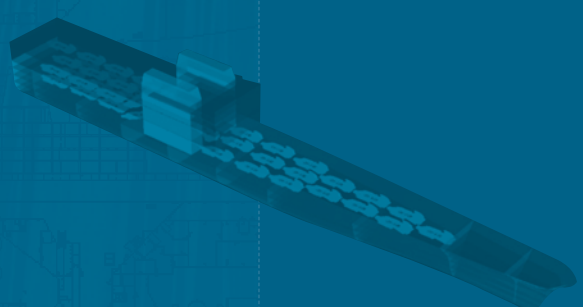


ON WATCH

NAVSEA
NAVAL SEA SYSTEMS COMMAND

2004 ENGINEERING THE VISION

ON WATCH

NAVSEA
NAVAL SEA SYSTEMS COMMAND

2004

ENGINEERING THE VISION

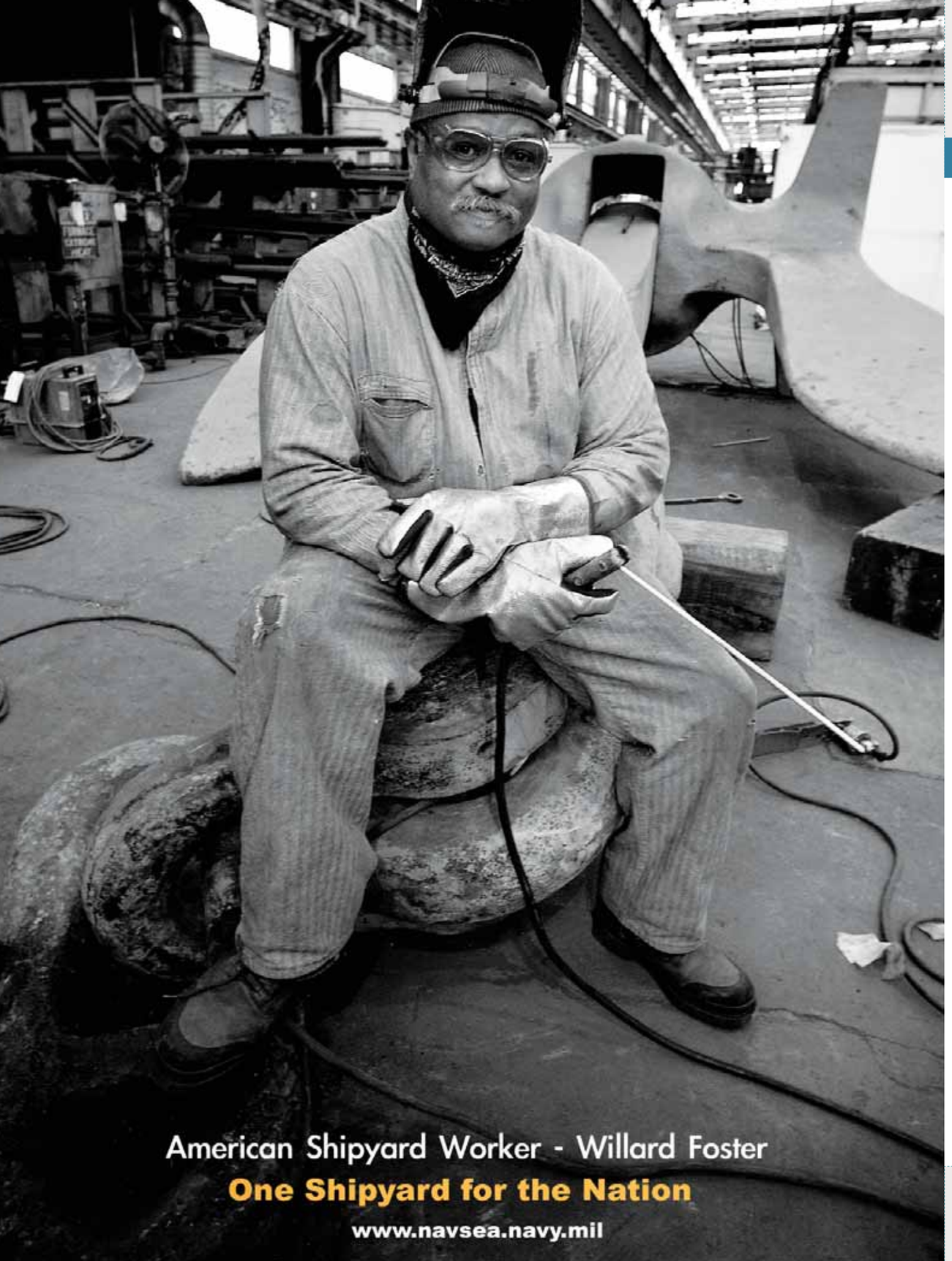


TABLE OF CONTENTS

In 2004, Our Navy and the Naval Sea Systems Command (NAVSEA) are executing the serious business of engineering the *Sea Power 21* vision to build a 21st Century culture of readiness that will equip and support our dedicated Naval warfighters as they serve our great Nation on the frontlines of freedom.

In origin and administrative structure, this publication speaks of NAVSEA. But, let there be no doubt, it really addresses the successes, the challenges and the opportunities of a Navy-wide team, working together in open collaboration: fleet and fleet maintenance, operator and program manager, uniformed member, government civilian, and industry partner. Our power to deliver a 21st Century Navy depends on the power and potential of the entire team.

Following a year of demanding change and organizational realignment, NAVSEA and its fleet and industry partners emerged amid historic Naval transformation as a dynamic alliance. This sea change is bigger than the Navy; it is a national effort to marry public and private resources to keep our Naval forces ready.

New alignments demand new models for success. The innovative spirit that has defined our transformation must now energize our efforts to define the metrics and requirements by which we will measure our success in achieving our goals.

Now it is time to deliver performance and the gains captured last year under *Sea Enterprise*... we are on target to continue these efficiencies and savings.

In his Guidance for 2004, the Chief of Naval Operations (CNO) charged the Navy's winning team with doing more to achieve our "stretch goals." Assistant Secretary of the Navy for Research, Development and Acquisition Young established similar benchmarks for the continued streamlining of our lines of business. Although NAVSEA's alignment process is in its final stages, and three phases of implementing command efficiencies and improving mission effectiveness are near completion, the momentum for change must continue.

New alignments demand new models for success. The innovative spirit that has defined our transformation must now energize our efforts to define the metrics and requirements by which we will measure our success in achieving our goals. The CNO challenged us to become a Department of Defense leader in this regard. The great strides we have made instilling a culture of readiness must continue. We must improve our productivity and transform resources into capabilities and readiness. These are the mechanisms by which we will accelerate our advantages, exercise transition, measure risk, and survey and respond to our Navy's constantly changing operational sea state.

Our fleet customer is on call to surge and provide flexible, rapid and agile response in a persistent manner; likewise, NAVSEA must stand our own vigilant and responsive watch.

At the end of 2003, we conducted a command assessment survey to measure our progress as we transitioned from alignment-focused change to business process transformation and delivery. Command-wide and customer feedback such as this has been critical in shaping needed adjustments to our alignment and our way ahead. Initial results indicate that we are on target. I am confident our three-phased business approach has been sound and has given us a stable construct to continue building upon.

Our Navy and the American taxpayers demand good stewardship over this new organization and our finite resources. As the CNO clearly articulated, "readiness at any cost is not acceptable." We must continue to take periodic soundings and ensure our business practices and our ship and systems development processes are the most efficient and effective means to make our Navy ready for sea.

Our Nation is engaged in a global war against terror. We must deliver the most capable ships and systems engineered around the skills of our Sea Warriors. Our products must be reliable and delivered on time and within budget. Our Nation's security demands nothing less.

This year's *On Watch* publication highlights some of our focus areas for 2004. We will continue to instill a culture of transformation at all levels, develop meaningful metrics, measure our productivity, capture further efficiencies, and continue to pursue productive processes, prudent business practices and refined organizational change. We will guarantee our Navy's current readiness through the transformation of our industrial base with the SHIPMAIN (Ship Maintenance) program, Distance Support, and One Shipyard initiatives; and shape future readiness with disciplined Human Systems Integration, integrated weapons systems, Open Architecture Combat Systems, and advanced electric drive propulsion and integrated power systems.

We are sustaining our Navy's ability to surge by abandoning historic maintenance patterns tied to predictable deployments. Senior operators and maintainers now sit at the same table and make informed decisions based on the demands of less predictable operational requirements. The result is a better balance for our nation's industrial base workload, and, most importantly, an insurance our fleet will be ready when called.

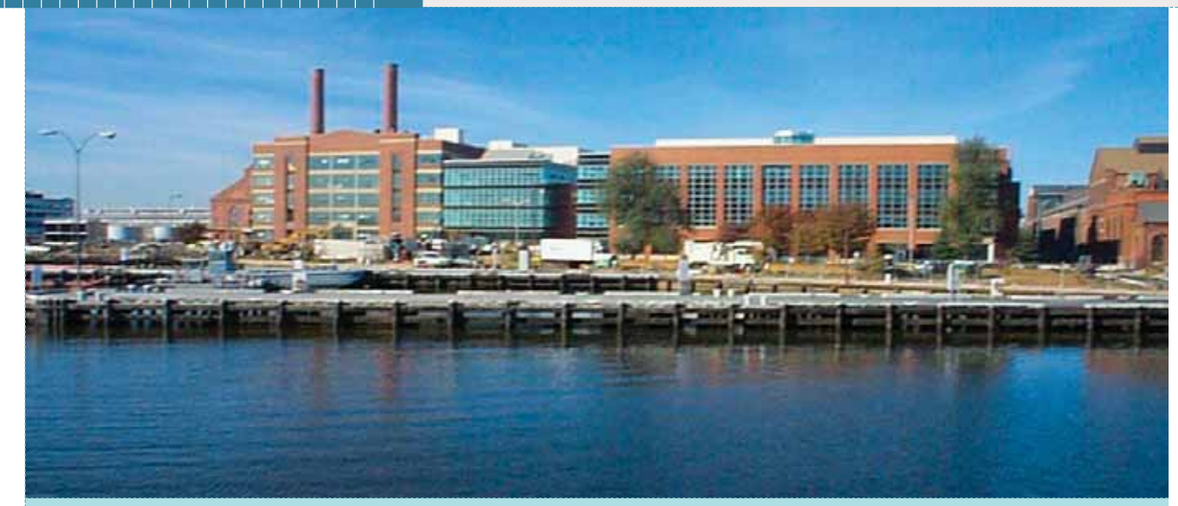
We are engineering the vision of an advanced Naval sea service, able to operate across joint and coalition boundaries in a complex battle space shaped by automation, leading technologies, and optimized manning. We cannot and will not design and build as we did in the past. The Sailor must be he cornerstone of each development program. We will leverage every resource and advantage, building ships and systems around our people and shaping the next Navy in concert with our military, industry and allied partners. The progress made in both the "Virtual Syscom" and Warfare Center Transformation will lead us to solutions that cross boundaries and harness the asymmetric advantages of our talented people and advanced technology.

New contracting mechanisms will be leading-edge forcing functions for current and future readiness. Innovative contracting approaches such as Sea Port Enhanced will benefit from consolidated administration and streamlined acquisition processes. The application of a disciplined Technical Authority process will establish common engineering practices tied to accountable, measurable and safe design processes and effectiveness.

NAVSEA and our Navy are postured for continued success. As you read this year's *On Watch*, I think you will appreciate the tremendous spirit and ingenuity of our dedicated, professional Navy team.

Our country has the best sea service in the world. That said, we are about an urgent business. We are turning a corner in transforming our Navy for the 21st Century. Our mission is to ensure our Naval forces continue to dominate the battle space by building a culture of readiness, second to none... we are engineering the vision.

P. M. Balisle, Vice Admiral, U.S. Navy
Commander, Naval Sea Systems Command



Builders of 21st Century Naval readiness, the Naval Sea Systems Command (NAVSEA) team is the U.S. Navy's *Sea Power 21* industrial base, serving as program managers, engineers, contracting and technical authority experts for ships and systems production and maintenance.

NAVSEA relies on more than 37,740 civilians and Sailors, along with thousands of private industry contractors, to engineer, build, maintain and support the fleet's ships and combat systems. Together, the team manages more than 100 acquisition programs.

Not just builders of readiness, but also harvesters of efficiency, NAVSEA began planting the seeds of better business in November 2002 and continuing throughout 2003. As an organization, NAVSEA completed two phases of a three-phase approach to achieve savings and mission improvement under the *Sea Enterprise* initiative to re-capitalize the fleet – a vision goal of *Sea Power 21*. This monumental effort included an organizational realignment, a 20 percent headquarters downsizing and a product area focused integration across its warfare centers.

Additionally, new business practices and processes took hold, including SHIPMAIN (Ship Maintenance), One Shipyard for the Nation, Virtual Systems Command (VSYSCOM) communication and streamlined contracting initiatives. These and other innovations for Naval readiness are further explained in this publication.

Moving forward in 2004, the NAVSEA team is postured to complete Phase III of its self-improvement to further capitalize on its boundary-less structure and to better support and build a surge capable Naval force for this century. The team will continue to evolve over this year with Navy transformation occurring within its shipyards and consolidation taking hold on the waterfront.

The command's integrated and lean team includes five affiliated Program Executive Offices (PEOs), four public Naval shipyards, eight supervisors of shipbuilding, conversion and repair (SUPSHIPs), two Naval surface and undersea warfare centers and their affiliated divisions, the Naval Ordnance Safety and Security Activity, the Naval Sea Logistics Center, headquarters operations, and a number of smaller activities.

NAVSEA also administers a sizeable foreign military sales program, involving nearly 70 foreign governments, and international organizations, with sales in excess of one billion dollars annually.

Headquartered at the Washington Navy Yard located in the nation's capital, NAVSEA is the largest of the U.S. Navy Systems Commands (SYSCOMs), operating on a fiscal year 2004 budget of approximately $22.3 billion, which accounts for nearly 18.5 percent of the Navy's $120.7 billion overall budget (Additional fiscal year information can be found in the *2004 NAVSEA Enterprise Guide*, a supplemental publication of *On Watch*).

Command Directorates and Codes

At the core of NAVSEA are ten directorates that form the primary command structure.

SEA 00 – Commander, Naval Sea Systems Command

Leading, administering, and communicating the business of building the Fleet is not only the job of the NAVSEA Commander. Much that execution and support is provided within the SEA 00 code by the NAVSEA Vice Commander and Executive Director, and their staffs. Additionally, key command functions fall directly under SEA 00, including the Chief Information Officer; Naval Ordnance Safety and Support Activity (NOSSA); Naval Explosive Ordnance Disposal—Technology Division (EOD—TD); and Navy Experimental Diving Unit (NEDU).

Command relationships and coordination with other SYSCOMs are structured through SEA 00. NAVSEA has formal partnerships with COMSPAWAR for C4I and COMNAVSUP for fleet logistics support.

Boilermaker Dale Head (right) installs a tube bundle into a lube oil purifier heat exchanger as John Cardenas prepares a manifold for hydrotesting.
Official U.S. Navy Photo by D. Lyons.

Key to 21st Century command communication among the NAVSEA Team, other SYSCOMs and its fleet partners has been the establishment of a Virtual System Command (VSYSCOM) network initiated last year. Meeting no less than once a week, often more than that, the Virtual SYSCOM leverages the advantages of modern communication technology to facilitate mutual understanding and decision making over fleet building issues that results in stronger team relations and improved business practices (See page 50 for more on VSYSCOM).

SEA 01- Comptroller

The SEA 01 directorate's mission is to provide financial policy, advice, and services to ensure NAVSEA customers' budgets are defensible and their program resources are properly and efficiently executed. Managing several areas of appropriations, Navy working capital funds, cost engineering and industrial analysis the Comptroller organization is driven to provide quality services, which exceed our customers' expectations.

SEA 02 – Contracts

How the Navy acquires its ships and systems is now center stage as efforts are being made to build improved efficiency into the acquisition process. SEA 02 Contracts directorate has the daunting mission to manage and process numerous types of contracts, while it also initiates new contracting processes (such as that for the CVN 21 aircraft carrier) to make the most of the Navy's readiness dollars. Initiatives such as SEA PORT, SEA PORT Enhanced, and the Multi-Ship/Multi-Option maintenance contracts, are working to reduce contract administration costs and leverage purchasing power. SEA 02 is redefining acquisition strategy in the Department of Defense with its innovations in contracting for major ships and weapon systems.

SEA 03 – Human Systems Integration

Stood up when NAVSEA realigned in November 2002, SEA 03 Human Systems Integration (HSI) directorate is leading the NAVSEA team in defining total system performance in hardware, software and Sailors. Because Sailors are the most valuable shipboard system, SEA 03 is partnering with acquisition program managers up front to design new ship classes and warfare systems around the Sailor.

And with the goal of providing superior warfighting performance at best cost, NAVSEA has renewed its focus to determine optimal manning requirements and provide relevant technical training. In 2004, SEA 03 will institutionalize HSI as a fundamental element of ship and systems acquisition and engineering.

See page 42 for details regarding HSI progress by the directorate and the NAVSEA team in building future readiness.

SEA 04 – Logistics, Maintenance & Independent Operations

The Logistics, Maintenance and Industrial Operations Directorate (SEA 04) plays a key enabling role in the execution of NAVSEA's mission. The Directorate provides the workforce skills and expertise, facilities, equipment, and information technology necessary to support the Fleet's ships and systems in a budget-constrained environment.

The Navy's maintenance and logistics philosophy has changed dramatically over the past two years. The Navy has clearly moved from a rotational Interdeployment Training Cycle (IDTC) – to a readiness-based IDTC. The people of NAVSEA 04 are responding to these changes to create the future, not just respond to it.

The Navy's maintenance and logistics philosophy has changed dramatically over the past two years.

For example, agreements among the member of the Virtual SYCOM have examined supply and logistics functions to better align and transform them. This has led to NAVSUP serving as the logistics support authority for all SYSCOMs. The SYSCOMs will continue to review their processes and realign supply and logistics functions to NAVSUP.

Perhaps the most important initiative that SEA 04 started this past year is the Shipyard Transformation Plan. This plan focuses on creating "One Nuclear Shipyard for the Nation." It is a maintenance philosophy to support the Fleet Response Plan. The plan will coordinate the nation's Naval ship maintenance and modernization industrial base, both public and private sectors, to effectively and fully respond in a quick and flexible way to perform necessary work when and where the ships are available. The One Shipyard concept aligns SEA 04 activities with the CNO's *Sea Power 21* and *Sea Enterprise* initiatives.

SEA 04 will continue to sustain the Fleet's current readiness while building future capabilities. It will also continue to develop and implement the Naval Shipyard transformation initiatives, the waterfront realignment and regional maintenance center stand-up, the Integrated Planning Activity stand-up starting with aircraft carriers, NMCI, Navy Enterprise Resource Planning, and the virtual SYSCOM. In addition, the Fleet Response Plan will impact SEA 04 activities.

Overall, people are at the heart of SEA 04. Its employees are its greatest asset and best hope for the future. They are on the frontlines of support for the transformation of the Navy. They will keep the Fleet ready, so that our nation can maintain its advantage over determined and capable enemies.

SEA 05 – Ship Design Integration & Engineering

The Ship Design, Integration and Engineering Directorate sets the standard for engineering excellence. The professionals throughout the directorate ensure that the ships and submarines of the current Navy, next Navy, and the Navy after next are safe to operate, operationally superior, and affordable.

SEA 05 establishes and maintains technical standards throughout the life cycle of a ship. They evaluate new ship concepts, formulate and develop ship design goals and requirements, and supervise the ship design process. They continue to direct the design process during modernization, and oversee the In-service engineering of many ship systems during operation and disposal.

SEA 05 is the formally appointed technical authority (TA) for almost all Hull, Mechanical, and Electrical (HM&E) systems. The exercise of technical authority is a process that establishes and enforces technical standards and policy. This is achieved through well-defined lines of communication and authority from COMNAVSEA to the Technical Warrant Holders, who are responsible for designated ship systems.

SEA 06 – Warfare Systems Engineering

The SEA 06 directorate is responsible for the deployment of fully mission-capable battle groups and ensuring common disciplined systems engineering process that optimizes cost, schedule and performance requirements at the force level. Their goal is to ensure battle force interoperability requirements are met or exceeded.

Through efforts such as the Distributed Engineering Plant (DEP) - born out of operational necessity as a high fidelity tool to provide the Navy the capability to optimize and deliver complex battle forces that are interoperable and mission capable, SEA 06 is supporting expanded mission areas and the ability of Naval forces to surge, if required, under the Navy's Fleet Response Plan.

The Warfare Systems Engineering directorate works closely with Naval Surface Warfare Center divisions in a teaming approach to build systems interoperability and engineering discipline. As is the case with SEA 05, there are numerous Technical Authority areas within this directorate, including electric weapons, mine countermeasures, surface ship guns, and combat systems.

SEA 07 – Undersea Warfare

NAVSEA's Undersea Warfare directorate is committed to advancing the Navy's sub-surface Naval war fighting capability. Managing new technologies for sub platforms, such as composite sail improvements and the accelerated development of unmanned undersea vehicles, SEA 07 is building 21st Century undersea readiness.

The Undersea Warfare directorate also works in cooperation with its Warfare Center counterparts in engineering undersea combat systems that enhance total battle force capabilities. Technical Authorities, including those with expertise in integrated undersea warfare, submarine sonar systems, unmanned underwater vehicles (UUVs), and torpedoes reside within SEA 07.

Additionally, the Submarine Maintenance Engineering, Planning and Procurement (SUBMEPP) Activity falls under the directorate, providing centralized life cycle support to U.S. Navy submarines and submersibles.

SEA 08 – Nuclear Propulsion

A strong Navy is crucial to the security of the United States, a nation with worldwide interests that receives the vast majority of its trade and energy via trans-oceanic shipment. Navy warships are deployed around the world every hour of every day to provide a credible "forward presence," ready to respond on-the-scene wherever America's interests are threatened. Nuclear propulsion plays an essential role in this, providing the mobility, flexibility, and endurance that today's smaller Navy requires to accomplish a growing number of missions. About 40 percent of the Navy's major combatants are nuclear-powered, including 10 aircraft carriers, 54 attack submarines, 14 strategic submarines - the Nation's most survivable deterrent, and 4 submarines removed from strategic service for conversion to a covert, high-volume, precision strike platform.

The mission of the Naval Nuclear Propulsion Program is to provide militarily effective nuclear propulsion plants and ensure their safe, reliable, and long-lived operation. This mission requires the combination of fully trained U.S. Navy men and women with ships that excel in speed, endurance, stealth and independence from logistics supply chains.

The Program is responsible for all aspects of naval nuclear propulsion, including research, design, construction, testing, operation, maintenance, and ultimate disposition of naval nuclear propulsion plants. The Program's responsibility includes all related facilities, radiological controls, and environmental, safety, and health matters, as well as selection, training, and assignment of personnel.

The Program maintains an outstanding record of over 129 million miles safely steamed on nuclear power. A leader in environmental protection, the Program has published annual environmental reports since the 1960s, which identify that the Program has not had an adverse effect on human health or the quality of the environment. Because of the Program's demonstrated reliability, U.S. nuclear-powered warships are welcomed in more than 150 ports of call in over 50 foreign countries and dependencies.

SEA 10 – Corporate Operations

NAVSEA's Corporate Operations directorate supports common operations in several areas. For PEO and NAVSEA directorate customers, SEA 10 is a single source for all headquarters campus operations support, including facilities, security, personnel, employee development, career planning, and administrative products and services.

For our industry fleet-building partners, the directorate provides value-added policy and guidance on security, strategic sourcing, civilian manpower budgets/allocations, civilian personnel, corporate and business planning, and leadership development. It lends acquisition support, foreign military sales coordination and university research assistance, and SEA 10 supports NAVSEA leadership with focused coordination, analysis, and response to complex Navy-wide issues and actions. The directorate serves the entire NAVSEA team, enabling members to focus exclusively on their Naval readiness mission of *"Keeping America's Navy #1 in the World."*

‹ San Diego, Calif. (Sep. 22, 2003) — Slicing across the surface of the water, members of Special Warfare Combat Craft (SWCC) Class 45 familiarize themselves with the maneuvering capabilities of their Ridged Hull Inflatable Boat (RHIB) during a day of training off the Pacific coast.
U.S. Navy photo by Photographer's Mate 3rd Class John DeCoursey.

For our industry fleet-building partners, the directorate provides value-added policy and guidance on security, strategic sourcing, civilian manpower budgets/allocations, civilian personnel, corporate and business planning, and leadership development.

Program Executive Offices

Five Navy Program Executive Offices (PEOs) are affiliated with NAVSEA and are responsible for all aspects of platform and system life-cycle management under their assigned programs. NAVSEA teams with the PEOs to provide total ship system acquisition, development and engineering support. The command also establishes and coordinates technical policy and procedures, and delivers integrated-logistics support.

The PEOs report directly to the Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN, RD&A) for designated acquisition matters, and to the Commander, NAVSEA (COMNAVSEA) for the purposes of planning and execution of in-service support.

PEO Carriers

In the 21st Century, the aircraft carrier remains a centerpiece of Navy's forward presence at sea, and it continues to prove its versatility and multi-mission value at the tip of the Nation's sword, projecting American Naval and air power like no other weapons systems in our arsenal. PEO Carriers continues to build to that dominant readiness as it shapes the Navy's carrier of the future, CVN 21.

Working with Chief of Naval Operations (N78), PEO Carriers is also advancing future carrier program technology requirements and accommodating a demanding baseline for current readiness support of in-service aircraft carriers through the technology management program, CARTECH. It guides team and industry R&D investments in new technology and ensures future carrier mission capability requirements are met.

Additionally, the PEO participates in a collaborative effort with NAVSEA and fleet Type Commanders and other SYSCOMS as part of Carrier Team One; chartered to develop and improve cross-organizational processes that will result in improved carrier maintenance availabilities. This year, Carrier Team One is conducting best practice comparisons between the shipyards and will be making strides to adopt best business practices for planning and assigning work between East and West coast.

PEO Carriers also oversees the Smart Carrier Program to reduce Sailor workload, reduce aircraft carrier total ownership costs (TOC), and improve Sailor quality of service and quality of life. Smart Carrier currently consists of 12 Ship Alterations (ShipAlts). In 2004, Smart Carrier will complete alterations aboard USS Abraham Lincoln (CVN-72) and conduct advance planning/procurement for FY05 Smart Carrier installations in USS John C. Stennis (CVN-74) and USS John F. Kennedy (CV-67).

PEO Integrated Warfare Systems

In its first year of operation, PEO Integrated Warfare Systems (IWS) immediately set out to transform "business as usual." The PEO is instituting a bold new business approach to streamline and standardize how the Navy designs, develops, procures, and integrates warfare systems for surface ships and submarine combat systems, shipboard missiles (except Trident and Tomahawk), radars, launchers (except Trident), Electronic Warfare (EW) and gun systems.

After only a year, PEO IWS is well into transforming warfare systems acquisition, changing the development and acquisition focus from platforms to Navy-wide warfare system requirements. PEO IWS is transitioning warfare system acquisition from a "stovepipe program/layering" approach to a cross-platform center-of-excellence construct (Integrated Combat Systems, Above Water Sensors, Surface Ship Weapons, Undersea Systems, and Command and Control).

In 2004, PEO IWS is eager to work closely with other PEOs and Navy and Department of Defense agencies. For example, PEO IWS is working closely with the Missile Defense Agency (MDA) in developing technologies and systems to support the national security goal of providing Ballistic Missile Defense (BMD) capability for the United States, its allies, and joint/coalition forces.

Building on a decade of joint research that uses commercial computing practices, PEO IWS is spearheading systems development of an Open Architecture (OA) systems based on commercial computing standards and products. The vision is to transform the current stovepiped combat system and elements that use MILSPEC Computing Systems, into a COTS-based Open Architecture Computing Environment (OACE). The OACE will enable software and hardware decoupling and significantly drive down the development, fielding and improvement of our combat systems through creation of a reusable software application library.

With the help of defense and non-traditional commercial industry, PEO IWS has already aligned with NAVSEA, SPAWAR, NAVAIR, CFFC, NETWARCOM, and OPNAV (N76, N71, FORCEnet) to realize this vision. See pages 44 - 45 for more on OA and spiral development of warfare systems.

PEO Littoral & Mine Warfare

PEO Littoral & Mine Warfare (LMW) mission is to integrate mission capabilities to exploit littoral advantages across the entire battle group. The PEO is working closely with other members of the NAVSEA Team, the fleet and special warfare communities to define littoral warfare through interoperable, netted combat systems.

One of the force multiplier initiatives that PEO LMW is pursuing to strengthen the Navy's Sea Shield capability and enhance aspects of Sea Strike is the Advanced Deployable System (ADS) being shaped as a mission module for the Littoral Combat Ship. ADS is a rapidly-deployable passive-acoustic undersea surveillance system employing distributed arrays placed on the ocean floor linked to a tactical interface on the sea-surface. The processing system for ADS capability demonstration will be based upon the Acoustics Rapid COTS Insertion (ARCI), which is used for both submarine and Integrated Undersea Surveillance System (IUSS) Undersea Warfare (USW) applications. The PEO is moving forward with ADS development in 2004, conducting a Multiple Array Test and an Open Ocean Environment test this fiscal year. For more on ADS, see page 46 on Force Protection.

Program managers within the PEO are also leveraging unmanned undersea vehicle (UUV) technology that was operationally tested in a Fleet Battle Experiment (FBE) last year from USS La Jolla. The successful FBE, a Sea Trial effort, demonstrated the value of UUVs for expeditionary strike groups (ESGs. For more, see page 50 on NAVSEA Team efforts in unmanned vehicles.

› Puget Sound Naval Shipyard, Wash. (Feb. 13, 2004) — Puget Sound Naval Shipyard and Intermediate Maintenance Facility (IMF) Commander, Captain Clarke Orzalli, addresses the civilian and military workforce at the Submarine Base Bangor site on Navy-wide transformation initiatives for ship maintenance. IMF performs intermediate and depot level maintenance on the Bangor-based *Trident* Missile submarine fleet as well as surface ships and aircraft carriers at Bangor, Everett, and Bremerton, Wash., facilities.
U.S. Navy photo by Brian Nokell.

PEO LMW is accelerating focus on littoral sensor development and constructing mission efficient and effective systems that will easily integrate in operation and contribution to overall battle group function.

PEO Ships

This PEO is focused on delivering Sea Strike and Sea Based capability through its ship program management, so critical to overall *Sea Power 21* vision execution. PEO Ships is active in the shaping of a Family of Ships, each complementing the other in mission capability and fleet support. From supporting the very capable AEGIS destroyers to managing next Navy platforms of DD(X), CG(X) and LCS, as well as current LPD 17 construction, the PEO is truly building 21st Century Naval readiness as well as supporting ships over their entire life cycles through the Inactive Ships Program Office. See pages 34 - 41 for more details on the Family of Ships.

In its platform support and development efforts, PEO Ships serves all Navy surface platforms. It is dedicated to finding efficiencies in the shipbuilding process, looking to shorten production timelines and leverage teaming advantages to design and engineer ships at cost, on time and with improved capability.

PEO Submarines

PEO Submarine is about the business of developing, acquiring, modernizing, and maintaining the world's best submarines and undersea systems and in leading the development and implementation of innovative modernization, acquisition and fleet support solutions.

From the new 21st Century Virginia Class submarine to giving new life to the Trident Class through SSGN (cruise missile platform) conversion, PEO Submarines is truly shaping a world-class sub force as it redefines undersea warfare to counter a new and unpredictable enemy. See pages 34 - 41 for more on PEO Submarines undersea platform development.

Other aspects of PEO Submarines activity include its diligent efforts in sub rescue, managing the Submarine Rescue Diving and Recompression System (SRDRS), which will provide a quick-response, worldwide capability for rescuing the crew of a pressurized, disabled submarine trapped on the ocean floor. The system will be quickly deployed in ISO shipping containers, transported via military aircraft, and installed aboard a qualified international vessel of opportunity or a USN T-ATF, eliminating dependence on specially-configured mother submarines or dedicated surface support ships. The PEO is working for SRDRS rescue capability to be operational in March 2006.

The PEO also manages other classes of submarines, including the Sea Wolf fast attack sub, which will see its final of three vessels enter the fleet this year. Like the other four program executive offices, PEO Submarines is actively seeking combat systems integration within and outside undersea platforms. From advanced sensor technologies to teaming partnerships with coalition navies, PEO Submarines also works on numerous collaborative projects with the NAVSEA Directorate SEA 07, thus forming the "Team Sub" partnership.

Naval Surface Warfare Center

The Naval Surface Warfare Center (NSWC) is comprised of six divisions—Carderock (with locations in Bethesda, Md. and Philadelphia, Pa.); Crane (in Crane, Ind.); Dahlgren (with locations in Dahlgren, Va., Panama City, Fla., and Dam Neck, Va.); Indian Head (in Indian Head, Md.); Port Hueneme (with locations in Port Hueneme and San Diego, Calif.; White Sands, NM; Louisville, Ky.; and Virginia Beach, Va.); and Corona (in Corona, Calif.).

NSWC is the Navy's principal research, development, test, and evaluation activity for ship and submarine platform and machinery technology for surface ship combat systems, ordnance, mines, and strategic systems support. A surface warfare laboratory for both the Department of Defense (DOD) and the Department of the Navy (DON), NSWC performs warfare analysis, research, design, development, test, evaluation, assessment, systems integration, strategic missiles systems support, amphibious warfare support, diving and life support, and fleet engineering services.

Naval Undersea Warfare Center

The Naval Undersea Warfare Center (NUWC) is the Navy's full-spectrum research, development, test and evaluation, engineering and fleet support center for submarine systems, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare.

With two divisions—in Newport, R.I., and Keyport, Wash., NUWC employs approximately 4,000 civilian and military personnel and has an operating budget of $910 million. NUWC is also a DOD and DON lab asset, exercising great flexibility in streamlining processes via internal waiver authority. NUWC is a leader in undersea warfare modeling and analysis, submarine combat and combat control systems, surface ship and submarine sonar systems, submarine electronic warfare, submarine communications, submarine weapons systems, undersea ranges, torpedoes, and torpedo countermeasures.

Naval Shipyards: One Shipyard for the Nation

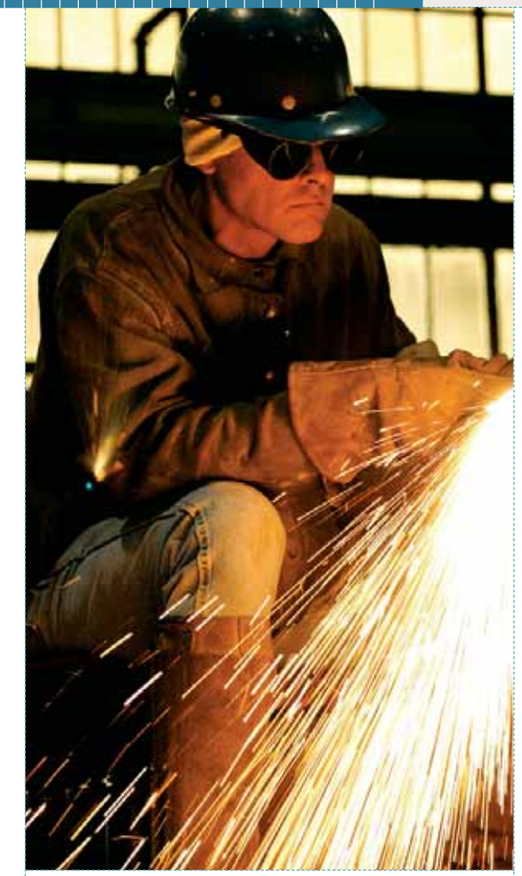
The four geographically dispersed public Naval shipyards—Portsmouth, Norfolk, Puget Sound, and Pearl Harbor—are the core of the Navy's industrial infrastructure that is responsible for the maintenance, modernization, inactivation, disposal, and repair of U.S. Navy ships and submarines. The highly skilled patriots of the nation's public shipyards give the Navy a unique capability to repair and overhaul U.S. Naval ships, and specifically, nuclear-powered vessels. More so, this expert shipyard workforce can also mobilize from yard to yard and wherever fleet requirements exist, providing the Navy and the President options to defend national interests by supporting a surge capable Naval force, operating under the Fleet Response Plan (FRP).

In an effort to better align the public yard infrastructure and business practices to the FRP that requires flexible maintenance support for surging forces, NAVSEA began execution of a Shipyard Transformation Plan last year, and it remains a top priority in 2004 to develop commonalities across the yards for more efficient, effective and responsive ship maintenance support. See page 27 for more on the "One Shipyard" concept.

Norfolk Naval Shipyard

Norfolk Naval Shipyard (NNSY) is adapting to new ways of doing business. By design, and in meeting real-time work challenges that arose in 2003, NNSY has aligned its major activities with both the Chief of Naval Operations' vision for a 21st Century Navy, *Sea Power 21*, and with NAVSEA's goals established to meet this high-level mandate. In doing so under the Shipyard Transformation Plan, NNSY is carefully re-examining the way it does business and is positioning itself to meet current and future fleet needs.

NNSY is already performing in support of FRP in a time of war. The fleet called on NNSY to help prepare its vessels for deployment during Operation Iraqi Freedom and is now relying on the shipyard to help reconstitute them as they arrive home. In providing quality service to the fleet, NNSY is returning money, when possible, to its customers who, in turn, use it to pay for additional work on their vessels.



New Englanders have earned the reputation as some of the hardest working, most educated laborers in the industrial workforce. It's a reputation earned through remarks like those from John Paul Jones about Portsmouth's shipbuilding skills on the ship *America*, "I have had her bottom opened up in several places and found it perfectly sound, the timber seasoned and the work everywhere a masterpiece."

Summing up NNSY's performance, capabilities and dedication to mission, the shipyard is uniquely positioned to address current and future challenges affecting national defense. In keeping with the shipyard's proven slogan: "We're prepared to fix *"Any Ship, Anytime, Anywhere."*

Pearl Harbor Naval Shipyard

Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) and other ship maintenance activities at Pearl Harbor joined to become Hawaii's regional maintenance center (RMC) on October 1, 2003. The establishment of Hawaii's RMC is part of a Navy-wide effort to set up regional maintenance centers in major homeport areas. This strategy brings regional Navy ship maintenance activities under a single command responsible for planning, execution, and oversight of ship maintenance.

The restructuring is being done in three phases, stretching into Fiscal Year 2005. Phase 1, during which transition teams mapped out a plan of action and prepared to set up the organization, ended October 1, 2003. Phase 2 runs throughout FY 04. Personnel, facilities, funding, and equipment belonging to the included activities will become aligned within the new organization. In FY 05, Phase 3 of reorganization will optimize resources, facilities, and equipment. Business and production processes will be refined, and facilities and equipment will be consolidated.

The creation of regional maintenance centers is one of many efforts to keep more ships in a higher state of readiness in order to support the Nation's surge-capable Fleet in the War on Terrorism.

Portsmouth Naval Shipyard

Portsmouth Naval Shipyard, a United States government-owned industrial facility, provides the U.S. Navy's nuclear-powered submarine fleet with quality depot level overhaul work (reactor servicing and systems/component modernization, repair, and testing) in a safe, timely and affordable manner. This includes a full spectrum of in-house support services (engineering, quality assurance, production shops, unique capabilities and facilities, and off-site support) to serve the complex assortment of Fleet requirements.

Faced with a dramatic bow wave of submarine overhaul and maintenance work across the Navy that continues to challenge the capacity of the Nation's public and private resources, Portsmouth has led the way. With improved work execution and increased throughput, the Shipyard has met this challenge head-on while, at the same time, reducing overhaul costs and schedules. A goal was established to decrease the duration of SSN availabilities from their notional values of 13 months to 11 months for DMPs and from 24 months to 20 months for EROs. The Shipyard has achieved this result by adhering to its basic philosophy of performing each job correctly the first time.

Puget Sound Naval Shipyard

In the past year, the Navy stood up a new maintenance command at Puget Sound, created by consolidating two existing organizations in the Pacific Northwest. Puget Sound Naval Shipyard (PSNS) and the Intermediate Maintenance Facility (IMF), created through the consolidation of the Puget Sound Naval Shipyard and the Naval Intermediate Maintenance Facility Pacific Northwest, is part of the Chief of Naval Operations (CNO) "Sea Enterprise" initiative and part of the overarching strategy to build what the CNO refers to as a "culture of readiness."

The consolidation will improve maintenance efforts by creating workforce flexibility, reducing maintenance infrastructure through sharing, and consolidating facilities and enhancing Sailors' technical skills through the integration with a highly skilled and experienced civilian workforce.

PSNS embarked upon a two-year pilot program directed by the Department of Defense to finance the shipyard through Resource Management Systems Funding (mission funding), instead of Navy Working Capital Funding (NWCF). The pilot will improve Fleet readiness by allowing the Navy to accomplish the highest priority — real time ship maintenance requirements in the year of execution, and achieve the most maintenance effort possible for the tax dollar.

Supervisors of Shipbuilding, Conversion, and Repair (SUPSHIPs)

Located near private shipbuilding and ship repair facilities throughout the Unites States, the SUPSHIPs are the Navy's waterfront industry leaders and act as NAVSEA's on-site technical, contractual and business agent, responsible for contract administration and project management of shipbuilding, ship repair, maintenance, and modernization accomplished in the private sector for the Fleet, DoD, PEOs and other government customers.

SUPSHIP personnel work closely with the shipbuilding and ship repair contractors, and are instrumental in bringing each new ship from the drafting table to the Fleet, as well as ensuring a ship's health and technical superiority throughout its life cycle. Like other Navy activities, the SUPSHIPs are being re-engineered to meet 21st Century requirements.

SUPSHIPs Pascagoula and New Orleans were consolidated last year to become SUPSHIP Gulf Coast in support of the Chief of Naval Operations *Sea Enterprise* initiative and to improve organizational alignment and increase future readiness. Significant savings and efficiency will be gained by having a single contract administration activity responsible for the entire Gulf Coast area.

Additionally, the goal to provide one-stop maintenance shopping for Fleet customers came closer to reality when on October 1, 2003, the four repair SUPSHIPs — Puget Sound, Jacksonville, San Diego and Portsmouth, NH — were transferred from NAVSEA to Fleet claimency, a move that will eventually lead to consolidation with Regional Maintenance Center (RMC) organizations. See pages 24-25 for more on RMC establishment.

Finally, a review of the SUPSHIPs' material function indicated that approximately 150 DoD civilians, plus 12 military billets could transfer to NAVSUP. NAVSUP anticipates a 30% savings through efficiencies by FY 07. SUPSHIP employees will remain in place, performing the same functions, under NAVSUP, and NAVSEA will reimburse NAVSUP for the level of effort transferred initially. SUPSHIPs Gulf Coast, Groton and Bath were the first to complete the transition, while other SUPSHIPs were delayed, awaiting completion of FISC A-76 studies.

Naval Ordnance Safety and Security Activity

The Naval Ordnance Safety and Security Activity (NOSSA) is a tenant command at NSWC Indian Head, Md. NOSSA is responsible for managing the DoN Explosives Safety Program, the DoN Insensitive Munitions Program, the NAVSEA Ordnance Quality Evaluation Program, and the Navy Ordnance Environmental Support Program.

Naval Sea Logistics Center

The Naval Sea Logistics Center (NSLC), headquartered in Mechanicsburg, Pa., specializes in providing integrated logistics, engineering, and information technology expertise to meet the needs of its worldwide customer base, and features hands-on management of various logistics business processes along with customized consulting services on the development and implementation of logistics information technology enabling tools. NSLC provides a range of products and services to all facets of the Navy's logistic support structure, including the operating fleet, the Department of the Navy Secretariat, and the Office of the Secretary of Defense.

› At sea with USS Florida (SSGN 728) Jan. 22, 2003 — USS *Florida* sails off the coast of the Bahamas during "Giant Shadow." *Giant Shadow* is a Naval Sea Systems Command/Naval Submarine Forces experiment to test the capabilities of the Navy's future guided missile submarines. *Florida* is one of four Ohio-class ballistic missile submarines (SSBN) to be converted to guided missile submarines (SSGN). *Giant Shadow* is the first experiment under the "Sea Trial" initiative of the Chief of Naval Operations' *Sea Power 21* vision and the first in a series of experiments before converting and overhauling the four SSBNs to SSGNs.
U.S. Navy photo by Chief Journalist David Nagle.

Giant Shadow tests SSGN capabilities

ABOARD USS FLORIDA — The waters off the coast of the Bahamas became a giant laboratory as Naval Sea Systems Command (NAVSEA) tested the capabilities of the Navy's future guided missile submarines (SSGNs).

Giant Shadow, conducted with USS *Florida* (SSGN 728), was the first in a series of experiments before overhauling and converting four *Ohio*-class ballistic missile submarines (SSBNs) to SSGNs.

The SSGNs will have the capability to support and launch up to 154 Tomahawk missiles, a significant increase in capacity from other platforms. The 22 missile tubes will also provide the capability to carry other payloads, such as unmanned underwater vehicles (UUVs), unmanned aerial vehicles (UAVs) and special operations forces equipment.

This new platform will also have the capability to carry and support more than 66 Navy SEALs (Sea, Air and Land) and insert them clandestinely into potential conflict areas.

Joint Fires Network put through paces

WASHINGTON — The capabilities of Joint Fires Network (JFN) components were put through their paces recently during an exercise in the U.S. Pacific Command area of responsibility. The Seventh Fleet flagship USS *Blue Ridge* (LCC 19) conducted a time-critical strike event during Exercise Terminal Fury with the Joint Air Operations Center (JAOC) at Hickam Air Force Base in Hawaii, using the Joint Fires Network's (JFN's) Tactical Exploitation System-Navy (TES-N) and the Air Force's Intelligence, Surveillance and Reconnaissance Manager (ISRM).

JFN is a transformational network-centric warfare family of systems, developed through a partnership among Naval Sea Systems Command, Program Executive Office for Integrated Warfare Systems, Naval Air Systems Command and Space and Naval Warfare Systems Command.

NUWC Newport, Coast Guard to Collaborate on Homeland Security

NEWPORT, R.I. — The Naval Undersea Warfare Center (NUWC) Division Newport, and the Coast Guard Research and Development Center, (R&D Center) Groton, Conn. recently signed a Memorandum of Understanding (MOU) for Homeland Security and Technical Support. Under the agreement, the R&D Center and NUWC will cooperate and collaboratively work on the Coast Guard's Underwater Security Program. The Underwater Security Program is an R&D Center initiative providing the Coast Guard with information, technology assessments, system engineering, and a one-stop knowledge brokering service for underwater inspection, detection, response, and training development needs in its homeland security mission.

Naval EOD Technology Division Lauded for Warfighter Support

INDIAN HEAD, M.D. — A team from Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV) recently returned from Afghanistan where it supported warfighters participating in Operation Enduring Freedom. Capt. Daniel Renwick, NAVEODTECHDIV commanding officer, led a team of five civilian employees in Afghanistan where they provided new technology to support military EOD technicians in the continuing war against terrorism.

Nimitz Battle Group Successfully Tests Cooperative Engagement Capability

After several recent test events, the first west coast battle group to include Cooperative Engagement Capability (CEC), the USS *Nimitz* Battle Group, is fully capable. A final flag panel convened in Washington, D.C. last year and certified the effectiveness of the group's self-defense and detect-control-engage capabilities. CEC is a unique sensor networking system helping war fighters detect, target and kill fast-moving airborne weapons, such as cruise missiles, with extreme speed and accuracy. Considered an enabler of network-centric warfare, CEC extracts data from sensors, turns the data into meaningful information and imparts knowledge to commanders.

Electromagnetic Railgun Successfully Tested

KIRKCUDBRIGHT, Scotland — A successful sea trial demonstration of an electromagnetic launcher (EML) was conducted in Kirkcudbright, Scotland recently, demonstrating how projectiles at hypersonic velocities can be fired. Senior U.S. Navy officials, including Adm. Robert Natter, Commander, U.S. Fleet Forces Command, and Rear Adm. Jay Cohen, Chief of Naval Research, were on hand to see this promising technology. Naval Surface Warfare Center (NSWC) Dahlgren Division designed, analyzed and manufactured the projectiles and sabots for this effort. The system demonstrated in Scotland is a one-eighth scale predecessor of a U.S. Navy system that will be developed to fire guided projectiles at speeds greater than 2,500 km/second (Mach 7) for distances beyond 200 nautical miles. That system will be located at NSWC Dahlgren.

› Aboard USS *Nimitz* (Dec 15, 1997) — The guided missile cruiser USS *Port Royal* (CG 73) (left), and the nuclear powered submarine USS *Annapolis* (SSN 760) steam in formation with the nuclear powered aircraft carrier USS *Nimitz* (CVN 68). The *Nimitz* battle group is currently deployed to the North Persian Gulf in support of Operation Southern Watch.
U.S. Navy photo by Photographer's Mate 2nd Class Matthew J. Magee.

› Fort Lauderdale, Fla. (Nov. 11, 2003) — Sailors aboard USS *Ronald Reagan* (CVN 76) "Man the Rails" as the Navy's newest *Nimitz* class aircraft carrier arrives in Fort Lauderdale, Fla.
U.S. Navy photo by Photographer's Mate 1st Class John Lill.

NSWC Indian Head delivers New Training System to the Fleet

INDIAN HEAD, M.D. — Naval Surface Warfare Center, Indian Head Division delivered two of three Integrated Maritime Portable Acoustic Scoring & Simulator (IMPASS) Systems to the fleet this past December, providing the Navy an entirely new capability to qualify navy gun teams and live-fire exercises without the use of land target ranges. The Department of the Navy has identified a combination of alternatives that will collectively provide equivalent or superior training options. Included are range sites in North Carolina, Florida, and the Gulf of Mexico, as well as the use of computer-aided simulators, such as IMPASS.

Pearl Harbor, Puget Sound Display 'One Shipyard' Teamwork on Buffalo

PEARL HARBOR, Hawaii — Displaying teamwork across organizational boundaries,indicative of the Navy's "One Shipyard" concept, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (NSY & IMF) and Puget Sound NSY & IMF recently partnered in support of USS *Buffalo's* (SSN 715) successful Engineered Refueling Overhaul (ERO). In mid-April, the Buffalo project received components from Puget Sound NSY & IMF to repair a major steam system valve. Personnel from Puget Sound's Business and Operations departments re-arranged their workload and re-allocated resources to remove these components from an inactivated submarine and ship them to Pearl Harbor. In addition, Puget Sound shipped the valve one week ahead of the date Pearl Harbor needed it.

Maintenance Pilot Program Merges Puget Sound Naval Shipyard, IMF

The Navy stood up a new maintenance command, created by consolidating two existing organizations in the Pacific Northwest on May 15.

Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS &IMF), created through the consolidation of the Puget Sound Naval Shipyard and the Naval Intermediate Maintenance Facility Pacific Northwest, is part of the Chief of Naval Operations' "Sea Enterprise" initiative as well as the overarching strategy to build what the CNO refers to as a "culture of readiness."

The consolidation is part of a two-year pilot program by the Department of Defense to finance the shipyard through Resource Management Systems Funding (mission funding) instead of Navy Working Capital Funding (NWCF). The pilot will improve Fleet readiness by allowing the Navy to accomplish the highest priority — real-time ship maintenance requirements, in the year of execution, and achieve the most maintenance effort possible for the tax dollar.

Navy Accepts Delivery of Ronald Reagan

WASHINGTON — The Navy accepted delivery of America's newest aircraft carrier, *Ronald Reagan* (CVN 76), commissioning the ship July 12th. The ship's design and construction was executed under a contract awarded to Northrop Grumman Newport News (NGNN) in December 1994.

Reagan marks its first deployment in 2005 from her San Diego, Calif. homeport, which is home to two other aircraft carriers. *Reagan* is the ninth of the *Nimitz*-class aircraft carriers, and is expected to be in service for 50 years.

Design improvements include a completely redesigned island, integrated ship systems with increased capacity to support future upgrades, and improved facilities for female personnel. In addition, *Reagan* has extensive repair capabilities, including a fully equipped Aircraft Intermediate Maintenance Department, a micro-miniature electronics repair shop, and numerous ship repair shops. The ship is equipped with a fiber optic based network for improved communication and machinery monitoring.

Navy Takes Delivery of ASDS

WASHINGTON — The Navy recently took delivery of the U.S. Special Operations Command's (USSOCOM) Advanced SEAL Delivery System (ASDS), during a ceremony at Northrop Grumman Oceanic and Naval Systems in Annapolis.

"This first-of-its-kind system provides a new level of operational capability to SEAL forces in high-threat areas," said Capt. Joe Fallone, ASDS Program Manager at Naval Sea Systems Command (NAVSEA). "The delivery of ASDS marks a major milestone in ensuring that our Naval forces have the most technologically advanced equipment for today's critical missions."

Currently, ASDS is deployable from some modified *Los Angeles*-class fast-attack submarines. However, the four *Trident*-class SSBN fleet ballistic missile submarines — once converted to SSGN cruise missile and special forces carriers — will be capable of carrying ASDS, as will *Virginia*-class attack submarines and the last of the *Seawolf*-class, Jimmy Carter (SSN 23). The ASDS is a key element in the transformational capabilities of the SSGN.

› The Pacific Ocean (July 1, 2003) — The *Los Angeles*-class submarine USS *Greenville* (SSN 772) recently completed sea testing for the Advanced SEAL Delivery System (ASDS) off the coast of Pearl Harbor, Hawaii. ASDS is an 65 foot mini-submarine, which rides attached to the top of a much larger *Los Angeles*-class submarine. It has increased range, speed, and capacity over the current SEAL Delivery Vehicle which is an open, wet submersible, that transports SEALs in scuba gear, exposing them longer to the elements. The ASDS mini-submarine is operated by a crew of two and can carry eight SEAL team members. The vessel is connected to the host ship via a watertight hatch, and has a sophisticated sonar and a hyperbaric recompression chamber.
U.S. Navy photo.

‹ New Orleans, La. (Jul. 18, 2003) — Texas Senator Kay Bailey Hutchison, sponsor of LPD 7 the *San Antonio*, christens the Navy's newest ship in New Orleans. *San Antonio* is the lead ship in a new class of amphibious warfare ships that will carry Sailors and Marines in defense of freedom for the next several decades. Photo courtesy of Northrop Grumman Corporation.

Amphibious Ship San Antonio Christened

NEW ORLEANS — "I christen thee San Antonio!"

With those words and the crack of a bottle of Texas sparkling wine over the bow, Senator Kay Bailey Hutchison (R, TX) christened the lead ship of the Navy's newest class of amphibious warship.

"We are christening today the most advanced amphibious ship ever built," said Gen. Michael W. Hagee, Commandant of the Marine Corps, during his address at the ceremony. "It is the first of a ship class that will take our Navy and Marines, as well as the nation, far into the 21st Century."

San Antonio is a ship of many firsts. It is the first surface ship designed in "virtual reality," using computer modeling to design most of the ship before any steel was cut. It is the first amphibious ship to support the "mobility triad" of Advanced Amphibious Assault Vehicles (AAAV), Landing Craft Air Cushion (LCAC) and the tilt-rotor MV-22 Osprey aircraft, and also the first to feature the Advanced Enclosed Mast/Sensor system. Several quality of life features are also incorporated, including gender-neutral living quarters with sit-up berthing, a consolidated galley and improved e-mail and Internet access via the Shipboard Wide Area Network, or SWAN.

First Combined U.S., Spanish Navy CSSQT a Success

WASHINGTON — The U. S. and Spanish navies successfully conducted a Combined Combat System Ship Qualifications Trials (CSSQT) off the coast of Wallops Island, Va. July 17-22. USS *Mason* (DDG 87) and the Spanish frigate Alvaro De Bazan (F-101) participated in the trial, the first Aegis Combined CSSQT with a foreign navy. CSSQT is a series of at-sea exercises and tests to verify that shipboard systems have been installed correctly and can be operated and maintained safely and effectively.

The Program Executive Office for Integrated Warfare Systems and the Spanish F-100 Program Office sponsored the Combined CSSQT. During the course of the trials, Mason successfully fired four SM-2 Block III missiles. Alvaro De Bazan also successfully fired four SM-2 Block IIIA Missiles, including one firing conducted with six U.S. ships.

Joint Live Fire Testing of IROS3 at Sea

A team from the Naval Surface Warfare Center, Crane Division (NSWC Crane), successfully completed their part in a joint live fire testing of the Integrated Radar Optical Surveill-ance and Sighting System (IROS3), aboard the USS *Ramage* in mid-August. The top priority of the test was to verify safe operations and execute multiple Detect-to-Engage sequences in a true shipboard environment. Specific scenarios were constructed to test and validate system performance and to assess current IROS3 maturity as currently installed aboard *Ramage*.

During the test scenarios, the radar properly detected the target and IROS3 operators responded to automated sensor cuing to identify the target, labeled the target hostile or friendly, accepted semi-auto cuing of the gun mount, and engaged the target. More than 15 scenarios were conducted, including the engagement of large stationary and small moving targets towed by remote control jet skis to simulate an attack, which was managed by PEO IWS – Integrated Warfare Systems.

SHIPMAIN changing Navy maintenance culture

A new set of maintenance practices gives Sailors on the waterfront more say in what systems are fixed, and when.

These practices are part of SHIPMAIN (Ship Maintenance), a Navy-wide maintenance initiative that builds a more effective and efficient maintenance system. One of the changes is the introduction of maintenance teams for ships, which creates a kind of "one-stop shopping" for screening and assigning repair work.

Currently, when a Sailor discovers a piece of equipment needing repair, he or she fills out a 2-kilo (OPNAV Form 4790/2K). "A typical 2-kilo could take a week or two to process before someone actually turns a wrench to repair the equipment," according to Capt. Bob Butler of Naval Surface Force, U.S. Atlantic Fleet. "If the ship is up against an operational schedule, a commanding officer might submit a casualty report to get the equipment repaired before the ship gets underway, increasing the cost of the work being performed. This is both wasted time and extra money the Navy can no longer afford," Butler added.

The ship's port engineer, representatives from SIMA, SUPSHIP, FTSC and most significantly, representatives from the ship, make up the maintenance teams. The maintenance team identifies and prioritizes work, then determines when and where the work gets done. This saves the Navy money in the long run, by identifying the best times to do routine maintenance.

"We are changing a culture that ultimately affects every Sailor on the waterfront," said Vice Adm. Timothy LaFleur, Commander, Naval Surface Forces. "What will make SHIPMAIN really work is Sailors understanding this change and making it a part of their daily routine."

Albuquerque ERO sets record

KITTERY, Maine — USS *Albuquerque* (SSN 706) is back with the Fleet, and Portsmouth Naval Shipyard (PNSY) has set a new record for the fastest Engineered Refueling Overhaul ever – completing it in 22.3 months.

The Ship started a Refueling Overhaul at the Portsmouth Naval Shipyard on July 1, 2001 and immediately the team of submarine maintenance experts, working closely with Ship's Force personnel, went to work, achieving a "fast start." The Fast Start concept, a term coined by the naval shipyard community and its headquarters, the Naval Sea Systems Command (NAVSEA), describes the effect of having a complete project plan, as well as the necessary materials and work documents, ready to go from the outset.

Like clockwork, using modern management techniques for planning, scheduling and executing work, including a state-of-the-art computer network based system called AIM, or Advanced Industrial Management, work and testing was systematically completed on or ahead of schedule. The team pushed hard and successfully undocked the ship three weeks early, helping the availability stay ahead of schedule. This success comes on the heels of an earlier record-breaking performance on USS City of Corpus Christi – an ERO completed one week shy of 24 months.

In order to give our President options in the global war against terrorism,

the Chief of Naval Operations (CNO) has told the Navy to "be ready."

‹ Aboard USS *Winston S. Churchill* (DDG 81) Aug. 5, 2002 — The bow of the *Winston S. Churchill* looms over the dry dock at Bath Iron Works in Bath, Maine. The crew and workers are nearing the end of the ship's Post Shakedown Availability (PSA), a $25 million upgrade to the ship's equipment, warfare systems, and living quarters. After being floated from the dry dock, the destroyer will receive the remainder of the upgrades pier side before departing for her homeport of Norfolk, Va., and becoming part of the USS *Theodore Roosevelt* battlegroup.
U.S. Navy photo by Intelligence Specialist 1st Class Holly Hogan.

Maintaining our naval readiness enables our fleet to surge forward and respond on a moment's notice as it did in Operation Iraqi Freedom.

Naval Sea Systems Command (NAVSEA) is actively working with fleet, waterfront, shipyard and industry partners to maintain our ships and systems to be ready to answer the nation's next call to arms.

How we are contracting the maintenance of our ships is changing. Contract vehicles like Multi-Ship, Multi-Option (MSMO) contracts are establishing responsive business practices that will ensure the critical demands of a fleet at war can be met more efficiently while still sustaining our ship repair industry.

The *One Shipyard for the Nation* concept is focused along the same lines of flexibility, workload balance and workforce mobilization. Initiatives like public yard mission funding and the consolidation of intermediate and depot level maintenance organizations, such as what has occurred at Pearl Harbor and Puget Sound Naval Shipyards, are geared to provide greater maintenance options and better employ the skills and talent of our shipyard professionals.

SHIPMAIN, or the Ship Maintenance program, is a maintenance culture change that is streamlining maintenance planning, providing better situational awareness across the table from operator to maintainer to the flag level, to improve the maintenance decision process and empower maintenance teams at the deck plate.

Just as NAVSEA realigned, our Navy's support infrastructure is better aligning to respond to fleet demands in real time. The Distance Support program is harnessing technology and information to be the lead tools of fleet maintenance at the pier or underway.

As much as NAVSEA is about engineering new ships and systems, it is also an active player on the Navy's maintenance team. In shaping our current readiness, we are better able to shape future readiness. If our Navy was not so ready now and able to respond, we would not have the resources to re-capitalize the fleet and shape the next Navy under *Sea Enterprise*.

› Norfolk, Virginia (Aug. 15, 2002) — USS *John F. Kennedy* (CV 67) pulls pierside at Naval Station Norfolk, Virginia to drop off locally stationed squadron personnel before continuing its journey to Mayport, Florida where it is homeported. USS *John F. Kennedy* (CV 67) just completed a six month deployment to the Medeterranean Sea and Arabian Gulf in support of Operation Enduring Freedom.
U.S. Navy photo by PH1(AW/NAC) Martin Maddock.

‹ Naval Submarine Base, Bangor, Wash. (Nov. 14, 2002) — Sailors complete the 200th drydocking maneuver of a *Trident*-submarine at the Intermediate Maintenance Facility (IMF) Delta Pier. The strategic missile submarine USS *Michigan* (SSBN 727) is one of the *Trident*-submarines that IMF has performed maintenance and a substantial level of overhaul work for which they recently celebrated their 20th anniversary.
U.S. Navy photo by Brian Nokell.

The establishment of Regional Maintenance Centers (RMCs) is part of a Navy-wide effort to consolidate maintenance activities in major homeport areas.

This strategy brings regional Navy ship maintenance activities under a single command responsible for planning, execution and oversight of all levels of Navy ship repair work, including organizational, intermediate and depot.

The RMC effort is one of several initiatives ongoing to keep ships in a higher state of readiness. According to the Chief of Naval Operations (CNO), Adm. Vern Clark, the Navy deployed 70 percent of its ships during Operation Iraqi Freedom. The service's Fleet Response Plan (FRP) calls for a force able to surge again when needed. The CNO directed maintenance activities to support this surge capability by streamlining processes and modifying their maintenance cycles to achieve faster turnaround without degradation in quality or service.

The effort to provide one-stop maintenance shopping for Fleet customers launched on October 1, 2003, when the four Supervisors of Shipbuilding (SUPSHIPs) responsible for repair, Puget Sound, Jacksonville, San Diego and Portsmouth, transferred from Naval Sea Systems Command (NAVSEA) to Fleet claimancy, a move that will eventually lead to consolidation with regional maintenance organizations.

SUPSHIPs Puget Sound, Jacksonville, San Diego and Portsmouth remain Echelon Three commands until consolidation with their respective regional maintenance activity. San Diego consolidates in April, 2004 with the others following as their respective ports develop their unified approach to delivering maintenance services. SUPSHIP Puget Sound and SUPSHIP San Diego Detachment Pearl Harbor realign under the naval shipyard in their respective regions. NAVSEA continues to exercise technical and contractual authority on maintenance issues for the Navy. This move is part of an extensive reengineering effort to streamline maintenance repair processes, culminating in a more efficient integrated maintenance support provided to the Fleet. "This is a merger of equals, not a takeover," said Capt. Ken Roey, SEA 04Z. "It will help us identify our best and most efficient practices, identify risk mitigation and Lean Manufacturing opportunities, and streamline our waterfront oversight efforts."

"This effort will foster better communications and allow for a better alignment to meet customer needs and lead to further efficiencies," said Roey.

Ship Maintenance (SHIPMAIN)

The proper alignment of the waterfront is meaningless unless we address maintenance business practices. SHIPMAIN is a new maintenance initiative, used to measure and expedite the planning process. Its goal is to streamline ship alteration and maintenance planning, reduce redundancy and promote the flow of information among all players involved. Finding greater efficiencies in our planning phase allows us to fine-tune the allocation of limited resources and maximize our maintenance dollars.

Members of the Naval Sea Systems Command (NAVSEA) team, including senior flag leadership, participate on a SHIPMAIN Process Improvement Team and support the maintenance initiative's four Cross Functional Teams – Requirements (CFT1), Package Preparation (CFT2), Placement & Oversight (CFT3) and Alterations Management (CFT4).

A phased effort, with full implementation anticipated to take three to four years, SHIPMAIN is already proving effective and more efficient.

Re-engineering Supervisor of Shipbuilding, Conversion and Repair (SUPSHIP)

The SUPSHIPs began extensive reengineering efforts to streamline processes and to support the concept of providing more efficient, integrated maintenance support to the Fleet. With 17 initiatives already underway, aggressive reengineering efforts have the SUPSHIP community executing the plan ahead of schedule. Downsizing is achieved largely without adverse actions to personnel.

One example is the transfer of material management responsibility to the Naval Supply Systems Command (NAVSUP) managed Fleet and Industrial Supply Centers, (FISCs). The SUPSHIPs plan to realign more than 170 civilian and military positions and anticipate a 30 percent savings through efficiencies achieved by FY 07.

Human Systems Integration (HSI) in the SHIPMAIN Process

The SHIPMAIN modernization program plays an essential role in the Navy's Fleet Response Plan (FRP) providing a Surgeable Force based on a "Culture of Readiness."

NAVSEA's Human Systems Integration (HSI) Directorate champions the evaluation of changes in Sailor Performance as a key criteria in judging the value of new ideas for ship systems Alterations and Modifications.

Focusing on the Sailor during the initial Business Case Analysis (BCA) identifies the impact on performance, efficiency, and workload. This is crucial in making Hardware, Software, and People equal parts of the entire design and modification process.

‹ Gunner's Mate 3rd Class Victoria Masako Nigorizawa cleans salt off of a Mark 44 Machine Gun during a force protection watch near the bridge of the USS Comstock (LSD 45) March 11, 2003. USS Comstock is operating in the Arabian Gulf area with the U.S. Coast Guard National Strike Force Team in a joint Maritime Environment Response Operation.
U.S. Navy photo by Photographer's Mate 1st Class Brien Aho.

The nation's private (commercial) and public (NAVSEA) shipyards are among the Navy's primary tools keeping her fleet ready to surge, strike, and meet the Chief of Naval Operations' (CNO's) charge to "give the President options" in the global war on terrorism.

With the Fleet Response Plan (FRP), the Navy is changing the way ship maintenance is scheduled and executed — no longer predictable, but driven by the critical demands of war. The nation's shipyards are at the heart of this change, and the *One Shipyard for the Nation* concept is a core element of NAVSEA's strategy to enact this revolution and better use of ship repair resources. Put simply, *One Shipyard* unites the Navy's industrial base to provide flexible support in anticipation of a surge response environment.

Within the confines of law, the *One Shipyard* concept unites the capabilities of the four NAVSEA shipyards and two private shipyards capable of performing work on nuclear-powered ships, ensuring that the Navy makes the best of available resources across the public and private sector. The shipyards are:

NAVSEA

Pearl Harbor Naval Shipyard-IMF, Hawaii
Puget Sound Naval Shipyard-IMF, Washington
Portsmouth Naval Shipyard, New Hampshire
Norfolk Naval Shipyard, Virginia

Private Sector

Electric Boat, Groton, Connecticut
Northrop Grumman, Newport News, Virginia

One Shipyard builds on past public-private successes and current partnerships, accelerating the industrial base's ultimate progression toward a single shared way of doing business.

The rationale for this progression is very simple: the industrial base today has an adequate number of resources, but these resources are not necessarily co-located with the ships needing them. *One Shipyard* ensures the ingenious management of these resources so they move "where the ship is" when they are required.

One Shipyard means our industrial forces have to be as flexible, and as mobile in their response to the workload, as are our forces afloat. The shipyard workforce is at the core of this effort. The nation's shipyard workers must be managed as a stabilized work force that can flow to and from different geographic locations to give the Navy the maximum response, agility and ability to respond in the shortest time possible.

Other *One Shipyard* initiatives include:
Productivity Enhancements – increasing productivity by leveraging advances in technology and process improvements to perform more work for the maintenance dollar.
Infrastructure Reduction and "Refootprinting" – improving infrastructure utilization and alignment.
National Material Strategy – improving efficiencies in purchasing and managing material as well as contracting for required services.

Work at Norfolk Naval Shipyard (NNSY) demonstrates *One Shipyard* in action. For years, NNSY has contracted routine ship repair work to private companies, freeing its workforce to concentrate on higher-level requirements — on average, NNSY contracts roughly $90 million a year to the private sector.

Recently, more than 2,000 Northrop Grumman Newport News (NGNN) employees worked at NNSY for a year-long period to complete repair of USS *Enterprise* (CVN 65). This work would normally have been completed at NGNN, but the yard had no dry dock available for the USS *Enterprise* availability. Instead, the private yard sent its workforce to the public yard, where a carrier dock was available. The naval shipyard provided extensive support services for the NGNN workforce, including shore power, office equipment access, and food service facilities. The government personnel at NNSY also teamed with the NGNN workforce, performing roughly one-third of the work.

A similar arrangement was recently made for emergency repairs on two submarines, USS *Seawolf* (SSN 21) and USS *Connecticut* (SSN 22). This time, General Dynamics Electric Boat workers traveled to NNSY to complete the work.

Public and private yards have long been effective as a team; *One Shipyard for the Nation* is capitalizing on that effectiveness as a common business practice to gain efficiency, improve responsiveness to emergent maintenance needs, make the most of the nation's limited ship repair enterprise resources, and sustain the country's industrial viability for nuclear ship maintenance.

The Chief of Naval Operations (CNO) directed developing tools to enable warfighters to "reach out and touch" the shore-based support infrastructure and receive any type of assistance in an efficient and direct manner.

In August 1999, under Naval Sea Systems Command leadership, the Distance Support Program was established as a 24/7/365 help desk (1.877.4.1.TOUCH) for fleet customers to ask questions and get answers. Distance Support integrates existing efforts into a consolidated tool set focused on reducing shipboard workload and streamlining access to the support infrastructure access.

Distance Support bridges the gap between the shore infrastructure and the deployed fleet. Distance Support acts as a catalyst, transforming fleet support both pier-side and at the tip of the spear, and is an integral part of every Carrier and Expeditionary Strike Groups' operational task requirements. It is a deckplate readiness tool in the hands of Sailors supporting both ship's maintenance and crew quality of life requirements.

Expanding its capability to the deployed fleet through *anchordesk@navy.mil*., Distance Support has grown to include Collaboration, Tele-Tools and a transformational business process with access to a wide spectrum of government and industry support providers, all linked together via a collaborative Customer Relationship Management (CRM) environment.

Distance Support is the fleet's primary means to obtain shore-based shipboard support for operational readiness. During Operation Iraqi Freedom (OIF), Distance Support was a key enabler to surge and sustain a mission ready forward-deployed combat presence. At the height of OIF, 51% of all Technical Assists (including CASREPS) were resolved via Distance Support.

Surging Naval forces fighting the Global War on Terrorism are maintaining and enhancing their combat readiness through Distance Support and Navy ships deploying under the Fleet Readiness Plan (FRP) are increasingly keeping their edge through the high-tech reach of Distance Support.

Extending beyond readiness backing, Distance Support also includes Quality of Life/Service tools such as chaplain services, personnel administration and medical support. The ability to provide rapid response to a crisis situation involving a fleet Sailor or their families ashore has been greatly enhanced through utilization of the Chaplain Care tool and its support processes.

The next step in the development of the Distance Support program builds on business rules, organizational structures and improves on the infrastructure and tool set. The Distance Support upgrade addresses the short fall associated with communication access within security and bandwidth constraints, connectivity for the last 100 feet, and knowledge management. It moves Distance Support towards a more ideal environment for data sharing and collaboration.

In August 2002, Assistant Secretary of the Navy for Research, Development and Acquisition (ASN (RD&A)) John Young made the decision to realign functional management of the four Enterprise Resource Planning (ERP) pilot projects under one Program Management Office (PMO) and to "converge" the four projects into one Navy ERP Program.

The goal of the Navy's converged ERP efforts remains the same as its four parts; to reform and refine how it conducts business in the 21st Century by leveraging commercial best business practices to improve Navy Department efficiency and mission effectiveness.

The Navy Enterprise Management Automated Information System (NEMAIS) is one of the four ERP pilots and is co-sponsored by Naval Sea Systems Command (NAVSEA) and Commander Fleet Forces Command (COMUSFLTFORCOM). NEMAIS is an integral step on the pathway to operating the converged ERP program.

The three other components of Navy ERP are:

- SIGMA integrates finance, project planning and budgeting, procurement and workforce management into a single system for program management and is sponsored by Naval Air Systems Command.
- CABRILLO, a Navy Working Capital Fund pilot, is focused on warfare center management and is sponsored by Space and Naval Warfare Systems Command.
- SMART (Supply Maintenance Aviation Re-engineering Team), which focuses on national and local supply management at the intermediate and depot levels of aviation maintenance, is sponsored by Naval Supply Systems Command.

Like all components of the Navy ERP, NEMAIS utilizes a Commercial Off-the-Shelf (COTS) solution. The NEMAIS application provides an integrated, process-oriented, information-driven, real-time Navy maintenance management system. It replaces the multiple "legacy" systems with a single system that reduces support costs and eliminates errors caused by manual data transfers among independent systems. NEMAIS is also contributing to the development of common business processes to maximize the reuse of its planning products as part of the Converged ERP.

Replacing costly multiple legacy systems is only one of the numerous benefits NEMAIS brings to the Fleet. NEMAIS also leverages best business practices embedded in the COTS product. Additionally, its standardization of business processes and data fields enables Navy maintenance managers to develop further process improvements as they become familiar with the power of a fully integrated system.

For example, when NEMAIS was implemented into Navy Southwest Region maintenance systems, Southwest planners instantly gained the ability to call up and use data from similar Work Orders generated previously by their Mid-Atlantic counterparts – something they could never have done before.

NEMAIS recognizes and acknowledges differing financial streams used by Atlantic and Pacific Fleets, and it showed Southwest planners how long it took to do similar work in Norfolk, what parts were ordered and used, and how long it took to get those parts.

This breakthrough in maintenance planning ensures that maintenance planning and material management can be done more effectively and efficiently to reduce costs and cycle time, achieve promised schedules, and increase Fleet readiness.

NEMAIS first went "live" in the Mid-Atlantic Region on June 3, 2002. By the end of its first year of operation, Navy maintenance activities in the Mid-Atlantic Region had processed Intermediate-Level ship maintenance work for 73 ships and screened more than 30,000 Work Notifications and completed 18,000. Presently, data for all non-nuclear Navy ships in the Atlantic Fleet are maintained in NEMAIS.

On July 30, 2003, the Office of the Secretary of Defense (OSD) signed a formal Acquisition Decision Memorandum for Networks and Information Integration (NII), authorizing NEMAIS deployed to I-Level activities in other regions worldwide. NEMAIS went "live" in the Southwest Region in August 2003 and in the Southeast Region (Mayport, FL) in October that year. I-Level rollouts continue throughout 2004 to implement NEMAIS in the Ship Repair Facility (SRF), Japan and in Pascagoula, Miss.

When fully implemented, NEMAIS and the other Navy ERP components will provide greater visibility of information assets across all Navy users, improving readiness assessments and decision making at all management levels. With data calls just a few mouse clicks away, Sailors will spend less of their valuable time researching information and instead concentrate on warfighting activities and training.

The Navy ERP program is a major supporting pillar of the Navy's *Sea Enterprise* campaign. The ERP solution is enabling the sea service to standardize and improve its business processes, becoming more efficient.

SeaPort: 21st Century Contracting

Among the contracting initiatives Naval Sea Systems Command (NAVSEA) is pursuing to leverage 21st Century business practices, is the highly successful SeaPort program for awarding service contracts using an on-line web-based portal by expanding this initiative to Naval Warfare Centers. Since SeaPort was launched in the spring of 2001, the program has won kudos for streamlining the contracting process and reducing administrative costs, while providing significant cost savings for program managers.

The program allows NAVSEA headquarters and PEOs to contract for professional services such as engineering, logistics, program management, and financial servicing on-line. NAVSEA is able to develop and post solicitations for services according to its ongoing needs. The paperless process allows staff in NAVSEA's Contracting directorate (SEA 02) to evaluate the proposals and award task orders, providing the needed services at the best value from the group of Multiple Award Contract (MAC) contractors. The process also encourages the participation of small businesses, which are solicited to submit proposals as prime contractors, sub-contractors, or through teaming arrangements.

Since its inception, customers of SeaPort report savings ranging from 7-10%. Some have even reported savings as high as 30%. Under the CNO's 2004 guidance for implementing the *Sea Enterprise* portion of the *Sea Power 21* philosophy, there is emphasis on finding further efficiencies in our business processes.

In 2004, the command will expand SeaPort so that the web-based portal and acquisition strategy is available to the Warfare Centers and all other NAVSEA activities. This expansion of SeaPort is called SeaPort Enhanced or SeaPort-e. There are 21 different engineering and technical services targeted for the strategy, including research and development support, human factors engineering support, and support associated with modeling, simulation and prototyping.

Each warfare center has a unique mission and therefore a unique set of requirements and contractors that it depends upon. SeaPort-e will provide functional areas needed by the Centers, while protecting the greatly needed local vendor base. To accomplish this, SeaPort-e will award contracts based upon seven zones (Northeast, National Capital, Mid-Atlantic, Mid-west, Gulf Coast, Northwest, and Southwest). Companies that have presence in a zone(s) will be able to compete for all requirements in that zone(s). Each of the 21 functional areas will be competitively available in each zone.

Up until now, the Warfare Centers have contracted individually for such services under a large number of contracts. Where as previously, companies may have had many separate contracts with NAVSEA, now one enterprise-wide contract will cover an expanded range of services. This saves administrative costs as well as time.

SeaPort-e's on-line system allows contracts to be awarded and executed through task orders, which are of shorter duration than traditional contracts. The task orders are tied to where the work needs to be done, and are generally awarded by the Warfare Center with the requirement. This strategy allows for the full implementation of the Product Area Director construct.

Under SeaPort-e, companies will be solicited for work and compete with companies they have been competing with previously. In addition, there will be incentives for small business to be involved, and opportunities for companies to make teaming arrangements. By design, it is relatively easy for new companies to start doing business with NAVSEA via SeaPort-e. Over time, a policy of "rolling admissions" will allow new companies to participate during a kind of "open season" no more than once a year.

A bonus of the electronic system is in its providing a ready source of metrics to evaluate how the program is performing. Using the data submitted electronically to the portal, it will be relatively easy to calculate costs and spending by individual Warfare Center or type of service provided. It will also be possible to track the level of involvement by small business.

The first MACs for Warfare Center professional services will be awarded through SeaPort-e this year.

As important as it is to maintain current fleet assets in the war on terror, it is paramount the nation invests in future naval readiness.

As part of the industrial base of *Sea Power 21*, Naval Sea Systems Command (NAVSEA) and its fleet and industry partners are shaping the next Navy through innovative platforms and systems that will ultimately change how naval warfare is conducted.

The anchor force asset in Navy battle groups for much of the 20th Century, the aircraft carrier of the future will evolve with technology and its changing roles in surge deployment of a carrier strike group (CSG). PEO Carriers is leading development of CVN 21 as a critical component of the Navy's vision, bringing sustained and decisive capability to the battlespace in the 21st Century.

The current carrier force will serve long into the future, and the Smart Carrier program aims to improve that service and Sailor quality of life. "Smart Carrier," headed by PEO Carriers, consists of 12 Ship Alterations (ShipAlts) to existing ships aimed at achieving the reduction of aircraft carrier Sailor workload as well as a reduction of aircraft carrier total ownership costs.

Similarly, surface *ShipAlts* are planned more efficiently and effectively, under SHIPMAIN, and in concert with the operators, maintainers and members of the NAVSEA Team, including SEA 04 and SEA 05.

PEO Ships and industry are shaping surface platforms that will redefine naval warfare from over the horizon to the littoral. Three industry design teams are scheduled to submit their preliminary LCS (Littoral Combat Ship) designs in Spring 2004. With multi-mission capabilities through module construct, LCS will be instrumental in executing the Fleet Response Plan (FRP) on many fronts from mine hunting, surveillance and logistics.

The DD(X) national team, together with PEO Ships and the NAVSEA Team, are developing a destroyer platform unlike any other. With many structural, system and weapons improvements planned, much of the DD(X) innovation lies in how it will be electrically propelled, how it will be optimally manned and how interoperable its combat systems will be with the entire Family of Ships.

While radical hullforms, advanced gun systems, stealthy super-structures and advanced radars are the most visible changes taking place in surface combatant design, another advanced technology in the form of an Integrated Power System (IPS) – led by SEA 05 and PEO IWS, which enables many of these transformational weapons – is being introduced below decks.

Other platforms, like the *San Antonio* Class LPD 17 ship or the *Virginia* Class submarine are not only defining 21st Century naval readiness, but they too are redefining how ships are engineered through virtual means and in the *Virgina's* case, how the Navy buys its submarines through multi-ship, multi-year contracting.

The future NAVSEA is building in 2004 and beyond is as much about how it does business as it is about the innovative platforms and systems it is shaping. Under *SeaEnterprise*, the team is ensuring it makes the most of its fleet building resources to produce the flexible and capable tools the Navy warfighter requires in the 21st Century.

When envisioning Naval combatants of the future, images might come to mind of sleek, radical hull forms, greater automation, netted combat systems and even laser weapons.

After all, it is the 21st Century, and that vision isn't far off from what the NAVSEA Team is building, while shaping our next Navy Family of Ships.

LCS

In November 2002, the Naval Sea Systems Command (NAVSEA) awarded $500,000 contracts to six industry teams performing 90-day Focused Mission Ship (FMS) concept studies, which explored a range of approaches to defining future ship requirements. The study results were also used to refine the Navy's requirements and knowledge of technology options for the proposed Littoral Combat Ship (LCS).

On a "fast-track" acquisition process, the Navy awarded three fixed-price contracts 17 July 2003 to develop preliminary designs for the Flight 0 LCS — the basic hull, mechanical and electrical (HM&E) "Seaframe" — with re-configurable and interchangeable mission modules to be procured separately. Each of three remaining contractors conducted a seven-month Flight 0 LCS preliminary design effort to refine its proposed LCS concept, with delivery of their preliminary designs due February 2004.

The timeline called for issuing a formal RFP to industry for Final Design/Detail Design and Construction awards and subsequent receipt of proposals in January 2004 while the contract award date is set for 24 May 2004.

The LCS program is managed within PEO Ships, but aspects of this innovative platform are being worked across the NAVSEA Team, including PEO Littoral & Mine Warfare; PEO Integrated Warfare Systems and SEA 03 Human Systems Integration; and SEA 05 Ship Design Integration & Engineering. Through team efforts, LCS will be optimized for littoral warfare, in terms of its design, combat systems and manning.

As part of the Family of Ships, LCS enhances the capabilities of the Navy's larger multi-mission surface combatants, such as the planned next-generation destroyer, DD(X) and CG(X) cruiser, as well as today's capable fleet of Aegis warships. In addition to its focused mission module package, each LCS will be equipped with inherent operational capabilities in order to: defend itself from attack; conduct intelligence, surveillance and reconnaissance missions; support joint special operations forces; provide joint mobility in the littoral; interdict other ships; and defend the homeland.

LCS's advanced networking capability will facilitate the sharing of tactical information with other Navy ships, aircraft and submarines, with unmanned vehicles, and with joint and coalition platforms, further netting the combined battlefield at sea and over the land.

These ships will be faster and smaller than current-generation surface combatants, displacing between 1,000-4,000 tons and drafting less than 20 feet, as compared to an *Arleigh Burke*-class destroyer that has a displacement of roughly 9,300 tons and a draft of 31 feet. LCS will be capable of speeds between 40-50 knots.

DD(X)

The 21st Century Destroyer, DD(X) will complement LCS and the Family of Ships in a reciprocal netted manner of total force capability. It too is a revolutionary ship that will break shipbuilding paradigms in its design.

In 2003, the program, led by PEO Ships, made great strides toward putting steel to plan. In conjunction with the DD(X) Phase III contract, the Navy conducted a Spiral Development Review (SDR) resulting in a CNO decision on DD(X) capability and size last summer. A successful Joint Capabilities Board (JCB) review of the DD(X) Operational Requirements Document (ORD) followed in November, and consequently, the DD(X) ORD received "paper" approval by the Joint Requirements Oversight Council (JROC) in December 2003.

Substantial progress was made on DD(X) Engineering Development Models (EDMs), including successful Preliminary Design Reviews (PDR) for Total Ship Computing Environment (TSCE), Advanced Vertical Launching System (AVLS), Infrared (IR) mock-ups, Integrated Power System (IPS), Integrated Deckhouse and Apertures (IDA), Autonomous Fire Suppression System (AFSS), and the Advanced Gun System (AGS).

The DD(X) Design Team is proceeding with engineering and requirements reviews with the Design Agent (DA) in preparation for a Total Ship PDR, scheduled for spring 2004.

The program schedule is on track to support the award of a lead ship in FY05 and ship's delivery in FY11. Several milestones were achieved in the last six months, including:

July 2003

- The DD(X) Design Agent successfully conducted an SRR, addressing requirements at the Total System level, which included ship systems, integrated warfare systems, and the Sailor-Human Systems Integration (HSI) up front.
- Delivered DD(X) SPY-3 Multi-Function Radar (MFR) to its Land-Based Test Site at Wallops Island, MD.
- Released DD(X) hull lines for model construction and tow tank testing.
- Announced plans to equip DD(X) with the S-Band versus L-Band Volume Search Radar (VSR).

August 2003

- Successfully completed TSCE PDR.

September
• Successfully completed the following DD(X) PDRs: Peripheral Vertical Launch System (PVLS), as well as AVLS, IPS and IDA.

October
• Successfully completed LRLAP BDR on 28 October 2003.

November
• Successfully completed Integrated Undersea Warfare (IUSW) PDR.

CVN21

The aircraft carrier of the 21st Century, the program was completely revamped by a Program Decision Memorandum dated 12 Dec 2002, adding RDT&E and SCN funding to accelerate advanced new technologies planned for later aircraft carriers. This also revised the name of the program from CVNX to CVN 21. Through its new nuclear propulsion plant, increased electrical generation capability, improved flight deck and infrastructure to support transformational technologies, CVN 21 will provide increased operational capability while reducing manpower and maintenance requirements.

Key design features include:
• Integrated Island Design – smaller and re-positioned for flight deck efficiency
• New Propulsion/Electric Plant – zoned power grid, all-electric auxiliary services
• Improved Weapon & Material Handling – heavy UNREP (underway replenishment) optimal elevator design
• Enhanced Flight Deck – Electro-Magnetic Air Launch System (EMALS), Advanced Arresting Gear (AAG)
• Design Improvements – Plasma Arc Waste Destruction System (PAWDS), Lightweight Materials for Large Doors, Conglomerate Galley design, Consolidated Office complexes, Improved Habitability

Progress last year included Under Secretary Of Defense For Acquisition, Technology And Logistics approval of the CVN 21 Revised Acquisition Strategy in August 2003. SEA 05's Ship Design Integration & Engineering directorate then established a Government Design Site at the Washington Navy Yard, which brings together engineers from various disciplines to provide technical requirements and specifications to the Lead Design Yard in support of ship design efforts. OPNAV N78 approved a Design Reference Mission, also in August, which provides mission requirements that will be used to analyze design concept alternatives. The Operational Requirements Document (ORD) was completed for JROC at year's end.

In addition, at the end of the year, CVN 21 realized the following milestones:
• Northrop Grumman Newport News (NGNN) development and submission of CVN 21 construction preparation contract proposal
• PMS 378 Development of Milestone B documentation: TEMP, LFT&E Management Plan, MER, PPP, TRLA, Risk Management Plan, C4ISR SPRT Plan, PLCCE, CARD
• Commenced EMALs full scale testing at NAWC Lakehurst
• Continued CVN 21 design under the IPPD contract with NGNN
• Continued advanced technology development in support of ORD key performance parameters
• NGNN submission of a revised Integrated Master Schedule for design and construction of CVN 21
• Support of Commander, Operational Test & Evaluation Force early operational assessment of CVN 21 in preparation for Milestone B

CVN lists four key dates in early 2004 — System Requirements Review (SRR) and EMALs Down Select in March 2004, followed by CP Contract Award and Milestone B in April 2004.

CVN21 Direction and Goals for 2004:
• Award of the Construction Preparation Contract for the CVN 21 to NGNN. Design will continue on the Zonal Electrical Distribution System (ZEDS), the electrification of all hotel and auxiliary systems, a new island design and a host of other design improvements to leap ahead of the current Nimitz class design. Consideration of Human Systems Integration factors is a fundamental aspect of the on-going design process.
• Seek Milestone B approval from the Defense Acquisition Board (DAB) to support the Detail Design and Construction of the lead ship of the CVN 21 Class. CVN 21 is a critical component of the *Sea Power 21* vision, bringing sustained and decisive capability to the battlespace in the 21st Century.
• Leverage the Office of Naval Research (ONR) Future Naval Capabilities program, by transitioning into CVN 21 new technologies that support survivability improvement, including the Dynamic Ship Protection program and the Advanced Damage Countermeasures Program.
• Down Select the Prime Contractor for detail design and fabrication of the Electro-Magnetic Aircraft Launch System (EMALS), a transformational technology that replaces steam catapults. EMALS will have a higher operational availability than steam catapults, while reducing manpower and maintenance requirements. Two vendors are currently competing in a prototype design and testing phase, with a winner to be determined in FY04. EMALS in conjunction with a redesigned flight deck supports Sea Basing and Sea Strike capabilities.
• Select the Prime Vendor to design and fabricate CVN 21 Advanced Weapons Elevator (AWE). AWE supports increased weapon throughput and reliability while reducing maintenance over the current hydraulic elevators. AWE leverages the latest technologies to replace existing hydraulic elevators.
• Begin Land-based Testing of PAWDS. PAWDS is being developed in cooperation with the commercial cruise line industry to create a system meeting all current and anticipated environmental requirements while reducing space, weight, and maintenance requirements. Use of the Plasma Arc system will greatly reduce the manual sorting of trash required by current waste processing equipment.
• Develop design concepts for an Integrated Warfare System (IWS) which provides a flexible architecture to meet the evolving requirements of joint strike mission planning, command and control, air operations, intelligence, surveillance, reconnaissance, and ship self defense.
• Continued design under CP contract.
• Continued technology development.
• Establish detailed process for Phase II aspects of the program.

LPD 17

With the launching of *San Antonio* in July 2003 and three other amphibious transport docks under construction, the LPD 17 shipbuilding enterprise is rapidly progressing. In 2004, for the first time in 34 years, the Navy/industry team will be building five LPDs at one time.

The FY04 President's Budget fully funded all twelve LPD 17 class ships and associated RDT&EN at $15.6 billion. The program is executing in accordance with the budget, with expenditures to date on the first five ships of approximately $3.2 billion. The overall program is on schedule, with the lead ship (LPD 17) expected to deliver in early FY05.

The *San Antonio* class of amphibious transport docks reflects a transitional design that has direct relevance to the *Sea Power 21* vision. This class has implemented significant innovations in acquisition reform. The ship class is the first to use three-dimensional computer-aided design (CAD) in an Integrated Product Data Environment (IPDE) with an intensive design process focused on the *Sea Warrior*. Leveraging industrial innovations, LPD 17 represents a benchmark for building 21st Century readiness.

The systems engineering effort for LPD 17 remains as expected at contract award and has been extremely successful in land based testing. Modifications to the integrated ship system were made largely to improve affordability.

LPD 17's mission flexibility supports a variety of potential expeditionary warfare tasking, whether serving as an integral part of an Amphibious Task Force, Amphibious Ready Group, or Expeditionary Strike Group. Key elements in this design include the "plug and play" concept for facilitating force embarkation, 30% growth potential for C4ISR equipment, and the use of air-blown fiber technology in the ship's fiber optic network conduits. As the first ship designed to support the Marine Corps' "mobility triad" — the LCAC (Landing Craft Air Cushion vehicle), AAAV (Advanced Amphibious Assault Vehicle), and MV-22 (Osprey tilt-rotor aircraft) — LPD 17 will play a key role in future *Sea Strike*, *Sea Shield*, and *Sea Basing* missions.

While there is no "flight" or "block" upgrade planned for the LPD 17 class, the ships are designed to accommodate cost effective implementation of future capabilities in several ways. First, the Shipboard Wide Area Network (SWAN) is designed with approximately 50% reserve capacity for carrying electronic data through the ship, with access to this capacity available through conveniently located "drops" throughout the ship. Similarly, the fiber optic cable plant, which carries air-blown fiber to essential electronics spaces on the ship, also has significant reserve capacity in the conduit through which the air blown fiber passes. Both of these design features will allow future upgrades to be installed with far less cable pulling than a traditional installation. LPD 17 is expected to enter the Fleet with the full 5% service life allowance reserved for weight and KG growth as well as a number of unassigned spaces, so ship stability and capacity should not be an issue for future upgrades. From a process point of view, the LPD 17 class 3-D Computer Aided Design Model provides tremendous utility in accomplishing design development for future upgrades.

Few ships possess the requisite intelligence center, ship signals exploitation, or Unmanned Aerial Vehicle (UAV) downlink capabilities of LPD 17. These are complemented by the ship's design support for Marine or Special Forces surface and air assets. The ship is also equipped to share equal situational awareness and tactical information throughout its command and control spaces, fully supporting a common, relevant operational picture and integrated interoperability. The LPD 17 has a variety of communications systems as well as multi-link capability. With these systems, LPD 17 can access diverse information sources, share information, and display details through a variety of technology media better than most other ships – a key element in *Sea Power 21*'s FORCEnet concept where our "network of forces" is only as strong as its combined theater components.

The LPD 17 program represents great promise for other shipbuilding programs. The Navy effort to transfer LPD 17 and DDG 51 class work between Bath Iron works and Northrop Grumman Ship systems were successfully completed. All material for the first affected LPD 17 class ship, the LPD 19, was shipped from Bath to Northrop Grumman for use in building the ship at the NGSS Ingalls facility. The ship is now 28% complete. The remaining affected LPD 17 class ships (LPD 22, 25 and 28) are slated for construction at NGSS. The effort has stabilized the workload at both shipyards, allowing each shipyard's management to focus on a single Navy product line.

Groton, Conn. (Aug. 5, 2003) — The Navy's newest and most advanced submarine, Pre-Commissioning Unit (PCU) *Virginia* (SSN 774) moved out doors for the first time in preparation for her Aug. 16 christening.
Photo courtesy Electric Boat.

Virginia Class Submarine

The current world environment is dramatically changing how naval warfare is conducted, from a surging Fleet Response Plan to a deliberate focus on operations in coastal regions critical to U.S. interests. In that same vein, the new *Virginia* Class Attack Submarine will redefine undersea warfare through its design for battlespace dominance in a littoral environment with the capability to perform a broad spectrum of regional and near-land missions and joint force operations.

The lead ship of the next-generation of attack submarines was christened USS *Virginia* during a ceremony on 16 August 2003 at Electric Boat Corporation's shipyard in Groton, CT. Mrs. Lynda Johnson Robb broke the traditional bottle of champagne against the hull. Mrs. Robb is the wife of former Virginia Governor and Senator Chuck Robb, and daughter of former President Lyndon B. Johnson. This is the sixth U.S. Navy ship to carry the name honoring the Commonwealth of Virginia. *Virginia* was more than 90 percent complete at the end of 2003, and its delivery to the Navy is scheduled for 30 June 2004. It is impressive to note that the christening occurred on the date set in a schedule developed six years ago. All five sister submarines are progressing to deliver on schedule.

Through the efforts of PEO Submarines and Team Sub members, the 21st Century sub has an Open Systems Architecture designed to facilitate future technology insertion and efficient upgrade of its Command/Control/Communications/Computer and Intelligence (C4I) systems. Capitalizing on increased stealth, improved covert surveillance capabilities, and persistent combat power, the *Virginia* Class will be delivered ready to gain and maintain access to forward areas, conduct covert long-term surveillance, host and support special operations forces, and attack targets far inland in support of *Sea Power 21* objectives.

These capabilities make the *Virginia* Class a critical component of the Chief of Naval Operations' vision of the 21st century Navy – "Sea Power 21." Its offensive capabilities emphatically enhance "Sea Strike", its ability to remain on station for long periods and support special operations forces enhances "Sea Basing", and its Anti-Submarine Warfare (ASW) capabilities enhance "Sea Shield".

One of the biggest innovations of the program lies in its contracting strategy. The Navy awarded a contract to General Dynamics Electric Boat on August 14 of last year, which purchased SSN 778, and provided for the purchase of five additional submarines. On January 29 of this year, the Navy converted the five additional ships to a multiyear procurement contract. Multiyear contracting will provide a total savings of $400 million ($80 million per ship). Conversion to the multiyear contract supports the CNO's *Sea Enterprise* initiative and is a large step forward to re-capitalizing our undersea platforms to meet 21st Century force-level and new mission requirements. In addition to the provisions of multiyear procurement, this contract represents an advancement in structuring positive financial incentives for the shipbuilder to deliver submarines on time for less than the target price, without affecting quality.

Some of the other innovations for *Virginia* Class, being led by PEO Submarines, include Distributed Pump and Jet Propulsion. Distributed Propulsion offers the potential to fundamentally alter submarine architecture. This could enable a future reduced cost submarine that brings full capability to the battlefield. The Navy and industry Research and Development (R&D) community is working with the NAVSEA Team to mature key technologies required to realize this opportunity, such as integrated motor/pump units external to the pressure hull. Distributed Propulsion could reduce displacement and acquisition cost by as much as 50% while delivering the war-fighting capability of the *Virginia* Class submarines.

Today, hydraulic power is the primary means for controlling and positioning major submarine systems and equipment such as ship control surfaces, weapons handling and launching, raising and lowering masts and antennas, and actuating valves. On the *Virginia* Class alone there are approximately 218 hydraulic actuators. The hydraulic distribution system and associated power plants are expensive, maintenance intensive, potentially environmentally unfriendly, and restrict arrangement flexibility on the submarine. PEO Submarines is working to replace the current on-board hydraulic actuators and ship-wide hydraulic distribution system with electric actuation systems. The new systems promise to reduce weight, noise, and hull penetrations, while improving safety, providing a cleaner atmosphere and environment, and reducing construction and total operating costs. Electric actuation will also require less time for Sailors to perform maintenance.

Other advances for *Virginia* Class include its automated weapons systems and improved crew weapons handling procedures. The Naval Undersea Warfare Center (NUWC) Keyport division is developing a trainer for the *Virginia* Class MK 71 Torpedo Tube and Weapons Handling System. Ole Birkland, Code 20 Project Manager, explains, "The *Virginia* Class has a completely 'hands-off' torpedo room. Sailors don't have to touch the weapons anymore. SSN 774 submarines have an automated shuttle system to move the weapons in their torpedo room. Shipboard personnel select a weapon, and the system automatically shuttles it into position and then slides it into the tube." Keyport has been tasked to design and

‹ Puget Sound Naval Shipyard, Wash. (Aug. 14, 2003) — Illustration of USS *Ohio* (SSGN 726) which is undergoing a conversion from a Ballistic Missile Submarine (SSBN) to a Guided Missile Submarine (SSGN) designation. *Ohio* has been out of service since Oct. 29, 2002 for conversion to SSGN at Puget Sound Naval Shipyard. Four *Ohio*-class strategic missile submarines, USS *Ohio* (SSBN 726), USS *Michigan* (SSBN 727) USS *Florida* (SSBN 728), and USS *Georgia* (SSBN 729) have been selected for transformation into a new platform, designated SSGN. The SSGNs will have the capability to support and launch up to 154 *Tomahawk* missiles, a significant increase in capacity compared to other platforms. The 22 missile tubes also will provide the capability to carry other payloads, such as unmanned underwater vehicles (UUVs), unmanned aerial vehicles (UAVs) and Special Forces equipment. This new platform will also have the capability to carry and support more than 66 Navy SEALs (Sea, Air and Land) and insert them clandestinely into potential conflict areas.
U.S. Navy illustration.

The Navy is giving new life to its *Trident* Class ballistic missile submarines, converting them into sea based undersea platforms to carry and launch cruise missiles.

construct a MK 71 Torpedo Tube and interface it with a prototype Weapons Handling System (built by Electric Boat and comprising one-third of the shipboard system), enabling the Submarine School to teach lashing, shuttling, loading, securing, and extracting weapons, as well as tube and handling system maintenance.

To house the MK 71 Torpedo Tube and the Weapons Handling System, Electric Boat Company is overseeing construction of an addition to the present undersea weapons facility at Groton. The Torpedo Room Trainer project partners include SEA 07 Undersea Warfare directorate and Naval Air Systems Command Orlando, which will provide program management and logistics support, with technical assistance being provided by AMSEC Corporation and ISEA personnel from NUWC Newport division. The facility will be ready to support Fleet training in June 2005.

Several other *Virginia* Class 'part-task' trainers (i.e., sections of a system required to teach a specific maintenance skill) are underway at Keyport, supporting air conditioning, seawater desalination, and oxygen generator maintenance training. NUWC Newport successfully completed shock test assessment of the Mk 48 Mod 5 and 6 Torpedo with the new Lashable Torpedo Mounted Dispenser and a Tomahawk Block 3 missile, both while stowed in a full scale replica of the *Virginia* Class weapon stowage cradle.

SSGN

SSGN is a key component of Sea Strike and Sea Basing capabilities for *Sea Power* 21. In all, four *Ohio* class submarines were removed from strategic service in FY03/04 and selected for conversion to SSGN.

The unique transformational aspects of the SSGN Program include:
- Proceeding rapidly from preliminary design to delivery of the lead ship in four years.
- Providing unprecedented strike and special operations force (SOF) payloads.
- Providing volume and systems to allow experimentation with new sensors, weapons, and other payloads such as Unmanned Underwater Vehicles (UUVs) and Unmanned Aerial Vehicles (UAVs).

In a true *Sea Trial* effort, NUWC Division Newport provided major support, along with many elements of Team Submarine, in the first successful launch of a Tomahawk missile from USS *Florida* (SSBN 728) in the Gulf of Mexico conducted during the January 2003 "Giant Shadow" Exercise. The feasibility of a Tomahawk missile launch from a large D-5 missile tube and the use of a newly developed Multiple-All-Up-Round Canister (MAC), designed to carry seven Tomahawk missiles per SSGN tube, was successfully demonstrated during this exercise. The attack weapon system boasts a capability of firing 154 Tomahawk missiles, special forces operations and upgrades to mission planning and connectivity.

The Navy has since awarded an SSGN conversion installation contract in November 2003 to General Dynamics/Electric Boat for two SSGNs. The conversion of USS *Ohio* (SSGN 726) began that month at Puget Sound Naval Shipyard and is scheduled to be complete by November 2005; with initial operational capability in 2007. Also at Puget Sound Naval Shipyard (PSNS), USS *Michigan* (SSGN 727) commenced an Engineered Refueling Overhaul (ERO) in November 2003. Conversion to SSGN is conducted in conjunction with the ship's ERO.

Together with GD/EB, PSNS's teamed efforts on SSGN conversions represent a public-private partnership of best athletes, a succeeding example of the "One Shipyard for the Nation" concept, which values the teaming of national yard resources. In this partnership, GD and EB act as SSGN Conversion Managers. The Naval Shipyards will perform the conversion and provide support/services and labor to GD and EB as agreed to through an innovative partnership plan. Similar partnering will occur this year at Norfolk Naval Shipyard (NNSY), where in April, SSGN conversion will commence on USS *Florida* (SSGN 728). NNSY is currently conducting the submarine's ERO.

All four SSGNs are slated for delivery in less than four years. The lead ship delivers in November 2005 with Initial Operation Capability (IOC) in May 2007. Further, a cost plus incentive fee contract for SSGN conversion program was signed 18 December 2003. The contract allows for installation and manufacturing for two FY 2004 conversions (USS *Ohio* and USS *Florida*). If also modifies a contract awarded on 26 September 2003 to GD and EB for Detail Design, Procurement and Manufacturing of Long Lead Time Material, and Conversion Planning.

Last year, the Navy also took delivery of the U.S. Special Operations Command's (USSOCOM) Advanced SEAL Delivery System (ASDS), during a ceremony at Northrop Grumman Oceanic and Naval Systems in Annapolis. The ASDS is a key element in the transformational capabilities of the SSGN to respond to today's asymmetric threats. Four Trident-class SSBNs – once converted to SSGN cruise missile and special forces carriers – will be capable of carrying ASDS, as will *Virginia* Class attack submarines and the last of the *Seawolf* Class, Jimmy Carter (SSN 23).

Significant events and milestones for SSGN efforts include:
- Nov 2003: Award SSGN conversion installation contract for two SSGN Conversions to General Dynamics/Electric Boat (GD/EB).
- Nov 2003: Commence USS *Ohio* (SSGN 726) Conversion at Puget Sound Naval Shipyard (PSNS). USS *Ohio* Conversion is scheduled to complete in November 2005 with Initial Operational Capability in FY 2007. PSNS and GD/EB are partnering to execute the USS *Ohio*/USS *Michigan* Conversions under a public-private partnership.
- March 2004: Commence USS *Michigan* (SSGN 727) Engineered Refueling Overhaul (ERO) at PSNS.
- April 2004: Commence USS *Florida* (SSGN 728) Conversion at Norfolk Naval Shipyard. USS *Florida* ERO commenced in August 2003.
- Sept 2004: Expected Contract award for Conversion Contract for USS *Michigan* (SSGN 727) and USS *Georgia* (SSGN 729).
- Oct. 2004: Commence USS *Michigan* (SSGN 727) Conversion at PSNS.

As SSGN moves forward, Keyport expects to design and build two sets of "Lock-out Trunk" trainers to support SSGN Class training at the Trident Training Facilities at Bangor and Kings Bay.

› Pacific Ocean (Oct. 4, 2003) — Sailors "man the rails" of USS *John C. Stennis* (CVN 74) as the ship arrives in port during the annual San Diego Fleet Week parade of ships ceremony. U.S. Navy photo by Photographer's Mate 2nd Class Jayme Pastoric.

Tomorrow's fleet operates in an ever more complex and hostile battle environment. Fewer Sailors control, manage and support increasingly sophisticated technology.

Under tight time constraints, each Sailor makes numerous operational decisions with far-reaching consequences. To be effective at each and every post, we must realize the Sailor is at the center of our capability to fight and to win.

In essence, the human must be engineered into the system from the earliest stages of "system of systems" conception to optimize Sailor performance and "right size" unit manning. By taking advantage of our modern Sailor's ability to proficiently multi-task, and of best business practices in acquiring, fielding and supporting the fleet, the Chief of Naval Operation's (CNO's) vision of re-capitalizing the navy's fighting edge will be realized.

Naval Sea Systems Command's (NAVSEA's) Human Systems Integration (HSI) Directorate (SEA 03) focuses its constituent attention on improving Sailor performance and system effectiveness by placing the Sailor at the center of war-fighting capability. To do this, a transformational approach to program acquisition, manpower, distribution and training under the aegis of the CNO's *Sea Warrior* initiative is underway with the Sailor at the heart of every move.

With the advent of the HSI Directorate, NAVSEA now defines total system performance with three components in mind — hardware, software and Sailors. Because Sailors are the most valuable shipboard system, acquisition program executives and managers are partnering with SEA 03 to design new ship classes and modernization efforts around the Sailor.

An engineering discipline with deep roots in man-machine interface scenarios as varied as aircraft cockpit design and automobile door handles, HSI reveals the human factor is the critical dependent variable in system design.

Focusing on the Sailor during the initial Business Case Analysis (BCA) identifies the impact on performance, efficiency and workload. This is key to making hardware, software and people equal parts of the entire design and modification process.

HSI cannot succeed to its demonstrated potential without keen advocates who understand something of its principles.

The HSI Directorate is NAVSEA's warranted technical authority to ensure human performance is measurable and certifiable. To help explain and describe Total Systems Performance, the Directorate developed the necessary human performance and program performance metrics as well as a technical metrics guide (a user's guide) NAVSEA Program Managers use to measure how well ships and systems delivered to the fleet meet their warfighting requirements.

HSI metrics also appear in SHIPMAIN (Ship's Maintenance) Alteration and Modification processes. The evaluation of human performance has become a part of the Test and Evaluation Master Plan (TEMP), and was used in USS *Chaffee* (DDG 90)'s Littoral Warfare Assessment concentrating on Combat Information Center (CIC) mission effectiveness. Human performance data collected in such tests and evaluations is used to fix HSI issues and identify workload and situational awareness drivers for different warfare areas.

The Directorate fostered a strong partnership with the Commander, Fleet Forces Command (CFFC) and the Human Performance Center (HPC) to resolve fleet-wide human performance issues and leverage in-service units to conduct human performance testing. NAVSEA also established a Human Performance Lab (HPL) to provide a controlled and predictable testing environment. There are plans to integrate the HPL with the Integrated Command Environment Lab, Command and Control Lab, Distributed Engineering Plant and Warfare Center Labs. This integrated "super lab" will provide the Navy and private industry with one of the finest and most robust human performance testing infrastructures in the world.

SEA 03 has developed metrics and identified HSI tools to measure human performance for new and revolutionary ship and subsystem designs such as DD(X) and the Littoral Combat Ship (LCS). Similarly, NAVSEA is teaming with program managers for major modernization redesigns, such as DDG Modernization and CG Conversion. Ultimately, NAVSEA will create an HSI Database that provides program managers with HSI criteria, metrics, tools and acquisition requirements tailored to their program size, type of acquisition and phase of acquisition.

In building a new generation of highly efficient warships NAVSEA is committed to placing its multi-role fighters, its Sailors at the center of the engineering and acquisition equation. While program budget and system lifetime costs are certainly of primary interest to NAVSEA, we are also concerned with the personal and professional growth of sailors in a period of significant change. Human factors inform designs which delineate skills and define training requirements thus making the intersection of HSI and Task Force Excel's revolution in professional development especially timely.

Across the spectrum of FORCEnet initiatives, in *Sea Warrior* and in support of *Sea Power 21,* HSI and NAVSEA are key catalysts for positive transformation and effective advocates for placing the Sailor at the center of capability.

‹ Kauai, Hawaii (Dec. 11, 2003) — A Standard Missile-3 (SM-3) is launched from the Aegis cruiser USS *Lake Erie* (CG 70) as part of the Missile Defense Agency's latest Ballistic Missile Defense System (BMDS) test to defeat a medium range ballistic missile threat. The SM-3, part of the Aegis Weapon System intercepted a target launched from the Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii at an approximate speed of 3.7 kilometers per second. The two missiles collided several hundred kilometers from Kauai at an altitude of approximately 137 kilometers. The BMDS test included evaluation of the long-range surveillance and tracking capabilities of two Navy ships, the effective communications between the ships and command and control units in Colorado, and the launch of the SM-3 interceptor. This was the fourth successful intercept for the sea-based element of the BMDS.
U.S. Navy photo.

"We have a responsibility to the taxpayer and the warfighter to invest our limited R&D dollars wisely. The truth is we do not do as much R&D as we used to and that we are looking towards industry for their input," stated Balisle. "That said, we owe industry the necessary guidance and direction that will serve their needs and guard their investments."

The Program Executive Office for Aircraft Carriers (PEO Carriers) and other members of the NAVSEA Team are also managing SD and technology insertion for aircraft carriers through the CARTECH

From LCS to DD(X), CVN-21 and the Family of Ships that make up the next Navy, Naval Sea Systems Command's (NAVSEA's) teaming approach is aimed at moving beyond buzzwords to delivering real-time combat systems solutions for naval warfighters as they execute the Navy's *Sea Power 21* vision.

During a Navy League Corporate Breakfast last year in Washington, D.C., NAVSEA Commander Vice Adm. Phillip M. Balisle underscored that point, "Spiral Development (SD) is a term, like others in the Beltway, being floated around more and more. But if we don't act on it and move forward with spiral development, it stands the risk of meaning nothing at all."

NAVSEA moved ahead with SD in 2003 through its Surface Technologies, "SURFTECH" program. Like the submarine community's SUBTECH initiative, SURFTECH is managing the fast pace of technology and planning for its surface Navy insertion in an incremented and efficient process that is meeting the focused mission needs of the fleet. The SURFTECH process reviewed 268 Future Navy Capability projects, of which were found to be 52 critical to the surface community, including the development of electric weapons. Nine critical mission shortfalls in the current Navy science and technology agenda were also identified, including the need for battle damage assessment capability research and development (R&D).

program, similar in approach as the other two tech programs. The decision to evolve CVNX to CVN 21 accelerated the Navy's timeline for infusion of new transformational warfare capabilities and associated technologies required to meet CVN 21's capability requirements in support of *Sea Power 21.* Chief of Naval Operations (N78) and PEO Aircraft Carriers established the new technology management concept, CARTECH, to advance the future carrier program technology requirements while also accommodating a demanding technology base supporting current readiness for in-service aircraft carriers.

CARTECH addresses innovative technologies for future readiness of aircraft carriers; allows the Navy to more aggressively insert technology supporting current readiness into the Fleet's existing aircraft carrier assets; and promotes the effective capitalization of Science and Technology (S&T) and Research and Development (R&D) investments.

Open Architecture

Making the most of time and money requires combat systems to share common baseline software that promotes efficient and mission effective upgrades. Open Architecture (OA) is a critical enabler of the far-reaching transformation the Chief of Naval Operations outlined for the Navy in *Sea Power 21.*

The Open Architecture (OA) enterprise effort to change the way the Navy develops and fields warfare systems took a strong foothold in 2003 and work accelerates in 2004. To improve interoperability and reduce maintenance and upgrade costs for warfare system applications and computing equipment, the Navy is moving quickly to develop and field a modular, open systems architecture in its warfare systems. Recent direction by Assistant Secretary of the Navy John Young expanded the effort to include warfare systems intended for all dimensions of the battle space.

Emphasizing the word "integrated" in its charter, the Program Executive Office for Integrated Warfare Systems (PEO IWS) addresses several ways to overcome the Navy's proprietary and stove-piped legacy computing systems, with their numerous incompatible interfaces, hardware, firmware, software and middleware, all of which decrease operational efficiencies and drive up costs.

OA focuses attention on the need for thorough systems design and engineering to implement standards-based systems that permit technology refresh and the addition of new or improved warfighting functionality while minimizing the impacts that drive time and cost. The OA program will evolve along two major themes:

- An Open Architecture Computing Environment (OACE) based on mainstream Commercial Off-The-Shelf (COTS) technologies and systems implementing widely adopted open commercial standards and non-proprietary interface standards, services and formats.
- A single Navy-wide combat system functional architecture that is modular, extensible and scalable in function, capacity, and workload to meet joint warfighting requirements.

The OA initiative seeks to capture these important benefits by leveraging commercially developed technologies and increased marketplace competition. By inserting Commercial Off-The-Shelf (COTS) technology in OA development, multiple infrastructures that result from a myriad of competing functional and technical architectures are reduced, and a product-line approach is embraced, generating true economic efficiencies, all the while contributing to enhanced operational readiness and warfighting capabilities throughout the fleet.

With a defined OACE, applications will be decoupled from the technical characteristics of the computing environment. This permits technology refresh with the rapidity and frequency of innovation in the commercial technology market while avoiding re-engineering of applications programs to maintain compatibility.

A single Navy-wide functional architecture that is modular and open enables the use of common software applications across multiple platforms. Concurrent changes to warfare system application programs, whether for maintenance or added capability, are made with minimal impact. This permits more rapid and less expensive upgrade cycles for these application programs. It also ensures that the Navy and the defense industry do not develop and field warfare system application programs with duplicative or conflicting content.

This enterprise approach to OA requires all warfare systems included in the effort shift toward the defined functional architecture as well as the standards-based computing environment. Given the complexity of this move, the Navy has chosen to permit a phased approach. First, warfare systems with near term or evolving fielding requirements will move to the computing environment defined by OACE standards followed by transition to the modular, open functional architecture. Warfare systems with greater development time will implement both thrusts before fielding.

Among other "firsts" during its initial year of operation, PEO IWS recently opened the OA Test Facility at the Naval Surface Warfare Center Dahlgren, Va. Division. Raytheon assembled this facility as part of the DD(X) Total Ship Computing Environment (TSCE) initiative. In a proof-of-concept effort, the OA Test Facility runs on more than 200 COTS computers from various vendors, with multiple non-proprietary standards-based operating systems that process more than 200 billion bits of information per second.

These and other OA initiatives undertaken by the NAVSEA Team and its industry partners will go far toward making Open Architecture a reality in the Navy's 21st Century combat systems.

IROS3, executed under PEO IWS, is an overarching AT system, which integrates sensor information and communication data while also combining semi-automated engagement capability. It creates a common tactical scene for ship's forces to maintain 24 hour, situational awareness between watch standers, patrol boats, piers and shore-based stations. A demonstration of IROS3 was provided onboard USS *Ramage* (DDG-61) in August 2003 as part of Task Force Hip Pocket, which included participation of a team from NSWC Crane.

In building 21st Century Naval readiness, the Naval Sea Systems Command (NAVSEA) team is also developing modern ship, naval force and national defenses under the Sea Shield umbrella of force protection.

To have dependable *Sea Based* and *Sea Strike* components of the *Sea Power 21* vision, Navy assets and our national interests must be guarded, particularly as technologies and capabilities are optimally leveraged and force footprints are reduced under *Sea Warrior.*

Underscoring today's unpredictable operating environment, Program Executive Office (PEO) Littoral & Mine Warfare (LMW) has taken a lead to coordinate afloat and expeditionary Anti-Terrorism (AT) efforts internal to NAVSEA/PEOs as well as externally to the other systems commands. The PEO established the Anti-Terrorism Afloat Program Office (PMS AT-A) to provide programmatic structure for Navy afloat and expeditionary units to counter terrorism.

PEO LMW is closely working with Joint Non-Lethal Weapons Directorate (JNLWD) in Quantico, VA to develop and field non-lethal systems/devices. Non-lethal devices with Naval applications under development include:

- Joint Non-Lethal Flash Bang (JNLFB) Kit/Ammunition
- Active Denial System (ADS)
- Running Gear Entanglement System (RGES) (Static)
- Long Range Acoustic Device (LRAD)

The Shipboard Protection System (SPS) uses the system of systems (SOS) approach to provide the warfighter with an AT defense capability inside the sea buoy. Established as a program of record as a PR 05 start, this spiral development effort provides an organic shipboard family of systems designed to detect, classify and engage asymmetric threats. SPS currently includes:

- Integrated Radar and Optical Surveillance and Sighting System (IROS3)
- Swimmer Detection System (SDS)
- Non-Lethal Devices (NLD)

NAVSEA warfare center expertise has played an active role in these and other aspects of building improved force protection. The Swimmer Detection System is currently under development with NSWC Crane providing lead warfare center support and product direction.

Crane division is also providing for ships' self-defense with its NULKA Mk 234 Electronic Decoy Cartridge. The NULKA is an off-board decoy, which uses an active electronic payload mounted on top of a hovering rocket. The decoy is designed to counter a wide variety of present and future (mobile or land-based), radar guided Anti-Ship Missile (ASM) threats while flying a ship like trajectory.

NSWC Carderock has been active in other areas of force protection support, determining acoustic and magnetic measurements over the past year for Assessment And Identification Of Mine Susceptibility (AIMS). The division developed ship's signature for a number of M-Class ships, as well as Navy patrol craft, Coast Guard patrol craft, and Special Operations Craft–Riverine (SOCR); all with littoral locations. As a result of these measurements, each ship was provided with its susceptibility to influence mines. Crews were trained in acoustic and magnetic signature control and given an acoustic "quiet bill."

Today's threats faced by 21st Naval forces include former Soviet Navy's anti-ship cruise missiles (ASCMs) developed during the Cold War and subsequently sold throughout the world. Together with manned attack aircraft, ASCMs still constitute a proliferating threat from many sources. More recently, theater ballistic missiles and the danger they pose to land forces have heightened the need for an effective *Sea Shield*.

PEO Integrated Warfare Systems (IWS) is ensuring that the capabilities to combat these force threats will be in interoperable warfighter hands. PEO IWS missile programs include the RIM-7 SEASPARROW Missile and the RIM-162 Evolved SEASPARROW Missile (ESSM), two key elements of the U.S. Navy's ship self-defense capability against anti-ship cruise missiles. Also, the Rolling Airframe Missile (RAM, RIM-116A), a high firepower, low-cost system is designed to engage ASCMs in the littoral where active electronic countermeasures exist and more of our frontline forces operate in the war against terrorism.

IWS and others on the NAVSEA Team are pursuing Aegis Ballistic Missile Defense (ABMD), which includes modifications to the Aegis Weapon System and integration of the Standard Missile-3 (SM-3) and its kinetic hit-to-kill payload; part of the overall Missile Defense Agency efforts to deter these kinds of long-range enemy strikes against our forces and our national interests.

Aegis radar and weapons systems are the steel of today's Navy *Sea Shield*, and the NAVSEA Team continues to harden that steel through spiral development and technology insertion. The Aegis radar system, the AN/SPY-1(D)V, made its debut on USS *Pinckney* (DDG 91) and was tested last year as the latest upgrade to SPY radar, a multi-function phased-array three-dimensional radar capable of search, automatic detection, transition to track, and track of air targets located in selected coverage areas. *Pinckney* also received the newest Aegis Surface ASW (Anti-Submarine Warfare)

system, the AN/SQQ-89(V)15, as the latest upgrade to the tactical sonar suite, which provides integrated undersea warfare detection, classification, display, and targeting capability. The AN/SQQ-89(V)15 is a significant step in the evolutionary path to a fully open architecture through leveraging Commercial-Off-The-Shelf (COTS) technology.

NAVSEA is focusing on other areas of counter mines. Members of the team, including PEO LMW and NUWC (Naval Undersea Warfare Center), are working with industry on the unmanned undersea vehicle Remote Minehunting System (RMS) as first ever off-board mine reconnaissance capability from a surface combatant; *Arleigh Burke* Class DDG-51 Flight IIA ships. Considering that mines, due to their availability and relatively low cost, are one of the most likely threats to any sea-going vessel, RMS will provide a much-needed additional self-defense facet to the DDG and strike group. RMS developmental testing is scheduled to occur this spring and summer.

Mines aren't the only threats our forces need to detect. In today's unpredictable environment, asymmetric threats can come in the form of chemical or biological attacks. NSWC Dahlgren is providing CBR training technical assistance and operator/technical training for the Interim Biological Agent Detection System (IBADS) on board ships, such as USS *Ogden* (LPD-5). Dahlgren developed IBADS to detect and identify biological warfare agents and to provide a basis for appro-priate medical and decontamination countermeasures. The Dahlgren division offers CBR posture readiness assessment and assistance support, having recently visited Naval Support Activity (NSA) Souda Bay, Greece, and Gaeta, Italy to provide a comprehensive assessment of the USS *La Salle* CBR capabilities.

NSWC Port Huneme division will soon have a new platform to test ships self-defense and force protection initiatives. The Ex-USS *Paul F. Foster* (DD 964) is in the process of becoming the next dedicated ship self defense test and evaluation platform assigned to the West coast division. The direct turnover of *Paul F. Foster* is reducing conversion costs as many combat systems elements are already installed, including the MK 41 Vertical Launching System. Conversion of *Paul F. Foster* to a fully functional test ship will be completed this year and she will be ready to perform her test and evaluation mission by FY05.

In engineering the best ships and systems for our Navy, the NAVSEA Team keeps Sailor safety at the forefront of developing warfighter defense capabilities. Efforts such as IROS3, non-lethal systems and RMS – and many more not mentioned, are actively shaping 21st Century naval force protection.

Possibly more than any other development being pursued in building 21st Century naval readiness, the introduction of electric drive and high energy weapons could fundamentally change how the Navy conducts warfare from the sea.

Electric drive makes it all possible through the Integrated Power Systems (IPS). IPS enables the transformational warship design efforts of SEA 05, NAVSEA's Ship Design Integration & Engineering Directorate. While radical hullforms, advanced gun systems, stealthy superstructures and advanced radars are the most visible changes taking place in surface combatant design, another advanced technology, engineered below decks in the form of IPS, enables many of these transformational weapons to come to fruition.

Of major significance to the practical implementation of transformational weapons systems, IPS provides 10 times the electrical power currently available on Navy Combatants — a key enabler for very high power weapons and sensors. The DD(X) IPS, for example, will generate more than 80 megawatts of electrical power to feed an electric propulsion and electrical power distribution system architecture that provides for immediate ship arrangement, mobility, survivability, signature and affordability benefits.

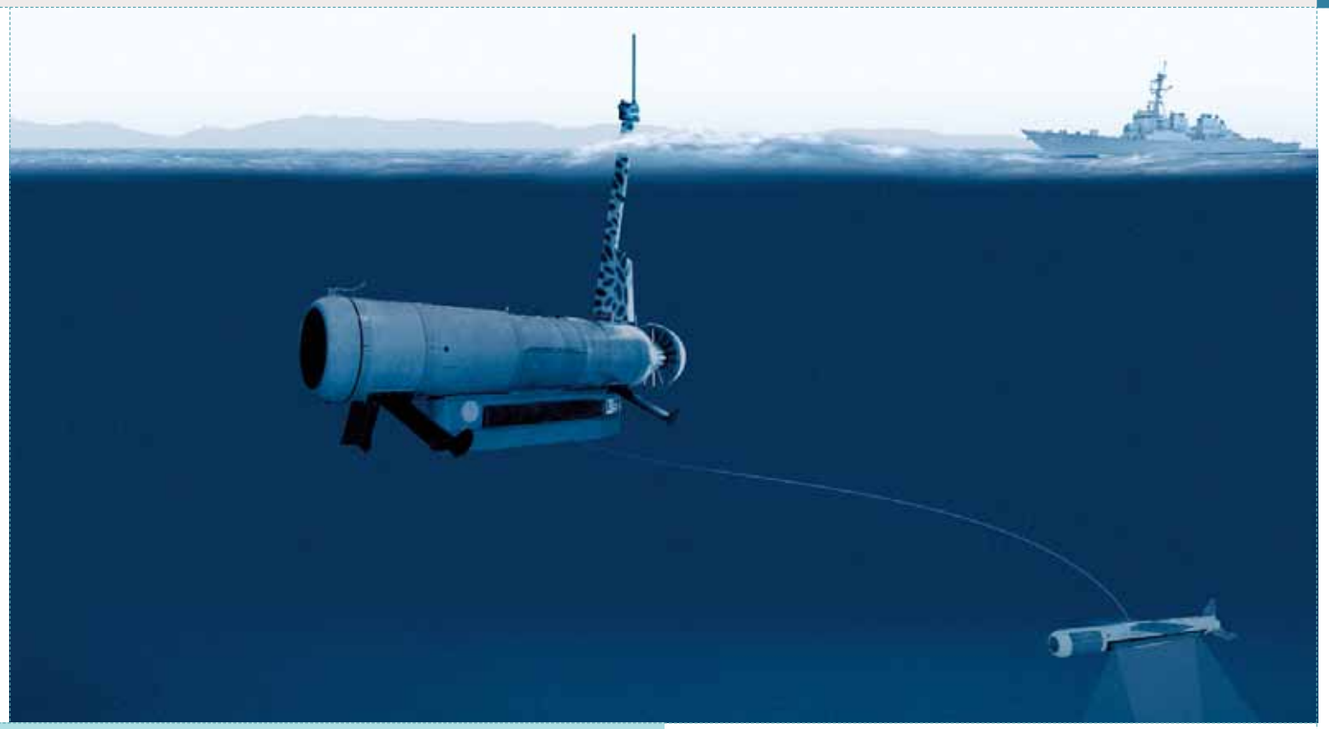
As Commander, Naval Sea Systems Command, Vice Adm. Phillip M. Balisle said during a conference last year on directed energy weapons, "The development of IPS is going to free up that untapped [propulsion] power and is the basis for this transformation at sea."

In 2001, the Navy's Directed Energy Weapons Office (PMS405) was established to focus efforts on the development of directed energy weapons, including High Power Microwave and High Energy Laser systems. The CNO later further directed NAVSEA to give PMS 405 the additional responsibility of managing the full-scale proof of concept for the Rail Gun, as well as any other future electro-magnetic weapons. PMS405 is now working closely with PEO Carriers, PEO Ships, and PEO Integrated Warfare Systems as the NAVSEA Team moves down the spiral development path for CVN21, DDX, and follow-on classes of electric warships.

Thomas Jefferson National Laboratory in Newport News, Va., under the direction of PMS405, is currently testing a 10KW Free Electron Laser. This is a critical milestone in the development of a weapon-grade free electron laser. Last year, funding for an electromagnetic Rail Gun test was received, and during the summer of 2003, a successful 1/8 scale test using a U.K. rail gun and a U.S.-produced projectile achieved hypersonic velocity. PMS 405 is also involved in several other cutting edge technology efforts, including high power optics development, high current electron beam injectors and other electrically powered devices.

A successful *Sea Trial* Demonstration of an electromagnetic launcher (EML) system took place at the U.K. Ministry of Defence (MOD) EML Facility, Kirkcudbright, Scotland on April 24, 2003. The demonstration followed two preparatory test series, a System Interfaces Verification and a Free-flight Verification conducted earlier in the year. During the demonstration, two projectiles were fired, each at muzzle velocities in excess of 2 km/sec. The demonstration culminated an intense five-month effort by a Naval Surface Warfare Center Dahlgren Division-led team to design, analyze, fabricate, and validate projectile and sabot performance at 1/8 the muzzle energy envisioned for a long range Navy EML.

Moving at a relatively high-energy speed, the electric drive and high-energy weapons programs are showing great promise for near future platform flight placement.



Unmanned vehicles have undergone a real renaissance over the last decade, transitioning from fairly simple target drones to systems providing force-multiplying capabilities in their own right.

The arena of the unmanned underwater vehicle (UUV) has seen vast investment and growing attention, extending the reach of submarines, and providing a wide range of capabilities for the clandestine and mine-clearance communities.

Additionally, the relatively inexpensive USVs (Unmanned Surface Vehicles) boast a number of capabilities that ensure their role as a vital link in the future networked naval battlespace. USVs are the only type of unmanned vehicles that can operate in all three environments: above-surface (linking to other platforms and operating radar and electro-optic (EO) sensors; on the surface, with all of the long-endurance benefits and ease of data communications that this brings; and subsurface, with sonar and underwater cameras.

The Naval Surface Warfare Center Carderock Division set up the Unmanned Vehicle Office in 2000 to oversee the requirements for USV development. The Navy is taking the armed RHIB (rigid-hulled, inflatable boat) concept one step further with its Spartan Scout advanced concept technology demonstrator. The core Spartan system will operate both semi-autonomously and under direct remote control, fitted with video cameras for navigation and control. The NAVSEA's Coastal Systems Station, Panama City, FL recently tested the MIW (Mine Warfare) module for Spartan. During these trials, the boat deployed operated, and recovered the sonar, beaming the picture back to a shore station.

USV designers have realized that contemporary craft, largely designed around human operators, limit effectiveness. Therefore, removing the human from the craft frees up a world of opportunities. The most obvious current example of this is the AN/WLD1 Remote Minehunting System (RMS). The RMS straddles the line between UUVs and USVs, with much of the vehicle's relatively large, heavy body sailing below the surface and only a snorkel mast to the diesel motor appearing above the surface. This combines some of the best attributes of both vehicle types — being sub-merged provides the RMS with a very stable platform, but being air breathing obviates the need for complicated, expensive, and thus far untried, battery technology. The RMS is currently undergo-ing a period of manufacturer's sea trials until June 2004, having successfully completed a series of trials with USS *Pinckney* (DDG 91) in the Gulf of Mexico last October.

NSWC Carderock is also investigating novel hullforms for USVs, but is focusing more on high-speed surface craft. This is another area of great potential for USVs because, without the human operators on board, vessels can operate in higher sea states and with virtually no regard for the environmental discomfort that can curtail manned boat operations.

A UUV, the Long-term Mine Reconnaissance System, or LMRS, will be delivered to the Fleet this coming December. The LMRS is designed to be launched from the 21-inch-diameter torpedo tubes of Navy nuclear-powered attack submarines. An LMRS system consists of two of the self-propelled autonomous UUVs, a 60-foot robotic recovery arm, and onboard handling equipment and mission-planning and analysis computers.

The Navy's UUV "vision" sees the unmanned vehicles as a future, cost-effective force multiplier that will extend the covert sensor range of manned submarines, allow a presence in high-risk or inaccessible areas, and provide timely, accurate and clandestine knowledge of the battlespace. The UUV Master Plan, last updated in April 2002, outlines four future "signature capabilities" for UUVs: (1) undersea search and survey, (2) maritime reconnaissance, (3) communications and navigation aid, and (4) submarine track and trail.

And, with the LMRS addressing the Navy's near-term requirements, the next step in this evolutionary development process for the expansion of the UUV's capabilities into these four signature areas is a program called the Mission-Reconfigurable UUV (MRUUV). The idea behind the MRUUV concept is to provide standard UUV "trucks" that could be easily reconfigurable to support different missions using interchangeable modular payloads.

The Navy gained some insights in regard to the Large-Displacement MRUUV during the January 2003 "Giant Shadow" experiment. The large, Seahorse UUV, built by Pennsylvania State University's Advanced Research Lab for the Naval Ocenaographic Office, was vertically launched from a missile tube on USS *Florida* (SSBN 728). The UUV then navigated a 10-mile course to a preprogrammed location, and then used its sonar for mine surveillance to find a clear path for Navy SEALs to move ashore.

Virtual SYSCOM

In this 21st Century Navy, where we are netting the Fleet's combat systems and conducting ship repairs via real-time technical reach back of Distance Support, we are also conducting more business via the global communications highway.

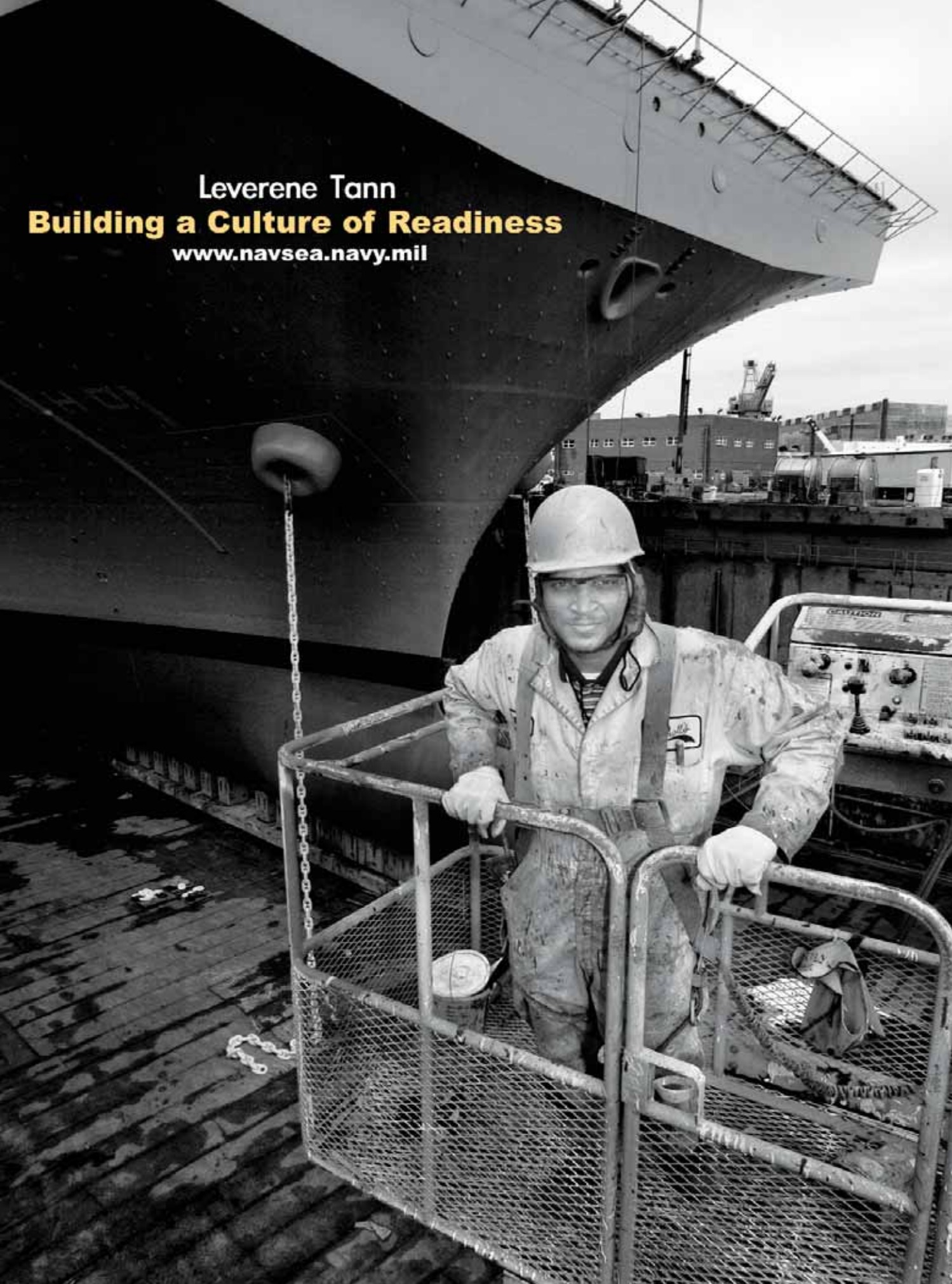
The largest of the four Naval system commands, Naval Sea Systems Command (NAVSEA) established Virtual Systems Command (VSYSCOM) to leverage communications technology, and more so, the fleet building efforts of the major SYSCOMs. Commanders and Executive Directors of NAVSEA, Naval Air Systems Command (NAVAIR), Space and Naval Warfare Systems Command (SPAWAR) and Naval Supply Systems Command (NAVSUP) started meeting virtually last year to identify efforts to pursue jointly to optimize system-platform development and production.

Achieving commonalities in several areas, such as Human Systems Integration (HSI), is one of the mission goals of the VSYSCOM. For HSI, the VSYSCOM initially identified six key elements to pursue common efficiencies, including policy/process coordination, application of HSI processes to reduce Total Ownership Cost (TOC), Fleet Support in HSI areas, HSI Information Technology, common HSI functions/programs, and HSI workforce training.

HSI is just one focus of the VSYSCOM. Senior SYSCOM leadership intend to gain other efficiencies and greater mission effectiveness in other areas of systems engineering, logistics, contracting and overall warfighter support. An annual work plan details VSYSCOM focus in other areas, such as FORCEnet pilot programs, warfare center concept of operations to further leverage product area direction and technical authority common approach.

The cyber collaboration won't stop at the SYSCOM level. VSYSCOM plans to virtually tap Fleet Type Commanders and Commander, Fleet Forces Command to identify specific opportunities to improve cross-SYSCOM efficiency and integration and move toward more common processes and business practices to build Fleet readiness.

Better aligned to *Sea Power 21* and current CNO guidance to support the Fleet Response Plan, NAVSEA and the VSYSCOM look to capitalize on other Sea Enterprise opportunities as they not only shape a 21st Century Fleet, but they also conduct business in this information age as part of a 21st Century Navy support infrastructure.


Leverene Tann
Building a Culture of Readiness
www.navsea.navy.mil

NAVSEA
NAVAL SEA SYSTEMS COMMAND

1333 Isaac Hull Avenue, SE
Washington Navy Yard, DC 20376
www.navsea.navy.mil