to use for advanced weapons evaluation without putting personnel at risk; and personnel from NSWC Panama City helped complete technical evaluation and training of the Remote Minehunting System (RMS) aboard USS *Bainbridge* (DDG 96). The evaluation enables the Navy to continue training on the system, designed as part of the Mine Warfare Mission Package for the Littoral Combat Ship.

In 2008, NUWC's Undersea Distributed Netted Systems (UDNS) initiative made significant progress toward its objective of addressing gaps in mission capabilities and using a system engineering process and end-to-end, or detect-to-influence, framework. NUWC developed and demonstrated this end-to-end UDNS testing capability using existing systems and prototype systems. In addition, NUWC partnered with the Naval War College to define a series of UDNS workshops, culminating in a UDNS wargame, to explore the warfighting potential of UDNS. As part of that process, NUWC conducted an innovation cell to generate innovative UDNS concepts, and together with the Naval War College, hosted two technology workshops where technologists from the anti-submarine warfare (ASW) community developed and refined operational concepts that employ distributed netted systems for ASW.



Naval Undersea Warfare Center Keyport Navy Diver 2nd Class Jeremiah Ruddell retrieves a test vehicle following a range exercise. U.S. Navy photo

Emeka Ebirim tests a laser at Naval Surface Warfare Center Dahlgren. Photo by D. Kevin Elliott

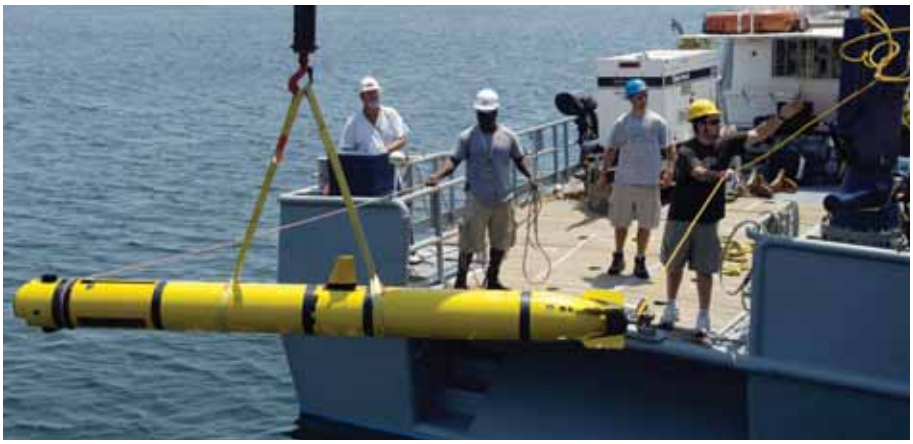
Other Warfare Center contributions toward building an affordable future Fleet included the development of advanced propellant formulations to improve performance and lower the cost of traditional guns at NSWC Indian Head, and the world record-setting firing of an innovative electromagnetic railgun at NSWC

Dahlgren. The railgun technology uses high-power electromagnetic energy instead of explosive chemical propellants (energetics) to propel a projectile farther and faster than any preceding gun. NSWC Carderock is making contributions through their ongoing collaborative efforts with international navies, fabricators, shipbuilders, and academia to assess the potential impact of composite materials and hulls on reducing Navy shipboard weight and life-cycle cost, while increasing payload, cruising range, and durability.

Sustaining Today's Fleet Efficiently and Effectively

The Warfare Centers' effectiveness in collaboration was demonstrated in February 2008 with the successful intercept of a failing satellite. NSWC Dahlgren engineers worked side by side with experts from NSWC Port Hueneme and Corona to ensure USS *Lake Erie's* (CG 70) success in using a modified Standard Missile 3 and Aegis weapon system to shoot down the satellite. The team then performed an immediate reinstall of the tactical Aegis Ballistic Missile configuration to three ships that ensured continued support of their missions protecting the interests of the United States and its allies.

The Warfare Centers substantially contributed to ensuring that the Navy's ships maintain full combat readiness and maximized in-service availability through their full design life, successfully conducting innumerable SHIPALTS, ORDALTS, OPALTS, and TEMPALTS. For example, NUWC Newport and Keyport directly performed or supported more than 322 of the aforementioned alterations in 2008. A specific example is provided in NSWC Crane's installation of the first increment of the Shipboard Protection System (SPS) in 2008. The system, the first of its kind, integrates long-range Electro-Optic multi-sensors with ship's radar and navigation systems to provide 360-degree situational awareness to counter surface threats while pierside or in restricted waters. NSWC Dahlgren and Crane worked with USS *Benfold* (DDG 65) to complete SPS pierside and underway test events. *Benfold* is the first ship outfitted with SPS, which integrates the AN/SPS-73 Surface Search Radar with twin electro-optical/infrared cameras to identify threats from high-speed seaborne small craft.



A Midsize Automated Research Vehicle (MARV) is hoisted aboard Project Support Craft 12 following pierside testing during Autonomous Underwater Vehicle (AUV) Fest hosted by the Naval Surface Warfare Center Panama City. Photo by John F. Williams

Another significant Warfare Center installation involved several NSWC divisions. NSWC Panama City developed and built the Deployable Joint Command and Control (DJC2) Maritime Variant Demonstrator, a prototype of a Joint Task Force (JTF) headquarters afloat C2 capability. It was designed as a proof of concept by the DJC2 Joint Program Office in partnership with Commander, U.S. 2nd Fleet. After NSWC Panama City completed production, NSWC Dam Neck installed the prototype on USS *Bataan* (LHD 5), where it was successfully tested by U.S. 2nd Fleet during a 2008 JTF exercise. The Maritime Variant Demonstrator is totally autonomous in providing C2 capability and can be installed on a ship of opportunity, requiring only the ship's power source to operate in theater.

A number of Warfare Center initiatives focused on solutions to the Global War on Terrorism and irregular warfare. NSWC Indian Head designed, developed, and produced the Mk 146 Mod 0 warhead to meet the demanding insensitive munitions requirements of in-theaters shipboard operations. NSWC Explosive Ordnance Disposal Technology, Corona, Crane, and Dahlgren divisions supported Counter Radio-Controlled Improvised Explosive Device Electronic Warfare initiatives in direct

support of Fleet, field, and combatant commanders, while NSWC Panama City paved the way for improvements to the closed-circuit MK MOD 1 Underwater Breathing Apparatus. NUWC Newport completed development of the first User Operational Evaluation System of its Integrated Swimmer Defense program in July 2008. Critical proof-of-concept tests were conducted with simulated combat divers in Newport, R.I., in August 2008.

NUWC Newport and NSWC Corona Sailors with the latest calibration procedures and reduces calibration time to approximately one-fourth of that previously required.

NSWC Panama City sponsored and conducted a significant homeland security experiment in 2008 with the assistance of the Office of Naval Research and the Naval Mine and Anti-Submarine Warfare Command. Simulated underwater improvised explosive device and mine shapes were placed in the waters of Tampa Bay, and two types of AUVs were used to locate and neutralize them as part of an end-to-end minehunting operation. Hosted by the U.S. Coast Guard in St. Petersburg, Fla., the experiment established an interagency Incident Command Post and included an underwater forensic survey of a post-blast debris field. Bottom mapping data from this experiment, provided to Naval Oceanographic Office, is now part of the baseline set and could be used to enable rapid and accurate change detection during a real-world response.

The Joint Warfare Assessment Lab theater at NSWC Corona provides a setting for collaborative performance assessment. U.S. Navy Photo

enhanced training and support provided over the past year. Newport developed modeling and simulation for the Submarine Multi-Mission Team Trainer (SMMTT), which represents a revolutionary leap forward in the delivery of submarine attack center trainers. The NSWC Corona-patented Metrology Benchtop system, otherwise known as METBENCH, enables automated ship-based calibration procedures to be developed in the lab and deployed to the Fleet via satellite. The system provides

In the range test and evaluation area, NUWC Keyport oversaw test events of extraordinary complexity in operation on their Dabob and Nanoose Ranges in Washington and British Columbia, Canada, respectively. The development of the Portable Underwater Tracking System for independent organic submarine precision tracking, along with the integration of modern technologies in portable ranges for tracing and eavesdropping of UUVs, has supported a growth in range capabilities for anytime-anywhere test and evaluation.

These examples of the Warfare Centers' many accomplishments throughout 2008 are the results of the efforts of a highly qualified and committed workforce.

"The NAVSEA Warfare Centers' highly skilled personnel are absolutely tenacious in their pursuit of technical quality. When you hear someone make reference to the Navy's 'intellectual capital', they are at the top of the list," said Shannon.

People are the Warfare Centers' most valuable resource, today and in the future. They contribute every day to mission success, working closely with customers to sustain today's Fleet, and build ships and systems for the Next Navy and the Navy after Next.

"Our strength is and will always be in our people," said Johnson, "and we are fully committed to the development of our workforce as an inherent part of fulfilling our mission." ■

ENABLE
OUR PEOPLE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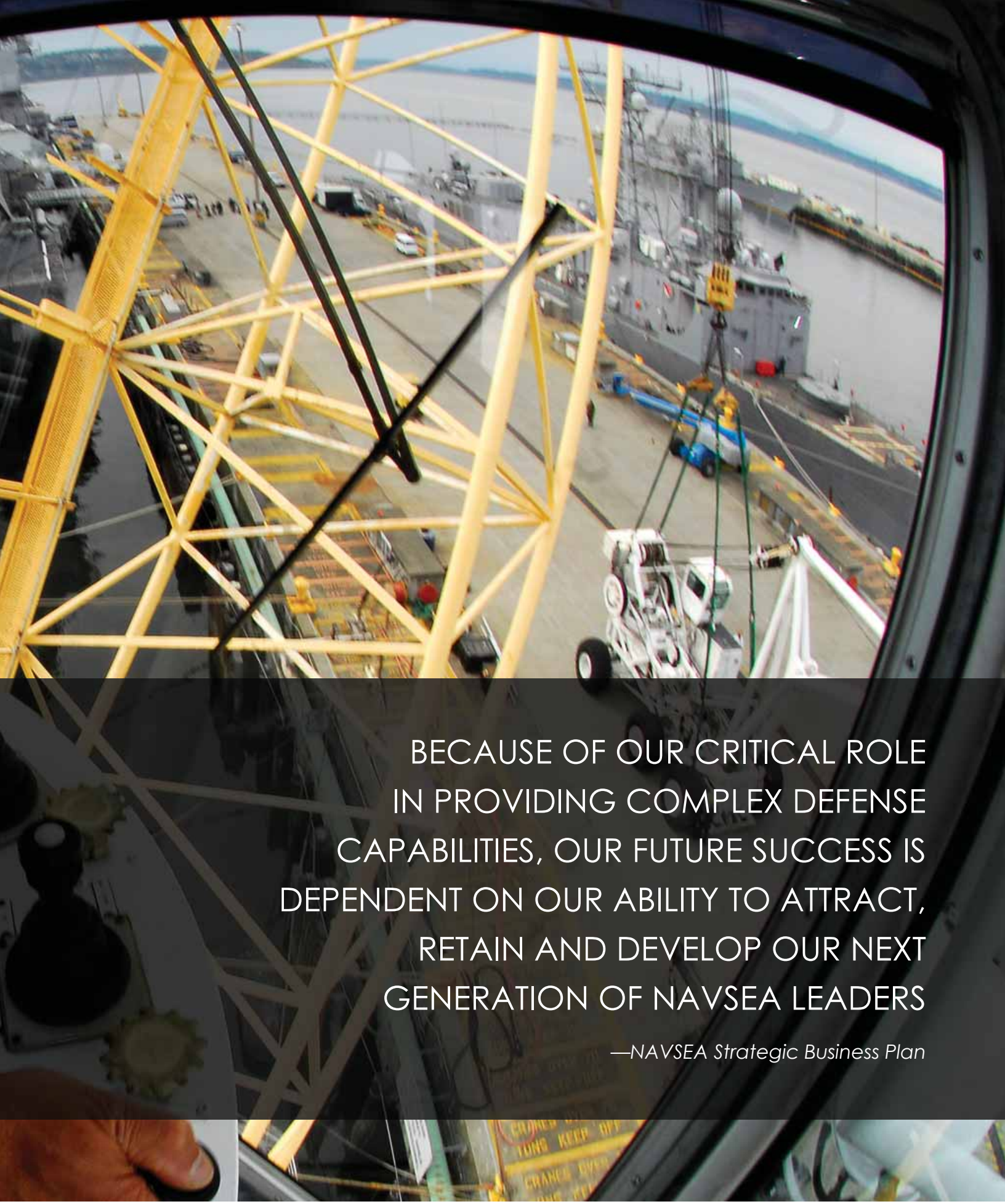


BECAUSE OF OUR CRITICAL ROLE IN PROVIDING COMPLEX DEFENSE CAPABILITIES, OUR FUTURE SUCCESS IS DEPENDENT ON OUR ABILITY TO ATTRACT, RETAIN AND DEVELOP OUR NEXT GENERATION OF NAVSEA LEADERS

—NAVSEA Strategic Business Plan

NAVSEA:

EXTRAORDINARY CAREERS. UNIQUE POSSIBILITIES.

Pipefitter apprentice Bryan Koike takes measurements for a piping run at Pearl Harbor Naval Shipyard, Pearl Harbor, Hawaii. Photo by Marshall Fukuki

As part of the NAVSEA strategic business plan goal to "Enable Our People," NAVSEA is looking for the next generation of employees for its shipyards, warfare centers, headquarters and other activities. 2008 saw the formation of a new partnership between all NAVSEA components. The partnership's goal: To recruit the next generation of professionals with diverse cultures and backgrounds to provide innovative solutions for the Navy's engineering, management, financial and scientific challenges.

Rather than running recruiting efforts through the multiple pillars of the command, a unified corporate recruiting strategy was developed in 2008 to leverage resources while presenting new recruits a complete picture of the career opportunities across NAVSEA.

"We are showing one face, like NASA or Microsoft," said Tony Gibert, recruiting and outreach liaison for the warfare centers.

Job candidates have a more comprehensive understanding of the opportunities that NAVSEA has to offer and the variety of interesting work being performed across NAVSEA's more than 30 activities. The approach helps NAVSEA compete with private companies that are also looking to hire the 'best and the brightest.'

NAVSEA is hiring engineers, scientists and other professionals to meet the challenges of tomorrow. U.S. Navy photo

"Instead of going to the same event representing ourselves separately, we're representing ourselves holistically but talking about the opportunities in different areas," said Russ Shiplet, NAVSEA's naval shipyards recruiting coordinator. "It allows us to share resources rather than competing. It also allows us to provide candidates greater opportunities because of our geographic breadth and unique activities."

Representatives from NAVSEA headquarters, warfare centers and shipyards gathered in Newport, R.I., and discussed recruiting at a corporate level in June 2008. A telling moment came when the group viewed a map of the United States that was highlighted to show where all of the unique offices recruited new employees. Forty-four of the 50 states and Puerto Rico were covered.

"We immediately recognized the benefit and efficiency that could be gained by a partnership strategy," said Alan Dean, deputy business executive for workforce at NAVSEA Warfare Centers.

NAVSEA's common repository for resumes allows information on candidates to be shared with recruiters across the organization. NAVSEA also implemented measures to track how successful the organization has been at following up with potential hires.

The partnership allowed Shiplet, from the shipyards, to inform one promising young candidate about an internship program at headquarters. It allowed headquarters access to a candidate they might have missed, and by establishing a relationship, the candidate might check out shipyard work down the road. Shiplet also advised a married couple, both potential hires, about opportunities across the country, rather than just in one region.

"Once a potential candidate really understands NAVSEA, it should be apparent that, while the average college graduate today will change careers every five to seven years, NAVSEA employees can move around within the organization and build an entire 30- or 40-year career without leaving the NAVSEA family," he said.

From left: NAVSEA interns Tuan Vu, Nathan Good and Courtney Crittenden complete rotations and challenging assignments during their first three years with NAVSEA. Photo by Nicole Martin

Those who don't stay at NAVSEA forever also come out ahead, he said.

"The benefits and experience that they gain in their career will provide them a strong foundation for other jobs in DOD, government, industry, or academia," Dean said. "And that benefits the nation as a whole." ■

OUR PEOPLE, OUR STRENGTH

CULTIVATING THE 21ST CENTURY WORKFORCE

As purposely focused as the organization is about building and maintaining the Fleet, NAVSEA is equally committed to enabling our people. Without the talent and contributions provided by the more than 50,000 men and women of NAVSEA, achieving the Fleet of the future and sustaining the Fleet of today wouldn't be possible.

NAVSEA's objective is to recruit, develop and retain a high-performing, competency-based workforce and give our employees the tools they need to succeed. NAVSEA is approaching this challenge from several fronts.

Retain, Develop

When it comes to growing the future leaders of America, hiring bright employees is only part of the answer. Once a talented new employee joins the NAVSEA team, we must offer them career and personal development opportunities.

To welcome new members to the team, NAVSEA created an on-boarding program in 2008. The program provides a mentor to help integrate new hires into the organization, a series of foundational workshops/seminars over a period of 60 to 90 days, a scheduled tour to "Meet the Fleet" in Norfolk with a senior leader and a continuous dialogue on how the employee is being integrated into the command.

Through NAVSEA's four-year shipyard apprenticeship program, more than 500 apprentices at NAVSEA-operated shipyards and intermediate maintenance facilities transitioned to journeymen in 2008. The training program combines hundreds of hours of academic classes and trade theory classes, along with thousands of hours of on-the-job training. Many apprentices are even able to earn an associate's degree as a part of the program.

Careers at NAVSEA span the country in a full range of environments, from industrial to scientific research to office cubicle. Outreach efforts to the next generation employee emphasize flexibility and variety in tomorrow's career opportunities. U.S. Navy photos

"Apprenticeship programs are so powerful," said Virginia Governor Timothy Kaine, at Norfolk Naval Shipyard's graduation ceremony in October 2008. "They're great ways to train the workforce to do needed work, and there is no apprenticeship program in the United States that has the history and the quality of this particular apprenticeship program."

NAVSEA's ongoing efforts to empower and enable every individual to reach their full potential begin with making sure there are opportunities for everyone to rise to the most senior levels of leadership.

NAVSEA's future leaders can also hone and enhance executive core competencies necessary for leadership positions through the Commander's Development Program (CDP). CDP is a 14-25 month program of rotational assignments, coupled with special development courses and other management training, which selects and prepares high-performing personnel to fill key leadership positions within the command.

As a part of the NAVSEA Executive Education Program, all NAVSEA employees have the opportunity to earn a certificate in public management and a master's degree in public affairs from Indiana University. Tuition is centrally funded, and employees are able to earn the degree while still working in their positions at NAVSEA.

Outreach and Awareness

To meet future challenges, the command is building a diverse workforce that embodies innovation through diversity of thought. NAVSEA's path to building a culture that welcomes new ideas and values individual contribution begins with outreach and awareness and is reinforced by management accountability.

Educational outreach programs and small business initiatives help NAVSEA foster the future workforce in the community, as well. Senior leaders at Naval Ordnance Safety and Security Activity serve as members of

the Charles County, Md., Blue Ribbon Commission on Diversity and Inter-group Relations. Portsmouth Naval Shipyard held a Diversity Focus Day that attracted hundreds of employees in August, while Puget Sound Naval Shipyard and Intermediate Maintenance Facility created a Diversity Team to attract the outside community into learning more about the facility. Also in Washington state, NUWC Keyport's *Diversity Day* Street Fair in the summer featured 47 display booths on cultural, educational, and special focus programs.

College Partnerships

As the demographic of America evolves, NAVSEA understands that traditional recruiting sources and methods will no longer suffice to create and sustain a culture of innovation, so the command is reaching out to academic institutions in every segment of our population.

In partnership with the Advancing Minorities' Interest in Engineering (AMIE) organization, the deans of 13 Historically Black Colleges and Universities (HBCU) engineering colleges and the Office of Naval Research, NAVSEA is funding 24 scholarships for students pursuing degrees in science, technology, engineering or math. NAVSEA strives to have 50 NAVSEA-funded scholars by fiscal year 2010 and 100 scholars in fiscal year 2013.

NAVSEA activities across the country are engaging with universities and colleges that focus on minority groups. Norfolk Naval Shipyard forged partnerships with the region's two HBCUs, Hampton and Norfolk State Universities. The shipyard supported Norfolk State's Technical Assistance Conference in April, providing keynote speakers and workshop demonstrations.

NSWC Indian Head and Explosive Ordnance Disposal Technology Division recently forged an educational partnership agreement with the Polytechnic University of Puerto Rico that allows the division and the school to work collaboratively toward mutual goals. NSWC Dam Neck engineers are partnering with Old Dominion University, Norfolk, Va., on developing papers, research, curriculum and collaborative initiatives in the areas of Systems Engineering, and Research and Development Management.

The Naval Sea Logistics Center is partnering with Pennsylvania State University, Messiah College and other institutions, as well as participating in Wounded Warrior hiring fairs, to continue to diversify its workforce. The Surface Combat Systems Center maintains an active relationship with the University of Maryland Eastern Shore, an HBCU, to recruit young engineers. The activities' leader-

Employees at Naval Surface Warfare Center Panama City discuss career opportunities like NAVSEA's Commander's Development Program. U.S. Navy photo

ship is also active in the engineering classrooms at the university.

Elementary – High School Mentoring

Through efforts to further diversity and combat the decline in younger individuals seeking careers in Science, Technology, Engineering and Mathematics (STEM), NAVSEA has become increasingly involved – both in participation and funding – with programs that encourage young men and women to pursue challenging career paths at an early age.

In 2008, both Puget Sound and Norfolk Naval Shipyard created tutoring programs for their local public school systems to excite children about future careers working for the Navy.

Over the summer, engineers from Explosive Ordnance Disposal Technology, NSWC Carderock, NSWC Indian Head and NSWC Dahlgren mentored middle and high school students at the Patriots Technology Training Center. During the technology camp, NAVSEA engineers inspired young students to consider STEM careers by teaching them to build small, remotely-operated vehicles, program robots for surface and underwater use, create and launch rockets, and assemble computer systems.

A college intern and NAVSEA environmental specialists perform tests at Surface Combat Systems Center Wallops Island. Photo by MC1 Jason Brunson

Similarly, more than 90 middle school students built, programmed and deployed robots on fictional missions to save lives, deliver humanitarian aid and construct sea bases at the Virginia Demonstration Project (VDP) summer camp held at NSWC Dahlgren.

"VDP will be leveraged as a corporate tactic for scholastic engineering development in support of the NAVSEA strategic plan," added Joe Coleman, NAVSEA VDP Element 1 lead. "It's the model that NAVSEA is proposing to implement at nine Warfare Centers and four shipyards over the next year as Element 1 of our 21st Century Engagement, Education, and Technology Program."

At NSWC Panama City, scientists and engineers teamed with local teachers June 9-20, 2008, to immerse 100 local middle school students in a summer camp of hands-on experiments using Department of Defense-sponsored STEM Learning Modules. In Rhode Island, NUWC Newport employees partnered with local middle school students to demonstrate remotely operated vehicles at the Autonomous Undersea Vehicle Festival in May 2008. NUWC Newport scientists and engineers voluntarily worked with students for several weeks, building the vehicles and testing them in underwater tank facilities.

NSWC Corona participated in the annual Science and Technology Education Partnership Conference, one of California's largest showcases of

Shipyard employees in NAVSEA's apprenticeship program receive formal education and on-the-job training before transitioning to journeymen.

hands-on science and technology demonstrations and exhibits for K-12 students. Since NSWC Corona began supporting the event in 2000, it has reached nearly 30,000 of Southern California's diverse students.

Small Business Initiatives

NAVSEA's support of small businesses is being recognized at the local, state and national level. For example, NSWC Crane strengthened relations between the government and private sector with a technology transfer agreement that will enable southern Indiana businesses to benefit from Crane's science and technology expertise, as well as its facilities and equipment. Through this technology agreement, Crane will make more than 70 patents available to businesses, and will provide research assistance and access to personnel and resources.

"It's quite amazing to think that local businesses will be able to harness this technology and market it for practical purposes, opening up the possibilities for significant job creation and wealth creation in southwestern Indiana," said Jonathan Weinzapfel, mayor of Evansville, Ind.

NSWC Port Hueneme fostered small business by co-sponsoring the 20th Annual Navy Gold Coast Small Business Opportunity Conference that provided an educational forum to guide and assist businesses, particularly small businesses, in working with the government.

Giving Employees the Right Tools

Navy Enterprise Resource Planning

(ERP) will modernize NAVSEA's business operations, establish a single data set with management visibility, and eliminate costly and limiting legacy systems. Navy ERP will become the financial and business management system of record linked to the Navy's contract writing systems, and will provide workforce management, program management, and supply management capabilities.

In 2008, NAVSEA completed its transition to a Competency Aligned Organization (CAO). CAO is NAVSEA's strategy for creating an organization capable of responding to work demand signals generated by our customers in a disciplined and cost-effective manner. By matching the workforce to the workload demand and standardizing processes, NAVSEA will be able to deliver to the warfighter the right readiness, at the right cost, at the right time.

NAVSEA is becoming more efficient and effective by implementing Lean Six Sigma (LSS) as its primary Continuous Process Improvement (CPI) methodology. Through LSS/CPI, NAVSEA promotes a culture of innovation and quality to standardize and streamline procedures and reduce our fiscal footprint. Over the past four years, more than 3,000 LSS events and projects have been completed, generating more than $200 million in reported cost reductions annually.

Conclusion

Each day, NAVSEA's diversity and outreach efforts bring the command closer to its goal of building and sustaining the Fleet and growing a workforce that more closely mirrors that of the American demographic. Most importantly, NAVSEA's efforts – both internally and externally – are enabling today's workforce to keep America's Navy #1 in the world.

Above and below: From conference room to computer room, NAVSEA decisions directly impact America's men and women in uniform. Workforce efficiencies, outreach programs and public awareness projects help ensure NAVSEA's continued effectiveness. U.S. Navy photos

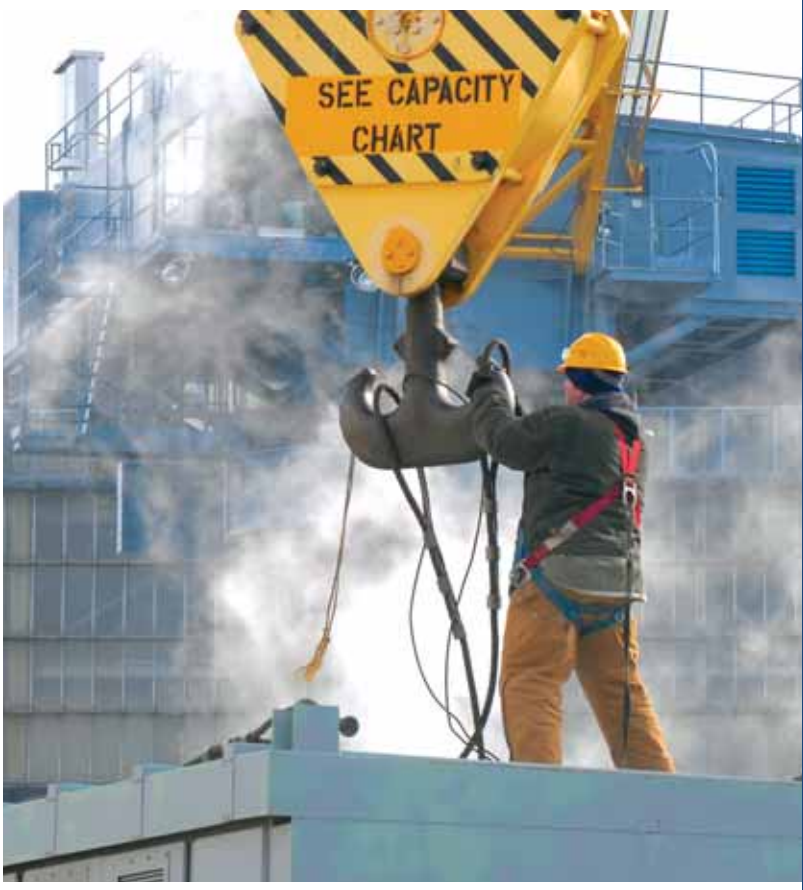
MISSION

WE DEVELOP, DELIVER AND MAINTAIN SHIPS AND SYSTEMS ON TIME, ON COST FOR THE UNITED STATES NAVY.

VISION

WE ARE THE NATION'S TEAM ACCOUNTABLE FOR ACHIEVING THE 313-SHIP NAVY:

- WE MUST OPERATE AS A DIVERSE ORGANIZATION WITH A SINGLE PURPOSE TO ENSURE THE U.S. NAVY REMAINS THE PREEMINENT MARITIME POWER
- WE MUST BE SUPPORTED BY A MODERN, EFFICIENT INDUSTRIAL BASE
- WE MUST BE A WORLD-CLASS EMPLOYER OF CHOICE THAT INSPIRES INNOVATION
- WE MUST SET THE VALUE-ADDED STANDARD FOR ACQUISITION, ENGINEERING AND MAINTENANCE



GOALS

BUILD AN AFFORDABLE FUTURE FLEET

SUSTAIN TODAY'S FLEET EFFICIENTLY AND EFFECTIVELY

ENABLE OUR PEOPLE:

- RECRUIT, DEVELOP AND RETAIN A HIGH-PERFORMING, COMPETENCY-BASED, MISSION-FOCUSED WORKFORCE
- BUILD AND VALUE A CULTURE OF DIVERSITY
- TRANSITION TO A COMPETENCY ALIGNED ORGANIZATION

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