

Boeing Is Refurbishing Harpoon Missiles for U.S. Navy Submarines



The Arleigh Burke-class guided missile destroyer USS Fitzgerald (DDG 62) conducts a live fire of a ship-launched variant Harpoon missile during Multi-Sail 2016. Boeing has now begun work to return Harpoon cruise missiles to operational status with the Navy's submarine force. U.S. Navy / Mass Communication Specialist 3rd Class Eric Coffey

ARLINGTON, Va. – Boeing has begun work to return the Harpoon cruise missile to operational status in the U.S. Navy's submarine force after a more than 20-year absence.

Boeing received an \$10.9 million Naval Sea Systems Command contract late last month to refurbish 16 Harpoon missile capsules and four all-up rounds of encapsulated Block 1C

Harpoon missiles for the Navy's submarines. Work is scheduled for completion by December 2022.

The UGM-84A Harpoon Block 1C missiles will be integrated on the Navy's Los Angeles-class submarines. The UGM-84A is encapsulated to be fired from a torpedo tube and has a rocket booster to propel it above the surface of the water and into flight.

"I am happy to report that we will have the first refurbished [Harpoon] missiles delivered to the fleet in [fiscal] '21," said Rear Adm. Thomas Ishee, director of undersea warfare in the Office of the Chief of Naval Operations, speaking Nov. 7 at the Naval Submarine League's annual symposium in Arlington.

In a demonstration in the 2018 Rim of the Pacific exercise, a Harpoon was fired from the Los Angeles-class attack submarine USS Olympia at a target ship, the first time one was fired from a U.S. Navy submarine since the UGM-84A Harpoons were withdrawn from the force in 1997.

The UGM-84A is encapsulated to be fired from a torpedo tube and has a rocket booster to propel it above the surface of the water and into flight.

"The Navy has a deep inventory of Harpoon Block 1C missiles," said Sally Seibert, director, Cruise Missile Systems at Boeing, in a statement. "These missiles can be refurbished and reintegrated into the fleet in a shorter timeframe, and at a fraction of the cost, compared to purchasing new missiles – and that is exactly what our team is doing."

The Harpoon cruise missile is a combat-proven, all-domain anti-ship missile used by the Navy and more than 30 international customers, a statement from Boeing said. "Evolving over the years to keep pace with emerging threats, the Harpoon Block II includes a GPS-aided guidance system that allows for autonomous, all-weather capability – and can

execute both anti-ship and land-strike missions. The more advanced Harpoon Block II+ adds a data link that allows for in-flight targeting updates.”

“The shelf life of the Harpoon missile allows us to maximize existing capability by bringing this weapon back to the submarine fleet,” Seibert said. “Customers who currently have Harpoon missiles in their inventory are prime candidates for refurbishments, or even upgrades, to add this extremely viable and cost-effective weapon to their arsenal.”

Currently, more than 600 ships, 180 submarines, 12 different types of aircraft and several land-based launch vehicles across the world are integrated with Harpoon missiles, Boeing said.

Future USS Daniel Inouye Completes Acceptance Trials



The future USS Daniel Inouye (DDG 118) departs General Dynamics Bath Iron Works shipyard on Feb. 3 for acceptance trials. SUPSHIP Bath

BATH, Maine – The future USS Daniel Inouye (DDG 118) successfully completed acceptance trials Feb. 4 after spending a day underway off the coast of Maine, the Program Executive Office (PEO) – Ships announced in a Feb. 5 release.

The Bureau of Inspection and Survey inspected the ship during a series of demonstrations while pier side and underway. Many of the ship's onboard systems, including navigation, damage control, mechanical and electrical systems, combat systems, communications, and propulsion applications, were tested to validate performance and met or exceeded Navy specifications.

“Following an outstanding Combined Alpha and Bravo trials this past December, DDG 118 performed superbly during the ship's Acceptance Trial earlier this week,” said Capt. Seth Miller, DDG 51 class program manager, PEO-Ships. “The Navy and

industry team are ready to deliver a highly capable multi-mission warship to the fleet within the next few weeks.”

Daniel Inouye is a Flight IIA destroyer, equipped with the Aegis Baseline 9 Combat System, which includes Integrated Air and Missile Defense capability and enhanced Ballistic Missile Defense capabilities. This system delivers quick reaction time, high firepower, and increased electronic countermeasures capability against a variety of threats.

Following delivery, Daniel Inouye will be the 37th Arleigh Burke (DDG 51)-class destroyer to be delivered by BIW. The shipyard is also in production on the future Arleigh Burke-class destroyers Carl M. Levin (DDG 120), John Basilone (DDG 122), Harvey C. Barnum (DDG 124), Patrick Gallagher (DDG 127), and Flight III ships, Louis H. Wilson, Jr. (DDG 126), and William Charette (DDG 130), as well as the future Zumwalt-class destroyer, Lyndon B. Johnson (DDG 1002).

Lockheed Martin's SPY-7 Radar Is Going to Sea



An artist's rendering of a Spanish future F-110 frigate equipped with AN/SPY-7(V)2. Navantia ARLINGTON, Va. – Lockheed Martin's new SPY-7 radar will be sailing to sea on the ships of three navies as the company highlights the radar's capabilities for application to other navies, including the U.S. Navy.

The SPY-7, which uses gallium nitride modules, initially was developed for the Navy's Air and Missile Defense Radar competition. It was adapted into the Long-Range Discrimination Radar (LRDR) procured by the U.S. Missile Defense Agency (MDA) as a sensor of the Ground-Based Midcourse Defense system. Being installed at Clear Air Force Station in Alaska, the LRDR is designed to discriminate between incoming warheads and decoys.

The core building blocks [of the LRDR] are the same core building blocks in SPY-7," said Jon P. Rambeau, vice president and general manager, Integrated Systems & Sensors, Lockheed Rotary and Mission Systems, during a Feb. 2 interview with *Seapower*. "[SPY-7] is a modular radar that allows us to build different configurations for both land-based and sea-based applications."

The SPY-7 has been selected by the Spanish navy to integrate it with the Aegis Combat System on its F110 frigates. The Canadian navy is procuring the radar to install it on its new Halifax-class surface combatant.

Japan had selected the SPY-7 for its two planned Aegis Ashore ballistic-missile defense sites, but when the plans were cancelled in part out of concern for missile debris falling on populated areas, Japan shifted to a plan to deploy the SPY-7 on some future, unspecified sea-based BMD platform. Japan already has BMD capabilities in its Kongo-class guided-missile destroyers with Aegis systems using the SPY-1 radar.

Japan, which already has placed an order for the SPY-7, "is going through a process now to determine exactly what that platform is going to look like," Rambeau said. "We are pleased with the progress that the technology has made, and we're starting to see some uptake both here in the U.S. as well as abroad."

"SPY-7 is part of the Aegis common source library (CSL) and the interfaces are understood," said Patrick W. McNally, director of communications for Integrated Warfare Systems & Sensors, in a statement to *Seapower*. "For Japan, we have completed the first of three releases which were recently demonstrated to MDA. Starting from the CSL, with over one million lines of code, Japan will be receiving the best of both Baseline 9 and 10 [Aegis software]."

The U.S. Navy is considering backfitting some Flight IIA Arleigh Burke-class guided-missile destroyers with a radar more modern than the SPY-1, and Lockheed is keeping a watch on developments in the event the SPY-7 could complete in the program if it comes to pass.

Rambeau said his company also "has some more affordable options available to upgrade some of the SPY-1 arrays to provide improved sensitivity and improved resistance to

electronic attack and we think we can do that at a fraction of the cost of a wholesale replacement, so we've put forth a couple of options for upgrades to SPY-1 to both MDA and the Navy."

New PTD0 Under Secretary of the Navy Designated



James F. "Hondo" Geurts. U.S. Navy
ARLINGTON, Va. – Acting Secretary of the Navy Thomas Harker has designated James F. "Hondo" Geurts as PTD0 (performing the duties of) under secretary of the Navy, the Navy announced in a Feb. 4 release.

Prior to this selection, Geurts served as the eighth assistant secretary of the Navy for Research, Development and Acquisition (ASN RD&A), from December 2017 to January 2021. As ASN RD&A, he served as the Navy's acquisition executive, with oversight of an annual budget in excess of \$100 billion and responsible for equipping Sailors and Marines with platforms, systems and technologies around the globe in defense of the nation.

"I've worked with Hondo for a number of years and know he will bring a wealth of insight and leadership derived from 34 years of DoD experience to this position," said Harker. "His stellar knowledge of acquisition efforts, experience driving positive change, and commitment to naval innovation will be a strong asset in this position, where he will continue to reinforce a clear understanding of the needs, requirements and capabilities of our Navy and Marine Corps."

In performing the duties of the under secretary of the Navy, in addition to serving as the deputy and principal assistant to the SECNAV, Geurts will serve as the chief operating officer and chief management officer for the Department of the Navy. Additionally, he will oversee intelligence activities, intelligence-related activities, special access programs, critical infrastructure, and sensitive activities within the department.

"Having supported the military, both in and out of uniform, for the majority of my life, I know that when we are empowered and focused on the mission we can accomplish amazing things," said Geurts. "I look forward to continuing to work with a great team of professionals as we spearhead efforts in support of the finest Navy and Marine Corps in the world."

Geurts previously served as the acquisition executive, U.S. Special Operations Command, at MacDill Air Force Base, Florida, where he was responsible for all special operations forces acquisition, technology and logistics. Prior to being

selected for Senior Executive Service, Geurts began his career as an Air Force officer. He served as an acquisition program manager with engineering and program management leadership positions in numerous weapon systems, including intercontinental ballistic missiles, surveillance platforms, tactical fighter aircraft, advanced avionics systems, stealth cruise missiles, training systems and manned and unmanned special operations aircraft.

He has over 30 years of joint acquisition experience and served in all levels of acquisition leadership positions including acquisition executive, program executive officer and program manager of major defense acquisition programs.

Geurts is a distinguished 1987 Reserve Officers' Training Corps graduate from Lehigh University where he received a Bachelor of Science in Electrical Engineering. He holds a Master of Science in Electrical Engineering from Air Force Institute of Technology, Wright-Patterson AFB and in National Security Resourcing from Industrial College of the Armed Forces, National Defense University, Washington, D.C. Geurts also attended executive leadership and international studies programs at Harvard Kennedy School and George Washington Elliot School.

Nimitz Carrier Group Sails into Indo-Pacific Command



The aircraft carrier USS Nimitz (CVN 68) transits alongside the Arleigh Burke-class guided-missile destroyer USS Pinckney (DDG 91) after a replenishment-at-sea in this 2017 photo. U.S. Navy / Mass Communication Specialist 2nd Class Craig Z. Rodarte

ARLINGTON, Va. – The USS Nimitz Carrier Strike Group is departing the Central Command area of responsibility and moving into the U.S. Indo-Pacific region, Pentagon Press Secretary John F. Kirby announced Feb. 4.

“We want to thank all the men and women aboard the ships in that strike crew and the squadrons who supported Central Command now for more than 270 days, ensuring our national security and deterring conflict in a very critical region of the world,” Kirby said.

The carrier is homeported in Bremerton, Washington. It is now in the 7th Fleet area of responsibility and can be called upon for operations, training or humanitarian exercises there.

The Nimitz's departure means there is no U.S. carrier operating in the Central Command area of operations. Kirby said Secretary of Defense Lloyd J. Austin III believes America has "a robust presence in the Middle East." U.S. service members are based in many nations in the Persian Gulf and there is more than enough airpower to counter any adversary.

Kirby said Austin has constant discussions with U.S. Central Command commander Marine Corps Gen. Frank McKenzie, as well as other combatant commanders. Austin must balance requirements from various parts of the world, and the United States doesn't have an unlimited number of aircraft carriers.

These decisions are carefully weighed, the press secretary said. "Every decision that we make with military forces – air, ground or naval – and certainly, decisions that you make with respect to a capital asset, like an aircraft carrier and its associated, supporting Strike Group is a decision driven by a frank assessment of the threats in the area, and also a frank consideration of the capabilities themselves," Kirby said. "So, absolutely, the secretary was mindful of the larger geostrategic picture when he approved the movement of the Carrier Strike Group from the Central Command area responsibility."

Also playing into the decision is the length of the deployment for the Nimitz sailors and their families. The Nimitz and supporting ships have been deployed longer than is typically required. Austin and CentCom and Navy officials must consider the wear and tear on the sailors, the ships and the aircraft.

**Navy Seeking Innovation in
New Places Despite
Challenges, ONR Director Says**



Anne Sandel, executive director, Office of Naval Research.
U.S. Navy / John F. Williams

While there is a new administration and leadership, the Office of Naval Research's executive director said she does not expect any major changes in the Department of the Navy's priorities, and the acquisition team will continue to be

focused on delivering and sustaining lethal capability, increasing agility, driving affordability and developing a work force to compete and win.

Anne Sandel, also the acting principal civilian deputy to the assistant secretary of the Navy for research, development and acquisition, spoke at the National Defense Industrial Association's Expeditionary Warfare Conference, which took place virtually Feb. 2 and 3.

Sandel said the Navy acquisition and research and development enterprise, like everyone else, was challenged by the global pandemic during 2020. COVID 19 had a big impact on the work environment. But, she said, through adaptation and process, the Navy has continued to execute.

"We've leapfrogged ahead to embrace that virtual and electronic environment," Sandel said. "Our outreach, communication and our collaboration has actually increased. Although people like to be in room with one another, I have seen much more collaboration across the board, whether it's Navy, Marine Corps, or any of our industry partners or allies. We are able to reach out on a moment's notice and do what we're doing today with one another. Many times, it's a force multiplier, because we can include people who personally would not have been available because of travel, cost or schedule demands. Today, they can log on, be part of a phone call, and be there instantaneously. It's multiplied our ability to communicate and move forward in a format that is unusual for those of us who grew up in an industrial infrastructure. We've had to transcend that with the acquisition, design, engineering and construction efforts. It's improved our processes."

Sandel has a long career in shipbuilding, maintenance and repair, but in her current role, she has a view of the many evolving technologies and concepts to address current and future warfighting requirements across all of the warfare

domains.

In her job at ONR, Sandel said she came to better appreciate just how much of ONR's portfolio is focused on the expeditionary mission and in support of Marines. In fact, the vice chief of naval research is a Marine who also commands the Marine Corps Warfighting Laboratory.

"We are very closely aligned with the Marine Corp and the expeditionary portfolio," she said.

Leveraging innovation

Sandel talked about finding and leveraging innovation. The NavalX organization, established by then-Assistant Secretary of the Navy for Research, Development and Acquisition James Guerts, focuses on embracing non-traditional agility methods across the DON workforce, and linking up isolated or disparate pockets of excellence and subject matter experts. As a part of NavalX, the Navy established storefront "TechBridge" offices – "agility cells" to broaden the network to help the Navy and Marine Corps learn and act faster in key locations.

The TechBridge storefront concept applies both internally within the Department of the Navy, but also externally, with other federal, state, regional and local government organizations, academia, nonprofits, trade and professional organizations and industry.

"Think of NavalX as the 'network,' and the TechBridges as the nodes on the network," Sandel said.

While she said the Navy is committed to developing and supporting America's industrial base, she also is looking at capabilities that are available on the global market, including government-to-government and international commercial collaboration.

Sandel said Rear Adm. Lorin Selby, the Chief of Naval

Research, has an international component to his job, and ONR Global has offices around the world to connect with academia, industry and governments to share developing technologies. The first TechBridge outside the U.S. has been established in the U.K., collocated with ONR Global at Northwood, to help make connections and find innovative technologies.

Another way to accelerate getting technology into the hands of warfighters is through experimentation. The Navy and Marine Corps are planning an ambitious array of exercises in the months and years ahead, including Trident Warrior, RIMPAC, Sea Dragon, Bold Alligator, Valiant Shield, Valiant Blitz, Large Scale Exercise 2020, to name a few, along with Advanced Naval Technology Exercises (ANTX) and Joint Interagency Field Exercises.

Originally planned for 2020, the Navy is looking to leverage Large Scale Exercise 2021 to operationalize concepts like Distributed Maritime Operations (DMO), Expeditionary Advanced Base Operations (EABO), and Littoral Operations in a Contested Environment (LOCE), naval operational architecture, and command and control in a contested environment to develop and test alternative warfare concepts.

“We’re putting tools and kit in the hands of the actual operators, experiment with it, and give us feedback directly,” she said.

Sandel discussed some of the ways the Navy in general, and ONR specifically, can move quickly to find, develop and field new technology. She pointed to ONR’s TechSolutions program as an example of how ONR can act promptly on ideas from deckplate Sailors or Marines to improve mission effectiveness. TechSolutions has resources to rapidly address suggestions and ideas from the fleet, investigate available technologies, and deliver prototype solutions.

She also recognized the importance of small business, such as

those participating in the Small Business Innovation Research (SBIR) program. “During my tenure at ONR, and now at the enterprise level, I have seen how we have been able to leap forward greater agility using the SBIR funding than I was aware of in all my years in the engineering and acquisition organizations. I knew they were there, and how to get innovation from small companies that couldn’t compete as primes, but I’ve learned that they’re more agile than I recognized, The SBIR program, the way its architected and funded, has the agility to take innovative technologies and leapfrog forward,” she said.

USS Philippine Sea Interdicts Over \$2.8 Million of Heroin in North Arabian Sea



Sailors assigned to the visit, board, search and seizure Sailors team of the guided-missile cruiser USS Philippine Sea (CG 58) board a dhow suspected of carrying narcotics in the international waters of the north Arabian Sea, Jan. 31, 2021. U.S. Navy

BAHRAIN – The guided-missile cruiser USS Philippine Sea (CG 58), deployed to U.S. Fifth Fleet and operating in support of the Combined Maritime Forces (CMF), interdicted a shipment of more than 600 pounds (275 kilograms) of suspected narcotics from a dhow in the international waters of the North Arabian Sea, Jan. 30, the CMF said in a Feb. 2 release.

Seven bags of suspected narcotics were seized and tested, resulting in a seizure of approximately 600 pounds (275 kilograms) of suspected heroin, worth \$2.89 million wholesale. This seizure, conducted in direct support of CMF's Combined Task Force (CTF) 150, marks the seventh CMF drug seizure since October 2020.

To mitigate the risk of contracting and spreading COVID-19, the boarding team undertook carefully executed precautionary

measures during and after the boarding, to include decontamination of all seized contraband.

CTF-150 conducts maritime security operations outside the Arabian Gulf to disrupt criminal and terrorist organizations, ensuring legitimate commercial shipping can transit the region, free from non-state threats. CTF-150 is currently commanded by the Royal Canadian Navy, now leading the task force for a fifth time.

Galini: Navy Considering Land-Based Test Site for Integration of Frigate Systems



An artist's rendering of the Constellation-class guided-missile frigate (FFG), which may have some of its systems tested on land. U.S. Navy

ARLINGTON, Va. – The commander of Naval Sea Systems Command (NAVSEA) praised the risk-mitigation qualities of land-based testing and prototyping of ship systems and said the Navy said the Navy is considering it for some level for the Constellation-class guided-missile frigate (FFG).

NAVSEA Commander Vice Adm. William Galinis, speaking during a webinar of the National Defense Industrial Association's Expeditionary Warfare Conference, said the Navy is using more land-based testing and integration to reduce risk before the systems are installed on a ship.

Land-based testing "is not something we can do for every platform, but judicious use of land-based testing where it makes sense is a good engineering development tool and a risk mitigator."

Galinis noted that extensive land-based testing is being conducted for the Flight III Arleigh Burke-class guided-

missile destroyer (DDG) at the Naval Surface Warfare Center Philadelphia Division.

“As we upgrade to the Flight III [of the Arleigh Burke class], we need additional cooling capacity, additional power-generation capacity, higher voltage level,” he said. “That electric plant is being tested right now in Philadelphia from the prime mover all the way to the power conversion modules.”

The SPY-6 radar, built by Raytheon Technologies for the Flight III DDG, is being tested at the Lockheed Martin Aegis test site in Moorestown, New Jersey, with the combat systems software, “from the power-conversion unit all the way out through the array face.”

Major propulsion components of the new Columbia-class ballistic-missile submarine, being built by General Dynamics Electric Boat, also are going through extensive land-based testing at Philadelphia.

“We will probably do something along that line for the Constellation-class frigate,” Galinis said. “We’re working through the details of that right now.”

Because the hull and propulsion of the Constellation is from a proven, parent design – the Fincantieri FREMM frigate – land-based testing is likely to focus on integration of systems, particularly combat and sensor systems.

Galinis said there are changes to the frigate in terms of “buy America” requirements and certain Navy requirements.

Mine Warfare Director: Detect-to-Engage Timeline Needs to be Speeded Up



Avenger-class mine countermeasure ships USS Pioneer (MCM 9), USS Chief (MCM 14) and an MH-53 helicopter from Helicopter Mine Countermeasures Squadron 14 conduct mine hunting training exercises in this 2020 photo. U.S. Navy / Information Systems Technician 2nd Class James Greeves

ARLINGTON, Va. – The Navy official in charge of mine warfare development said strides are needed to decrease the search and neutralization time of mine counter-measures operations.

“We need to get faster; we need to speed the timeline up,” said Capt. Robert Baughman, director, Mine Warfare Division at the Naval Surface and Mine Warfighting Development Command in San Diego, speaking at a Feb. 2 webinar of the National Defense Industrial Association’s Expeditionary Warfare

Conference. "Improving the detect-to-engage timeline is vital as we shift from a ship in a minefield to off-board and autonomous systems."

For single-pass detect-to engage, with "on-board processing and high-end autonomous target recognition, we can neutralize the mine immediately," Baughman said. "Machine learning is improving this capability, but we need systems to either pass contacts during the mission cycle, or immediately upon recovery in the interim, telling what it assesses to be a mine.

"In the meantime, industry can help us with in-stride data transfer, transmitting high-quality data beyond line of sight that will help us get data back to the ship to start the post-mission analysis, and not wait till the end of a 20-hour mission, which then requires 20 hours of post-mission analysis on the back side," he said.

The captain also said, "capabilities need to be smaller, more expeditionary, and more reliable. Unmanned systems need to be highly modular, built with open architecture in mind, with hi-rez sensors, and to be networked systems of systems. Sailors must be able to fix them on the ship and easily modify them for specific missions. We can't rely on a team of contractors or Ph.D.'s to effect repairs or change out sensors in the field."

Being acoustically quiet and having a low signature overall are important, Baughman said.

Single-use minesweepers are not affordable at this point, he said. "All future systems and enabling technologies should have this as a consideration in their design and development.

"Communications and navigation systems must be resilient and also be able to operate in denied environments for sustained periods of time," he said. "Having a clandestine capability can help with this, especially when we talk about mining

technology. If they're networked, we can control them better, turning them on or off as required to avoid detection at a time of our choosing.

"For all of these systems, power and portability are extremely important," the captain said. "We need systems with long duration that can conduct surveys and persistent station keeping for whatever we tack UUVs to do. We need to be platform agnostic.

"We are a more expeditionary, off-board, distributive force than we were even five years ago, and regularly integrate with our coalition partners," Baughman said. "So, being able to rapidly and seamlessly share info and make timely decisions as necessary through our tactical decision support aids, up and down the decision process. File size, classification, bandwidth and latency constraints can't hinder our ability to share data across the force. Data management is becoming more and more of an issue."

DMO is Navy's Operational Approach to Winning the High-End Fight at Sea



Vice Adm. Phil Sawyer inspects sailors of the Royal Malaysian Navy in this 2018 photo. U.S. Navy / Mass Communication Specialist 1st Class Chris Krucke

Navy Vice Adm. Phil Sawyer says the Chief of Naval Operations's Navigation Plan 2020 and the Distributed Maritime Operations (DMO) concept are central for the Navy going forward and for the Navy and Marine Corps team's ability to conduct enduring sea control and power projection missions.

Speaking at the NDIA Expeditionary Warfare Conference on Feb. 2, Sawyer, the deputy CNO for Operations, Plans and Strategy, said enduring means as a maritime nation, "the sea control and power projection mission hasn't changed in 200 years, but the way we do it today has."

The Navigation Plan 2020, released last month by CNO Adm. Mike Gilday, and the Tri-Service Maritime Strategy released last year, assert that the U.S. and Navy are "involved in a long-term competition that threatens our security and our way of life. Russia and China are both undermining the free and open conditions that has enabled the world to largely prosper since the end of World War II."

Both countries are attempting to unfairly control sea-based resources, intimidate their neighbors, and both are turning incremental gains into long-term advantages, with Crimea and the South China Sea as examples.

Although we must be clear-eyed about both Russia's and China's actions and intentions, Sawyer said China is the long-term strategic threat to the U.S. "That is not to discount Russia, but it looks like China is our pacing threat."

"The nation needs a larger hybrid fleet – consisting of manned and unmanned platforms," Sawyer said "But, it's not just the number, but it's about the composition of the fleet."

Sawyer said unmanned platforms will play a very important role, from ISR above, on and below the sea, to platforms that are large weapons batteries to aerial refuelers.

He said it's easy to fixate on numbers, but the mix is also very important. "Getting the right mix of platforms is just as important as the total number."

The Navigation Plan calls for a lethal, better connected fleet – a fleet that is able to deliver synchronized lethal and nonlethal effects across all domains. That includes distributed weapons of increasing range and lethality. Hypersonic and directed energy weapons are key R&D efforts for the Navy, he said.

Tying the Navigation Plan to the theme of the NDIA conference, "Distributed Maritime & Expeditionary Operations in a Peer Contested Environment," Sawyer said, "DMO is principally a warfighting concept. It's our operational approach to winning the high-end fight at sea."

According to Sawyer, DMO is geographically distributed naval forces integrated to synchronize operations across all domains. "DMO is a combination of distributed forces, integration of effects, and maneuver. DMO will enhance battle

space awareness and influence; it will generate opportunities for naval forces to achieve surprise, to neutralize threats and to overwhelm the adversary; and it will impose operational dilemmas on the adversary.”

A key capability to achieving DMO is the Naval Operational Architecture, which Sawyer said will enable decision superiority at speed in a high-end fight. “It’s the connective tissue between sensors, platforms and weapons, and its central to our DMO operating concept,” Sawyer said. It’s more than “every sensor connected to every shooter.”

It includes the infrastructure (computing power and data storage); the network (data links, antennas, routers, and protocols); a data architecture and a data strategy; and finally, the tool (tactical decision aids to help analyze and display data with understandable and actionable information to the operators).

The ability to communicate and share information is critical in a contested environment, he said.

“In peacetime, or against lesser adversaries, we know how to C2 distributed forces. We do it all the time. We know how to synchronize effects in time. We know how to dynamically maneuver our forces. What we working on is how to do this – assuming every domain is contested, or denied – and with speed, such that we decision superiority.”

Another DMO imperative is logistics, and an enterprise to operate and sustain us in a contested space. That will require new platforms, manned and unmanned, to sustain small, dispersed units far to the front.

DMO is not a Navy or Marine Corps problem. “DMO is a naval concept. Navy and Marine Corps integration is pivotal to us winning the high-end fight, particularly in the Pacific,” Sawyer said. “In the future, the Marine will be able to project power in order to support sea control or sea denial

efforts.”

Sawyer said the Navigation Plan fully supports DMO, and fueling those capabilities necessary to fully realize the DMO concept. “New capabilities are important. But while the fleet waits for the introduction of these capabilities, we are moving out and exercising with what we have.”