U.S. NAVY

PROGRAM GUIDE 2014

FOREWORD

THE U.S. NAVY AND MARINE CORPS TEAM IS THE WORLD'S PREEMINENT MARITIME FORCE AND SEAPOWER CONTINUES TO SERVE THE NATION AS A POWERFUL INSTRUMENT OF DEFENSE AND DIPLOMACY. AS AMERICA'S "AWAY TEAM" POSTURED FORWARD IN PLACES THAT COUNT, THE SUN NEVER SETS ON OUR FORCES. WE ARE READY WHERE IT MATTERS, WHEN IT MATTERS TO SAFEGUARD AND ADVANCE OUR NATIONAL SECURITY INTERESTS.

Each day we fulfill our longstanding purpose of extending America's defense in depth, bolstering global stability that underpins our country's economic vitality, and building trust and confidence through ever-present engagement with allies and partners. The U.S. Navy's mix of capabilities, operating forward in the global commons today and tomorrow, will give the President ready options to promptly deal with disruptions that could undermine our security or economic prosperity. Naval forces will continue to field and operate a balanced mix of capabilities to assure access, deter aggression, respond to crises, and where necessary, decisively win wars.

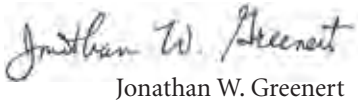
No matter how uncertain the future may be, or where conflict may emerge, the U.S. Navy's roles will not fundamentally change—they are timeless. Our inherent multi-mission flexibility allows us to deal with an unpredictable and highly transformative world. This adaptability is also key as we prudently steward taxpayers' dollars, squeeze out costs, find efficiencies, and innovate. The U.S. Navy will do its part to reduce the deficit, but we will do so in a responsible way, balancing our duty to sustain current readiness while building an affordable future force able to address a range of threats, contingencies, and high-consequence events that could impact our nation's core interests. This program guide describes our investments that will deliver the seapower to do just that.

You can be proud of the Navy we have built and will continue to evolve. We are putting it to good use and the nation is getting a high return on its capital investment. Over the last year, we were on station in the Pacific to deal with provocative North Korean actions. We patrolled off the shores of Syria, Libya, Egypt, Somalia, and Sudan to protect American lives, hunt violent extremists, and induce regional leaders to make constructive choices amid widespread disorder. We delivered aid and relieved suffering in the Philippines in the wake of a devastating typhoon. We mobilized to restrain coercion against our allies and friends in the East and South China Seas. We kept piracy at bay in the Horn of Africa. We projected long-range combat power from aircraft carriers in the North Arabian Sea into Afghanistan, and arrayed our forces to enhance stability in the Arabian Gulf. Across the Middle East and Africa, we took the fight to insurgents, terrorists, and their supporting networks by providing high leverage expeditionary support to Special Operations Forces. Every day, our people are bringing their knowledge and equipment to bear against America's toughest challenges, and they are making a difference.

We will continue to flow our advanced capabilities forward where they can be used interdependently with other joint forces for best effect. Increasingly lethal Coastal Patrol Combatants are arriving in Bahrain, Ballistic Missile Defense-capable destroyers are starting to base out of Rota; versatile Littoral Combat Ships, P-8A aircraft, and nuclear-powered attack submarines continue deploying to the Pacific as part of our strategic rebalance; and a mix of highly configurable expeditionary support ships like the Mobile Landing Platform, Joint High Speed Vessel, and Afloat Forward Staging Base are already in, or coming to, a theater near you.

The sensors, weapons, and tailored force packages—the "payloads"—carried by these and other Navy platforms are equally, if not more important, than the "truck" itself. This program guide will give you a strong sense of the value we place on those capabilities, some of which are truly game changing. If history is any guide, our Sailors and line leaders will not just use these capabilities as designed, they will employ them in imaginative and novel ways to overcome any challenge they may face on, under, or over the sea.

Our Navy has never been more indispensable to America's global influence, security, and prosperity. I trust every member of the Navy-Marine Corps team will capitalize on their intellectual talent and warrior spirit to make the most of the cutting-edge technology coming into the force.



Jonathan W. Greenert
Admiral, U.S. Navy
Chief of Naval Operations

U.S. NAVY PROGRAM GUIDE 2014

FORWARD *WHERE* IT MATTERS, READY *WHEN* IT MATTERS

A MARITIME NATION

The United States is a maritime nation with vital interests far from its shores. Operating forward around the globe, the U.S. Navy is always on watch, contributing key capabilities to win our Nation's wars, deter conflict, respond to crises, provide humanitarian assistance and disaster response, enhance maritime security, and strengthen partnerships. The Navy Fiscal Year (FY) 2015 Program supports the highest priorities of the President's *Defense Strategic Guidance (DSG)*. We organize, man, train, and equip the Navy by viewing our decisions through three tenets: *Warfighting First*, *Operate Forward*, and *Be Ready*. The Navy will continue to rebalance to the Asia-Pacific region, sustain support to our partners in the Middle East and other regions, focus our presence at key strategic maritime crossroads, and satisfy the highest-priority demands of the geographic combatant commanders.

The standard that guides our FY 2015 President's Budget submission is the DSG and its objectives for the Joint Force; this guidance is benchmarked to the year 2020. The DSG incorporated the first set of Budget Control Act (BCA)-mandated budget reductions and directed the military to address "the projected security environment" and to "recalibrate its capabilities and make selective additional investments to succeed in the missions" of the Armed Forces.

The Navy prioritized investments to maintain a credible and modern sea-based strategic deterrent, maximize forward presence using ready deployed forces, preserve the means to defeat or deny adversaries, sustain adequate readiness, continue investing in asymmetric capabilities, and sustain a relevant industrial base. The Navy's FY 2015 Program provides the resources to achieve the President's strategic guidance, albeit at higher levels of risk for some missions - most notably if the military is confronted with a technologically advanced adversary or is forced to respond to more than one major contingency. In the near term, we face readiness challenges because of sequester-induced shortfalls, limited FY 2015 funding, and the expected demand for U.S. military forces globally. Throughout the long term, we face the risk of uncertainty inherent to the dynamic nature of the security environment. Should funding be adjusted to the BCA reduced discretionary caps, the Navy will not be able to execute the President's defense strategy in the near or long term.

The Navy made tough choices to achieve a comprehensive and balanced FY 2015 Program, based on the following strategic priorities:

- Provide credible, modern and safe strategic deterrent
- Provide global forward presence
- Preserve means to defeat or deny adversaries

- Sustain adequate readiness and manning
- Sustain asymmetric advantages
- Preserve sufficient industrial base

SAILING DIRECTIONS

Sailing directions assist mariners in planning a long voyage by describing the destination, providing guidance on which routes to take, and identifying the conditions, cautions, and aids to navigation along the way. The Chief of Naval Operations' (CNO) ***Sailing Directions*** provides the vision, fundamental tenets, and principles to guide the Navy as it charts a course to remain ready to meet current challenges, build a relevant and capable future force, and support our Sailors and Navy Civilians and their families.

WARFIGHTING FIRST

The Navy's first consideration is to ensure the ability to fight and win today, while building the ability to win tomorrow. This is the primary mission of the Navy. Quickly denying the objectives of an adversary or imposing unacceptable costs on aggressors are essential elements of deterring conflict. To this end, the FY 2015 Program is focused on maximizing forward presence and addressing current and projected threats. Our budget continues to address near-term challenges and develop future capabilities to support the *DSG* missions. Leveraging the Air-Sea Battle Concept, the Navy is focusing on deterring and defeating aggression and assuring access to enhance U.S. advantages in maintaining forward presence, overcoming anti-access challenges, and exploiting our adversaries' vulnerabilities.

Warfighting First prioritizes investments that provide the most capable and effective warfighting force. Our force must have relevant near-term warfighting capability and effective, credible presence, but we must also build the future force able to prevail against future threats. Each decision made in the FY 2015 Navy Program was assessed in terms of its effect on warfighting.

Strategic nuclear deterrence remains the Navy's number one investment priority. The Navy leverages its undersea dominance to enable a secure nuclear deterrent with our ballistic-missile submarines (SSBNs)—the most survivable component of the Nation's nuclear triad. While maintaining our *Ohio* (SSBN 726)-class submarines at 2014 inventory levels, we will continue to invest in the next-generation SSBN(X) program.

The Navy continues to conduct warfighting assessments using a kill-chain approach that comprises: sensors to detect, identify, track, and engage targets; communications networks to transmit information; kinetic and non-kinetic weapons; trained operators and well-maintained platforms; and an integrated logistics infrastructure to sustain our warfighting capabilities and forward operations. By focusing on capabilities and effects, we can accomplish missions more efficiently and address vulnerabilities more comprehensively. As new threats emerge, the Navy can modify capabilities and capacities.

The Navy takes a similar kill-chain approach to defeat an adversary's capabilities. Navy capability investments emphasize finding ways to deny adversaries the ability to find, target, communicate information about U.S. and allied forces, and to defeat their weapons. Our FY 2015 Program invests in capabilities that target key adversary vulnerabilities. For example, early defense against anti-ship cruise missiles (ASCMs) focused primarily on shooting down the missile with a missile or gun. A more effective method is to deny adversaries the ability to find and target our ships, or by jamming or deceiving incoming missile threats. The FY 2015 Program continues development of non-kinetic methods to defeat anti-ship threats, while continuing to improve existing kinetic hard-kill methods.

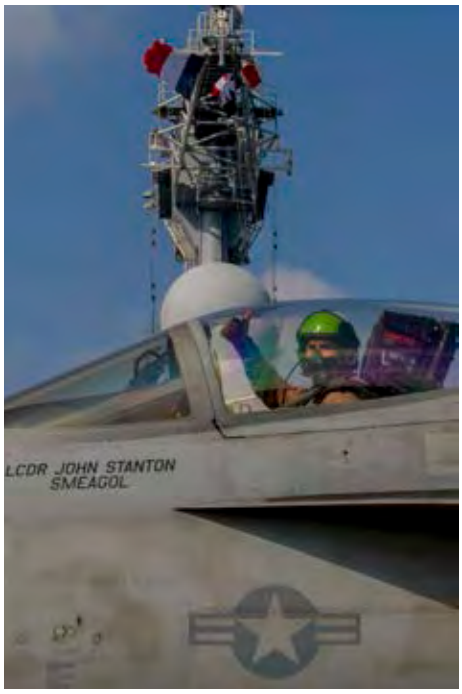
The undersea environment is the one domain in which the United States has clear maritime superiority, but this superiority is not unchallenged. A growing number of countries are developing their own undersea capabilities, seeking to exploit the undersea domain for their own purposes. To keep our undersea advantage, we need a combination of new operating capabilities and innovative technologies.

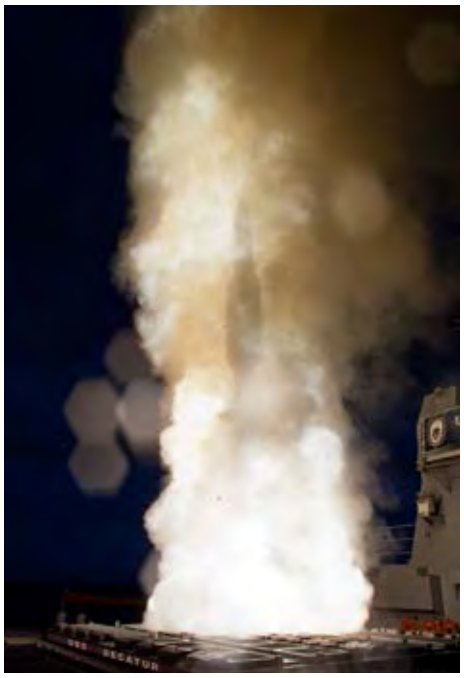
The FY 2015 Navy Program sustains the Navy's undersea advantage through continued improvements in anti-submarine warfare (ASW) kill chains that deny an adversary's effective use of the undersea domain. Proven platforms such as the *Virginia* (SSN 774)-class attack submarine, *Arleigh Burke* (DDG 51)-class destroyer and MH-60R *Seahawk* helicopter, along with new platforms such as the P-8A *Poseidon* maritime patrol and reconnaissance aircraft, will host new systems and payloads to sustain our undersea dominance. These systems include improved sonar processors, new airborne periscope-detection radars, Mk 48 and Mk 54 torpedoes, and more effective sonobuoys. Development continues on the Virginia Payload Module (VPM), which could enable *Virginia*-class SSNs to mitigate the large undersea strike capability lost with guided-missile submarine (SSGN) retirements that

begin in 2026. VPM will provide future *Virginia*-class submarines an additional four large-diameter payload tubes, increasing Tactical Tomahawk (TACTOM) strike capacity from 12 to 40 missiles. To enhance undersea sensing and expand it into waters inaccessible to other systems, the Navy continues to develop and field longer-range and endurance unmanned undersea vehicles (UUVs).

In 2018, the Navy will deploy its first F-35C *Lightning II* aircraft. The aircraft will deliver a transformational family of next-generation strike capabilities, combining stealth and enhanced sensors to provide lethal, survivable, and supportable tactical strike fighters. This will enable new operating concepts that employ its stealth and intelligence, surveillance, and reconnaissance (ISR) capabilities alongside the complementary payload capacity of the F/A-18 *Hornet* and *Super Hornet*. To improve air-to-air warfare, the FY 2015 Program also continues to improve kill chains that overcome or circumvent radar jamming by using improved sensors and air-to-air missiles. These improved capabilities began delivering last year on the F/A-18E/F *Super Hornet* and will continue with the introduction of the F-35C. With a broad wingspan, ruggedized structures and durable coatings, the F-35C carrier variant is designed to stand up to harsh shipboard conditions while delivering a lethal combination of 5th-Generation fighter capabilities. This aircraft sets a new standard in weapon systems integration, maintainability, combat radius, and payload that brings greater multi-mission capability to carrier strike groups (CSGs).

To assure access for surface forces, the Navy is sustaining effective defenses against ASCMs and will counter each link in the kill chain of anti-ship ballistic missiles (ASBMs). Countering ASCMs will be accomplished with kinetic defense that combines platforms, payloads, systems, and weapons and will be capable of detecting and engaging ASCMs hundreds of miles away. In August 2013, the Aegis guided-missile cruiser USS Chancellorsville (CG 62) successfully conducted a live-fire SM-6 engagement of a BQM-74 target drone with successful detection, engagement and destruction at predicted ranges, and all supported by off-board targeting. To defeat ASCMs at closer ranges, the FY 2015 Program upgrades short-range missiles and electronic warfare systems to destroy incoming missiles or cause them to miss by deceiving and jamming their seekers. Similarly, the Navy will defeat the ASBM threat by countering actions needed for an adversary to find, target, launch, and complete an attack—using a kill chain similar to those used to defeat aircraft and ASCMs. Through September 2013, the Aegis Ballistic Missile Defense (BMD) system demonstrated 27 successful "hits" in 33 at-sea tests, including interceptions of two targets by two interceptors during a single event.





The Navy continues to develop and field options for air and surface-launched weapons and systems to find and combat increasingly dangerous threats. Building on investments beginning in FY 2012, the FY 2015 Navy Program invests in capabilities to defeat small-boat swarm threats through the addition of Advanced Precision-Kill Weapon System (APKWS) guided rockets for helicopters. The Program is also investing in development of the Long-Range Anti-Ship Missile (LRASM).

The FY 2015 Program grows capacity and further develops unmanned aerial vehicles (UAVs) to improve maritime ISR with the MQ-4C *Triton*, MQ-8 *Fire Scout* vertical takeoff unmanned aerial vehicle (VTUAV), and Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) System. In 2013, an Unmanned Combat Air System Demonstrator (UCAS-D) completed the first-ever unmanned autonomous aircraft launch and recovery on an aircraft carrier.

The FY 2015 Program delivers warfighting improvements in mine countermeasures (MCM), including continued deployment of the Afloat Forward Staging Base (Interim) USS Ponce (AFSB(I) 15) the Arabian Gulf. We have continued investing in deployment of the Mk 18 *Kingfish* UUV and *Sea Fox* mine neutralization system, as well as improved manning and maintenance for today's MCM ships and aircraft. In addition, the LCS mine warfare mission package is on track to field its first increment in 2015 and the second in 2019.

In addition to maintaining an at-sea amphibious ready group (ARG) with an embarked Marine Expeditionary Unit in both the Asia-Pacific and Middle East regions, the Navy will provide amphibious lift for U.S. Marines operating from Darwin, Australia, by establishing a fifth ARG in the Pacific by FY 2018 and will continue to develop concepts to deploy Marines on other vessels, including High Speed Transports and Mobile Landing Platforms (MLP).

The Navy will continue to fully exploit cyberspace and the electromagnetic spectrum as a warfighting domain through fielding additional E/A-18G *Growler* aircraft, developing the Next-Generation Jammer for airborne electronic warfare, and delivering Surface Electronic Warfare Improvement Program upgrades to improve the ability of guided-missile destroyers to detect and defeat adversary radars and anti-ship missiles. Significant expansion of the Navy's offensive cyber capability and active defense will be supported through the addition of hundreds of cyber operators filling new cyber warfighting teams throughout the coming years.

The Fleet of 2020 will include proven platforms and a range of new weapon, sensor, and unmanned vehicle payloads with greater reach and persistence, which support the *DSG*, Air-Sea Battle Concept and *Cooperative Strategy for 21st-Century Seapower*.

OPERATE FORWARD

The Navy will continue to *Operate Forward* with ready forces, where it matters, when it matters. The Navy and Marine Corps are our nation's "away team" and history demonstrates the Navy is at its best when we are present forward and ready to respond.

Our FY 2015 Program delivers the fleet size and readiness to provide the overseas presence directed in the Secretary of Defense-approved Global Force Management Allocation Plan (GFMAP) and rebalances our effort toward the Asia-Pacific region, while sustaining support to our partners in the Middle East and Europe.

Global presence is the key to the Navy's mandate to be where it matters and to be ready when it matters. The Navy will maintain a carrier strike group and amphibious ready group in both the Asia-Pacific and Middle East regions for the foreseeable future, even under the reduced discretionary budget caps. In addition, the Navy will maintain about three CSGs and three ARGs certified for all operations and available to "surge." However, in the event funding is lowered to the reduced discretionary cap level, the Navy will only have one CSG and ARG "surge ready."

High demand for naval forces requires an innovative combination of rotational deployments, forward basing, rotational crewing, and the use of partner nation facilities overseas. The Navy is working to better align ships with missions by fielding Mobile Landing Platforms (MLP), Afloat Forward Staging Bases, Joint High Speed Vessels (JHSV) and Littoral Combat Ships during the next five years. These ships use rotational military or civilian crews, which enable the ships to remain forward longer and free up other ships for other missions. The FY 2015 Program also provides the future fleet with a mix of ships that better aligns capability and capacity with the needs of each geographic region and its missions. For example, LCS and JHSV will be well suited for maritime-security, security-cooperation, and humanitarian-assistance missions, particularly in Africa, South America, and the Western Pacific. Similarly, the AFSB is fully capable of supporting MCM, counter-piracy, and counter-terrorism operations overseas.

Building on the successful deployment of the USS Freedom (LCS 1) to Singapore, which concluded in December 2013, the FY 2015 Program sustains funding for further LCS operations in Southeast Asia with the 16-month deployment of the USS Fort Worth (LCS 3) during 2015 and early 2016. Additionally, we will base two more *Arleigh Burke*-class destroyers (in addition to the two arriving in 2014) in Rota, Spain to provide ballistic missile defense to our allies and free up U.S.-based destroyers for operations in other regions.

The FY 2015 Program will continue to support the Navy posture in the Middle East by moving toward the goal of permanently basing ten Patrol Coastal (PC) ships and additional MCM crews in Bahrain to improve their proficiency and strengthen our partnerships in the region. The first LCS is planned to arrive in Bahrain in 2018. In early 2014, eight PCs and four MCMs are stationed in Bahrain.

Our rotational deployments of expeditionary warfare ships will continue and these forces are in high demand around the world. To meet this demand, our FY 2015 Program invests in the next large-deck amphibious assault ship, the *America*-class (LHA 6). It continues efforts to ensure our *San Antonio* (LPD 17) Amphibious Transport Dock ships and *Whidbey Island*- and *Harpers Ferry* (LSD 41/49)-class Dock Landing ships are maintained and upgraded to maximize their operational availability and relevance to today's missions. The JHSV and AFSB classes will provide additional support in this important mission area.

BE READY

The Navy will ensure that deployable forces are proficient and ready to meet all operational tasking. Ready Sailors and Civilians remain the source of the Navy's warfighting capability; our people will be prepared, confident, and proficient. In addition, our equipment will be properly maintained with adequate spare parts, fuel, ordnance, targets, and training time made available. Fleet capability will be sustained through fully funding required maintenance and modernization.

The Navy's most pressing challenge during the next decade will be sustaining fleet capacity while maintaining relevant capability. Capacity is a function of properly maintained and operationally available payloads and platforms. History shows ships and aircraft in poor material condition are unable to deploy effectively and less likely to reach their expected service lives (ESLs), generating earlier replacement costs and capacity shortfalls. The FY 2015 Program sustains afloat readiness to ensure ships and aircraft reach ESLs by funding scheduled overhauls and modernization.

The FY 2015 Program ensures the Navy is prepared to harness the teamwork, talent, and imagination of our diverse workforce to be ready to fight. Most importantly, it gets ship and sea-shore manning back into balance, and addresses unfilled, high-priority fleet needs. In addition, increased manning for cyber operations, shore maintenance, and training activities will ensure critical needs are addressed.

The resilience and safety of our Sailors and their families are focus areas for the FY 2015 Program. The Navy continues to emphasize and fund training to prevent sexual assaults and provides the necessary resources for incident response. Additionally, a sustained effort to increase awareness, training, and resources for suicide prevention is continued. Both sexual assault and suicide prevention are of great importance, and our priority is to ensure resources are ready and accessible to help Sailors in need.

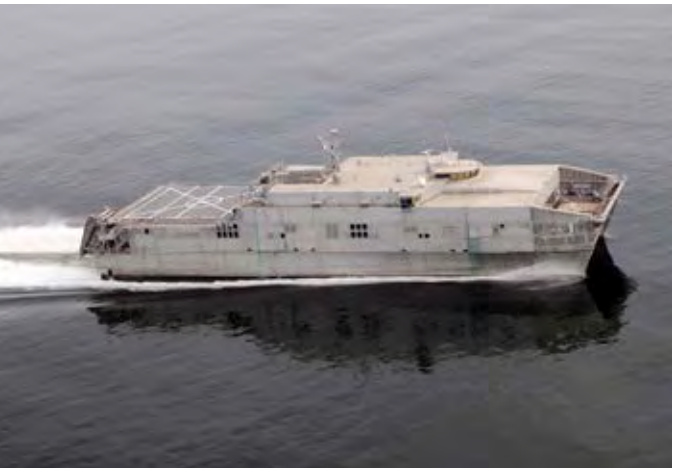
The Navy also maintains strong family and transition assistance support in the FY 2015 Program with investments in childcare, morale, welfare, recreation, and youth programs. Military-to-civilian transition assistance is provided through the Transition Assistance Program and Veteran's Employment Initiative to improve preparation and job opportunities for Sailors after their active duty service is complete.

CONTINUING THE REBALANCE TO THE ASIA-PACIFIC REGION

The FY 2015 Program continues implementing defense guidance to rebalance our efforts toward the Asia-Pacific region. This rebalance involves each of the CNO's tenets and reflects the growing importance to the United States of the arc extending from the Western Pacific and East Asia into the Indian Ocean region and South Asia.

Our national security and economic interests are inextricably linked to the Asia-Pacific region. The region is home to five of our seven treaty allies, six of the world's top 20 economies, four of the top ten U.S. trading partners, and a range of emerging partners with whom the United States is building networks of economic and security cooperation. Like the United States, our Asia-Pacific allies and partners depend on the maritime domain for food, energy, and trade. More than 90 percent of trade by volume and the majority of global energy supplies travel by sea, and our ability to deter and defeat threats to stability in the region fundamentally relies on maritime access. During the next five years, half of all economic growth is expected to be in Asia, with the region's gross domestic product estimated to double by 2020 at its current rate. In addition, energy use in Asia is expected to grow from a third of the world total to about half in the next 15 years.

The Navy has had an important role in the Asia-Pacific for more than 70 years. Today, more than 50 percent of our deployed ships are in the Pacific Ocean with almost 90 percent of those permanently or semi-permanently stationed there.



The FY 2015 Program continues our emphasis on the Asia-Pacific region in four main ways: (1) deploying forces to the Asia-Pacific; (2) basing more ships and aircraft in the region; (3) fielding new capabilities focused on specific Asia-Pacific challenges; and (4) developing partnerships and intellectual capital across the region. Fiscal constraints in the current and future budget environments may slow, but will not stop, these efforts.

First, the ship and air forces built and deployed to the region will increase the Navy's presence in the Asia-Pacific from about 52 ships today to about 65 ships by 2020. The FY 2015 Program sustains today's level of CSG and ARG operations, continues forward-stationed LCS operations from Singapore, integrates forward-operating JHSV into the Pacific Fleet, and increases amphibious and surface warship presence in the region.

Second, the FY 2015 Program continues to implement the shift to homeport 60 percent of the Navy's ships on the U.S. West coast and in the Pacific by 2020. At the end of FY 2013, the Navy had about 57 percent of the ships in these ports. U.S. homeport rebalancing will continue as new ships are commissioned and in-service ships emerge from maintenance and modernization availabilities.

Third, the Navy will continue to field capabilities focused on Asia-Pacific security challenges, particularly those needed to assure access and maneuver space. The Navy will also preferentially deploy platforms with the newest, most advanced capabilities to the region, including: power projection, ballistic missile defense, cyber, anti-submarine warfare, electronic warfare, and electronic attack.

Finally, the Navy will develop partnerships and intellectual capital toward the region. Notably, the Navy is sharpening its focus on the warfighting missions that are most important in the Asia-Pacific—ASW, ISR, BMD, air defense, electromagnetic spectrum and cyber maneuver, and electronic warfare. The Navy is developing its people to serve in the Asia-Pacific, emphasizing the region's unique geopolitical and operational environment in our training and education programs. Additionally, we are increasing efforts to reassure allies and strengthen partnerships in the Asia-Pacific region by leading or participating in more than 170 exercises and 600 training events annually with more than 20 allies and partners in the Pacific and Indian Oceans. These include:

- For 40 years, the Navy has hosted the Rim of the Pacific exercise (RIMPAC). RIMPAC 2012 included 22 countries and 40 ships. We are in the planning stages for RIMPAC 2014, which for the first time will include the Chinese People's Liberation Army (Navy) (PLA(N)).

- For 20 years, we have hosted Cooperation Afloat Readiness and Training (CARAT), a large exercise in Southeast Asia. The exercise has expanded from the Southeast Asia region into the Indian Ocean, with India and Bangladesh also participating.
- We participated in a multi-national exercise hosted by Brunei last year, involving the Japanese Maritime Self-Defense Force (JMSDF) and the PLA(N), which deployed the *Yong Wei* hospital ship in a humanitarian-assistance/disaster-relief scenario.
- The bilateral Talisman Saber 2013 exercise featured ten Royal Australian Navy ships and 14 U.S. Navy ships, including the USS George Washington (CVN 73) Strike Group and the USS Bonhomme Richard (LHD 6) ARG, and about 28,000 people.
- The bilateral Malabar exercise with India has expanded from two ships conducting limited operations (e.g., "PASS-EXs" consisting of flashing-light and flag-hoist drills) to coordinated operations with carrier-based aircraft and submarines.
- We will continue to explore routine and institutional engagements with the PLA(N), including RIMPAC, counter-piracy, search and rescue, and MEDEVAC exercises. For example, in August 2013 the USS Mason (DDG 87) participated in a counter-piracy exercise in the Gulf of Aden with elements of the PLA(N).
- We continue to conduct key military exercises with the Republic of Korea (ROK) to improve the capabilities of both U.S. and ROK forces. In 2013, the USS John S. McCain (DDG 56), USS Fitzgerald (DDG 62), USS McCampbell (DDG 85) and USS Lassen (DDG 82) participated in exercise Foal Eagle, a recurring integrated exercise involving U.S. and ROK forces to increase readiness to defend the Republic of Korea, protect the Asia-Pacific region, and maintain stability in the Korean Peninsula.

We are continuing these and other advanced exercises, stepping up our collaboration with more than 20 allies and partners in the Pacific and Indian Oceans.

FOUNDATION FOR THE FUTURE

Ultimately, the U.S. Navy exists to protect national security interests. For that, we must be deployed forward wherever U.S. interests might be at risk and remain ready to respond when directed. Our readiness to execute our missions cannot be episodic. We must maintain a vigilant and ready watch – today, tomorrow, and beyond.

The 2014 *Navy Program Guide* describes the programs the Navy has fielded and is developing—technologies, systems, payloads, and platforms—to generate the capabilities and capacities to meet the Nation's needs. While some programs contribute to a single capability, many of them are designed, engineered, acquired and maintained to support multiple capabilities, missions, and operational requirements across warfare domains in an integrated manner. This adaptability, flexibility, and effectiveness are at the core of the Navy's contributions to America's security in a dangerous world.

NAVAL AVIATION

Naval Aviation is a critical component of the Nation's ability to carry out full-spectrum operations in the 21st Century—from delivering humanitarian assistance and disaster relief at home and overseas, to maritime security operations to ensure safe passage of commercial vessels, to high-intensity sea control and power projection in a major contingency. Helicopters and fixed-wing aircraft operating from nuclear aircraft carriers, large-deck amphibious ships and shore stations, and helicopters operating from amphibious ships, cruisers, and destroyers—complemented by advanced unmanned aerial vehicles—are key contributors to the capabilities of the U.S. Navy and Marine Corps.

AIRCRAFT CARRIERS

CVN 68 *Nimitz*-Class and CVN 78 *Ford*-Class Aircraft Carrier Programs

Description

The U.S. Navy's nuclear-powered aircraft carriers (CVNs), in combination with their embarked air wings and warship escorts, provide the right balance of forward presence and surge capability to conduct peacetime, crisis, and warfighting operations around the globe in support of national strategies and interests. Sailing the world's oceans, each carrier strike group possesses a versatile, deadly—and perhaps most importantly—independent striking force capable of engaging targets hundreds of miles at sea or inland. The carrier's mobility and independence provide a unique level of global access and maneuver that does not require host-nation support. Nuclear-powered aircraft carriers can remain on-station for months at a time, replenishing ordnance, spare parts, food, consumables, and aircraft fuel while simultaneously conducting air strikes and other critical missions. This capability demonstrates the carrier's remarkable operational flexibility and self-reliance, which is vital to conducting time-critical operations. Aircraft carriers and their strike groups are days away from where they need to be, ready on arrival, and often the last to leave once the mission has been carried out.

To meet the demands of 21st-Century warfare, U.S. aircraft carriers will deploy with air wings comprising the newest and most capable aviation platforms: the FA-18 *Super Hornet*, EA-18G *Growler*, F-35C *Lightning II*, E-2D *Advanced Hawkeye*, and, in the not-too-distant future, the Unmanned Carrier-Launched Airborne Surveillance and Strike System (UCLASS). Joint concepts of operation, centered on the aircraft carrier, will additionally leverage the military strengths of all the services, bringing cooperative "muscle" to the fight and a potent synergy across the naval operational continuum.

Following the inactivation of the USS Enterprise (CVN 65) in December 2012, after more than 51 years of service, the Navy has been fulfilling its mission with a reduced force structure of ten *Nimitz* (CVN 68)-class CVNs, as authorized by the National Defense Authorization Act for Fiscal Year 2010. The force will return to the statutory requirement of 11 aircraft carriers when Gerald R. Ford (CVN 78) is delivered to the Navy in the second quarter of Fiscal Year 2016. The lead ship of the first new class of aircraft carriers since 1975, when the USS Nimitz joined the Fleet, CVN 78 has been under construction since 2008.

The *Ford*-class aircraft carriers are designed with increased operational efficiency throughout the carrier, aimed at reducing the 50-year total ownership cost by approximately $4 billion per ship when compared to *Nimitz*-class carriers. In converting all auxiliary systems outside the main propulsion plant from steam to electric power, the requirement for costly steam, hydraulic, and pneumatic

piping, as well as the repair of those distributed systems, will be significantly reduced. The new and more efficient reactors provide an electrical generating capacity nearly three times that of a *Nimitz*-class carrier, enabling such new technologies such as the Electromagnetic Aircraft Launch System and advanced command-and-control systems. The new ship design, which is based on the CVN 68 hull, also includes the Advanced Arresting Gear system, Dual-Band Radar, and Joint Precision Approach and Landing System. The redesigned flight deck, which incorporates a smaller island structure located further aft on the ship, allows greater flexibility during aircraft turnaround and launch-and-recovery cycles, leading to at least a 25 percent increase in daily sortie generation rate capability.

Combined, these new technologies and more efficient systems will enable *Ford*-class ships to operate with between 500 and 900 fewer Sailors than their *Nimitz*-class counterparts.

Status

Construction of Gerald R. Ford, the lead ship in the CVN 78 program, was approximately 70 percent complete in late 2013 at Huntington Ingalls Industries, Newport News Shipbuilding. The ship is scheduled for delivery to the Navy in 2015. Keel laying for CVN 79 is planned for 2015.

Developers

Huntington Ingalls Industries — Newport News, Virginia, USA

AIRCRAFT

AH-1Z and UH-1Y Upgrades

Description

The H-1 Program replaces the UH-1N and AH-1W aircraft with new UH-1Y and AH-1Z four-bladed, all-composite rotor system helicopters. The program will ensure that the Marine Air-Ground Task Forces (MAGTFs) possess credible rotary-wing attack and utility support platforms for the next 20 years. The H-1 Upgrade Program will reduce life-cycle costs, significantly improve operational capabilities, and extend the service lives of both aircraft. There is 85 percent commonality between the two aircraft. This greatly enhances the maintainability and readiness of the systems by leveraging the ability to support and operate both aircraft within the same squadron structure. The program includes a new, four-bladed, all-composite rotor system, coupled with a sophisticated, fully integrated glass cockpit. It also incorporates a performance-matched transmission, four-bladed tail rotor drive system, and upgraded landing gear. The integrated glass cockpit with modern avionics systems will provide a more lethal platform as well as enhanced joint interoperability. Operational enhancements include a dramatic increase in range, speed, survivability, payload, and lethality of both aircraft, with a significant decrease

in logistics footprint. The UH-1Y will operate at nearly twice the in-service range, with more than double the payload. The AH-1Z will realize similar performance increases, with the ability to carry twice the in-service load of precision-guided munitions.

Status

Through the end of FY 2013, 181 H-1 aircraft were on contract (119 UH-1Y, 62 AH-1Z), with 83 UH-1Ys and 34 AH-1Zs delivered as of September 2013. The FY 2014 budget requests 26 H-1 Upgrade aircraft. The last 90 aircraft have delivered an average of 30 days ahead of contract schedule at Bell Helicopter's production facility in Amarillo, Texas. AH-1Z Full Rate Production was achieved on November 28, 2010, and at the same time the H-1 Upgrades program was designated Acquisition Category 1C. AH-1Z Initial Operational Capability was reached on February 24, 2011 and the first successful deployment of the new attack helicopter occurred with the 11th Marine Expeditionary Unit (MEU) from November 2011 to June 2012. This MEU detachment was another program "first," as it was the first "all Upgrades" (UH-1Y/AH-1Z) deployment. The UH-1Y made its initial deployment with the 13th MEU from January to June 2009, and the UH-1Y has conducted sustained combat operations in *Operation Enduring Freedom* since November 2009. The UH-1Y and AH-1Z have been aggressively deployed ahead of their respective Material Support Dates, in an effort to support our deployed troops with the most capable aircraft available. The H-1 Upgrades program of record is for 160 UH-1Ys and 189 AH-1Zs.

Developers

Bell Helicopter Textron	Fort Wort, Texas, USA
	Amarillo, Texas, USA

AV-8B *Harrier II+*

Description

The AV-8B *Harrier* is a single-seat, light attack aircraft that supports the Marine Air-Ground Task Force (MAGTF) commander by engaging surface targets and escorting friendly aircraft, day or night, under all weather conditions during expeditionary, joint or combined operations. By virtue of its vertical/short take-off and landing (V/STOL) capability, the AV-8B can operate from a variety of amphibious ships, rapidly constructed expeditionary airfields, forward sites—e.g., roads and forward operating bases—and damaged conventional airfields. Two variants of the aircraft are in service, the AV-8B II *Night-Attack Harrier* and the AV-8B II+ *Radar Harrier*. The *Night-Attack Harrier* improved the original AV-8B design through incorporation of a Navigation, Forward-Looking Infrared (NAVFLIR) sensor, a digital color moving map, night vision goggle compatibility, and a higher performance engine. The in-service *Radar Harrier* has all the improvements of the *Night-Attack Harrier* plus the AN/APG-65 multi-mode radar. The fusion of night and radar capabilities allows the *Harrier II+* to be responsive to the MAGTF's

needs for expeditionary, night, and adverse-weather offensive air support.

Status

The *Harrier* Operational Flight Program H6.0 integrated the digital improved triple-ejector racks for increased carriage capacity for Joint Direct Attack Munition (JDAM), fully integrated ALE-47 airborne warning hardware and software, adjustments for improving moving target engagements, improved radar capability, and safety improvements, as well as AIM-120 A/B flight clearance. The AV-8B continues to maximize integration of the LITENING Advanced Targeting Pod, a third-generation dual-TV/IR sensor providing target recognition and identification, laser designation, and laser spot tracking for precision targeting capability. Work on H6.1 Operational Flight Program will offer fourth-generation LITENING, in-weapon laser capability for JDAM and Laser JDAM, and moving-target calculations for increased laser JDAM effectiveness, as well as software improvements. LITENING Pods have also been equipped with a video downlink, which enables real-time video to be sent to ground-based commanders and forward-air controllers. This facilitates time-sensitive targeting and reduces the risk of fratricide and collateral damage.

Developers

Boeing	St. Louis, Missouri, USA
	Amarillo, Texas, USA

C-2A(R) *Greyhound* Logistics Support Aircraft

Description

The C-2A *Greyhound* is the Navy's medium-lift/long-range logistics support aircraft. Capable of operational ranges up to 1,000 nautical miles, the C-2A can transport payloads up to 10,000 pounds between aircraft carrier strike groups and forward logistics sites. The *Greyhound*'s cargo bay can be rapidly reconfigured to accommodate passengers, litter patients, or time-critical cargo. The large rear cargo ramp allows direct loading and unloading for fast turnaround and can be operated in flight to airdrop supplies and personnel. Equipped with an auxiliary power unit for unassisted engine starts, the C-2A can operate independently from remote locations. The versatile *Greyhound* can also provide casualty evacuation as well as special operations and distinguished visitor transport support.

Status

The aircraft has undergone several modifications and a service life extension program that extended the *Greyhound*'s service life until 2028. The Navy recently updated a study of alternatives to field a new carrier-suitable, manned, aerial logistics aircraft by 2026.

Developers

Northrop Grumman	Bethpage, New York, USA

C-40A *Clipper*

Description

The Naval Air Force Reserve provides 100 percent of the Navy's organic intra-theater logistics airlift capability via its Navy Unique Fleet Essential Airlift (NUFEA) community. NUFEA provides Navy component commanders with short-notice, fast response intra-theater logistics support for naval power projection worldwide. The legacy C-9B and C-20G aircraft are being replaced by the C-40A Clipper, a modified Boeing 737-700/800 series aircraft. This state-of-the-art aircraft can transport 121 passengers (passenger configuration), 40,000 pounds of cargo (cargo configuration), or a combination of the two (combination configuration), at ranges greater than 3,000 nautical miles at Mach 0.8 cruise speed. The ability to carry cargo pallets and passengers simultaneously maximizes the operational capability, safety, and capacity. The C-40A has an electronic flight deck fully compliant with future communications, navigation, and air traffic control architectures; advanced technology Stage III noise-compliant, fuel-efficient engines; and an integral cargo door/cargo handling system. Maximum gross takeoff weight is 171,000 pounds.

Status

Twelve aircraft are in the C-40A inventory. The Navy has purchased the aircraft via commercial-off-the shelf standards using standard best commercial practices. C-40A squadrons are located at Naval Air Station Oceana, Virginia; Naval Base Coronado/Naval Air Station North Island, California; Naval Air Station Jacksonville, Florida; and Naval Air Station/Joint Reserve Base Fort Worth, Texas.

Developers

Boeing — Seattle, Washington, USA

C-130T *Hercules* Intra-Theater Airlift Aircraft

Description

The Navy C-130T *Hercules*—a component of the Navy Unique Fleet Essential Airlift (NUFEA) complement—provides heavy, over-, and outsized-organic airlift capability. These aircraft are deployed worldwide and provide rapid-response direct support to Navy component commanders' theater requirements. This aircraft can be reconfigured within minutes to transport up to 40,000 pounds of cargo or up to 75 passengers.

Status

The Navy has started a program to upgrade its C-130T aircraft to meet all communications navigation surveillance/air traffic management requirements. These NUFEA, heavy-lift aircraft are stationed at Naval Air Station Jacksonville, Florida; Naval Air Station Joint Reserve Base New Orleans, Louisiana; Joint Base Andrews/Naval Air Facility Washington, DC; Naval Base Ventura County/Naval Air Station Point Mugu, California; and Joint Base McGuire/Dix/Lakehurst, New Jersey.

Developers

Lockheed Martin	Bethesda, Maryland, USA
Lockheed Martin	Marietta, Georgia, USA

CH-53K (HLR) Heavy-Lift Replacement Helicopter

Description

The CH-53K is the follow-on to the Marine Corps CH-53E *Super Stallion* heavy-lift helicopter. Major systems improvements of the newly manufactured helicopter include more powerful engines, expanded gross weight airframe, drive train, advanced composite rotor blades, glass cockpit, external and internal cargo handling systems, and enhanced survivability. The CH-53K will be capable of externally lifting 27,000 pounds on a "sea level hot day" (103° Fahrenheit) to a range of 110 nautical miles and delivering cargo in a landing zone at a pressure altitude of 3,000 feet at 91.5°F, a capability improvement nearly triple the in-service CH-53E. Additionally, the CH-53K will be capable of transporting 30 combat-loaded troops. The CH-53K's increased capabilities are essential to meeting the Marine Expeditionary Brigade 2015 ship-to-objective maneuver requirement. The CH-53K fully supports the joint operational concept of full-spectrum dominance by enabling rapid, decisive operations and the early termination of conflict by projecting and sustaining forces in distant anti-access, area-denial environments. The expeditionary maneuver warfare concept establishes the basis for the organization, deployment, and employment of the Marine Corps to conduct maneuver warfare and provides the doctrine to make effective joint and multinational operations possible.

Status

The Post Milestone B System Development and Demonstration contract was awarded to Sikorsky Aircraft Corporation on April 5, 2006. The program conducted its Preliminary Design Review during the fourth quarter of FY 2008. The Critical Design Review was successfully completed ahead of schedule in the third quarter of FY 2010, and the program has transitioned from the design to the manufacturing phase. The ground test vehicle has been mounted to the test pedestal and was scheduled for engine light-off in the first quarter of FY 2014. First flight and the delivery of Engineering Demonstration Models, which will be used for Developmental Test and Evaluation, are scheduled for FY 2014. On 31 May 2013, the System Demonstration Test Article (SDTA) contract was awarded to Sikorsky. The four SDTAs will be the first fleet representative CH-53K helicopters delivered and will be used for Operational Test and Evaluation. The Marine Corps requirement remains 200 aircraft.

Developers

Sikorsky Aircraft Corporation	Stratford, Connecticut, USA

EA-6B *Prowler*
Airborne Electronic Attack (AEA) Aircraft

Description

The EA-6B *Prowler* provides Airborne Electronic Warfare capabilities against enemy systems operating within the radio frequency spectrum. EA-6B capabilities traditionally support the strike capabilities of the carrier air wings, Marine Air-Ground Task Forces (MAGTFs), and joint force operations. The need for EW demonstrably increased during numerous joint and allied operations since 1995 against traditional and non-traditional target sets in support of ground forces. The enormous demand for AEA in *Operation Enduring Freedom* and *Operation Iraqi Freedom* coupled with worldwide Airborne Electronic Attack requirements have driven EA-6B employment rates to record levels.

Status

The EA-6B Improved Capability (ICAP) III upgrade reached Initial Operational Capability in September 2005. This generational leap in AEW capability deployed for the first time in 2006. ICAP III includes a completely redesigned receiver system (ALQ-218), new displays, and MIDS/Link-16, which dramatically improve joint interoperability. The Navy will eventually "sundown" the *Prowler* and transition to an all EA-18G *Growler* force by 2015. The Marine Corps has completed its transition to ICAP III aircraft in FY 2012 and will fly the EA-6B ICAP III through 2019. Its planned replacement is a series of networked air and ground EW payloads forming a collaborative system of systems labeled MAGTF EW, which will provide increased EW capacity, flexibility, and scalability in direct support of the MAGTF commander and the joint force commander. The first implementation of MAGTF EW, the Intrepid Tiger II pod carried on the AV-8B *Harrier II+*, made its initial deployment in May 2012.

Developers

Northrop Grumman Corporation Bethpage, New York, USA

EA-18G *Growler*
Airborne Electronic Attack (AEA) Aircraft

Description

The EA-18G *Growler* is replacing the Navy's EA-6B *Prowler*. Like the *Prowler*, the EA-18G provides full-spectrum Airborne Electronic Attack to counter enemy air defenses and communication networks, most notably Airborne Electronic Attack and employing anti-radiation missiles. These capabilities continue to be in high demand in overseas contingency operations, where *Growler* and *Prowler* operations protect coalition forces and disrupt critical command and control links. The *Growler* maintains a high degree of commonality with the F/A-18F, retaining a great deal of the latter's inherent strike-fighter and self-protection capabilities while providing air-to-air self-protection, thus freeing other assets for additional strike-fighter tasking.

Status

The EA-18G *Growler* reached Initial Operational Capability in September 2009 and is currently in Full Rate Production. In December 2009, the Department of Defense decided to continue the Navy Expeditionary AEA mission and recapitalize the Navy EA-6B expeditionary force with the EA-18G. As a result, 26 additional aircraft were programmed for procurement for three active and one reserve expeditionary squadrons. All three active component expeditionary squadrons have transitioned to the EA-18G. The FY 2014 President's Budget requested 21 additional EA-18Gs to stand-up two more expeditionary squadrons, one in FY 2016 and the other in FY2017.

The first EA-18G deployment occurred in November 2010 in an expeditionary role in support of *Operation New Dawn* and redeployed in March 2011 in support of *Operations Odyssey Dawn* and *Unified Protector*, during which the EA-18G conducted combat operations. The first carrier deployment occurred in May 2011 on board the USS George H. W. Bush (CVN 77). As of the end of FY 2013, 90 EA-18G aircraft had been delivered with another 12 aircraft scheduled for delivery in FY 2014. An inventory objective of 135 aircraft is planned to support ten carrier-based squadrons, five active expeditionary squadrons, and one reserve squadron. Full Operational Capability is planned for FY 2017.

Developers

Boeing	St. Louis, Missouri, USA
Northrop Grumman	Bethpage, New York, USA

F-35 *Lightning II* Joint Strike Fighter

Description

The JSF F-35 *Lightning II* program will deliver a transformational family of next-generation strike aircraft, combining stealth and enhanced sensors to provide lethal, survivable and supportable tactical jet aviation strike fighters. The Navy Carrier Variant (CV), the Marine Corps Short Takeoff and Vertical Landing (STOVL) and Air Force Conventional Takeoff and Landing (CTOL) "family of aircraft" designs share a high level of commonality while meeting U.S. service and allied partner needs. The keystone of this effort is a mission systems avionics suite that delivers unparalleled interoperability among U.S. armed services and coalition partners. Agreements for international participation in System Development and Demonstration (SDD) have been negotiated with Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, and the United Kingdom. Israel and Japan selected the F-35 through the U.S. Foreign Military Sales program. The F-35 Carrier Variant will replace F/A-18A-C aircraft and complement the F/A-18E/F *Super Hornet*. The STOVL variant will replace Marine F/A-18s, AV-8Bs and EA-6Bs.

Status

The JSF is in its 13th year of a planned 17-year SDD program. Following a Nunn-McCurdy breach, the Office of the Secretary of Defense (OSD) certified the JSF as essential to national security. The 2005 DoD Base Realignment and Closure Commission directed the first JSF Integrated Training Center to be at Eglin Air Force Base, Florida. The first CTOL variant SDD flight was December 2006; first STOVL flight was June 2008; and first CV flight was June 2010. Initial amphibious ship testing for the STOVL variant occurred onboard the USS Wasp (LHD 1) in October 2011. Subsequent testing on board Wasp in September 2013 was also successful. Initial Electro-Magnetic Aircraft Launch System (EMALS) testing for the CV aircraft occurred in November 2011. Roll-in and fly-in arrestments were scheduled for early 2014 prior to the first testing on board an aircraft carrier in August 2014. STOVL Initial Operational Capability (IOC) is planned in 2015, and CV IOC is planned in 2018. By the end of 2014, 50 STOVL aircraft will have been procured along with 34 scheduled deliveries and 26 CV aircraft procured with 13 scheduled deliveries. The first USMC STOVL transition of a legacy F/A-18 squadron occurred in 2013. The first Navy CV transition of a legacy F/A-18 squadron is scheduled for 2016. The program of record buy is planned for 340 F-35Bs and 340 F-35Cs (USN-260/USMC-80).

Developers

Lockheed Martin	Ft. Worth, Texas, USA
Pratt & Whitney	Hartford, Connecticut, USA

F/A-18A-D *Hornet* Strike-Fighter Aircraft

Description

The F/A-18 *Hornet* is a multi-mission strike fighter that combines the capabilities of a fighter and an attack aircraft. The single-seat F/A-18A and two-seat F/A-18B became operational in 1983. Eventually, the Hornet replaced the Navy's A-6 *Intruder*, A-7 *Corsair II*, and F-4 *Phantom II* and the Marine Corps F-4 aircraft. Reliability and ease of maintenance were emphasized in the Hornet's design, and F/A-18s have consistently flown three times as many hours without failure as other Navy tactical aircraft, while requiring half the maintenance time.

The F/A-18 is equipped with a digital fly-by-wire flight control system that provides exceptional maneuverability and allows the pilot to concentrate on operating the aircraft's weapons system. A solid thrust-to-weight ratio and superior turn characteristics, combined with energy sustainability, enable the *Hornet* to hold its own against any adversary. The ability to sustain evasive action is what many pilots consider to be the *Hornet*'s finest trait. The F/A-18 is the Navy's first tactical jet to incorporate digital-bus architecture for the entire avionics suite, making this component of the aircraft relatively easy to upgrade on a regular and affordable basis. Following a production run of more than 400 F/A-18A/Bs, deliveries of the single-seat F/A-18C and two-seat F/A-18D began in September 1987.

The F/A-18C/D models incorporated upgrades for employing updated missiles and jamming devices. These versions are armed with the AIM-120 Advanced Medium-Range Air-to-Air Missile and the infrared-imaging version of the AGM-65 Maverick. The *Hornet* has been battle tested and proved to be a highly reliable and versatile strike fighter. Navy and Marine Corps *Hornets* were in the forefront of strikes in Afghanistan in 2001 during *Operation Enduring Freedom* where they continue to serve and in Iraq in 2003 during *Operations Iraqi Freedom/New Dawn*. The latest lot of F/A-18C/D Hornets is far more capable than the first F/A-18A/Bs. Although the F/A-18C/D's growth is limited, the *Hornet* will continue to fill carrier air wings for years to come, before gradually giving way to the larger, longer-range and more capable F/A-18E/F *Super Hornet* and the F-35 *Lightning II* Joint Strike Fighter. The last Hornet, an F/A-18D, rolled off the Boeing production line in August 2000.

Status

As of October 2013, the Navy and Marine Corps had 95 F/A-18A, 21 F/A-18B, 373 F/A-18C and 131 F/A-18D aircraft in service and test roles, and two NF/A-18C and two NF/A-18D versions in permanent test roles. *Hornets* equip 20 active Navy and Marine Corps and three Navy and Marine Corps Reserve strike fighter squadrons, two fleet readiness squadrons, three air-test and evaluation squadrons, the Navy's Flight Demonstration Squadron (Blue Angels), and the Naval Strike and Air Warfare Center.

Developers

Boeing	St. Louis, Missouri, USA
General Electric	Lynn, Massachusetts, USA

F/A-18E/F *Super Hornet* Strike-Fighter Aircraft

Description

The multi-mission F/A-18E/F *Super Hornet* strike fighter is an evolutionary upgrade of the F/A-18C/D *Hornet*. The F/A-18E/F is able to conduct unescorted strikes against highly defended targets early in a conflict. The *Super Hornet* provides the carrier strike group with a strike fighter that has significant growth potential, more than adequate carrier-based landing weight, range, endurance, and ordnance-carrying capabilities comparable to those of the F-14 *Tomcat* and F/A-18A/C *Hornet* it replaces. The single-seat F/A-18E and the two-seat F/A-18F have a 25 percent larger wing area and a 33 percent higher internal fuel capacity that effectively increases endurance by 50 percent and mission range by 41 percent. It has five "wet" stations that give the *Super Hornet* in-flight tanker capability.

The *Super Hornet* incorporates two additional wing stations that allow for increased payload flexibility in the mix of air-to-air and air-to-ground ordnance. The F/A-18E/F can carry a full array of the newest joint "smart" weapons such as the Joint Direct Attack Munition (JDAM) and the Joint Standoff Weapon (JSOW). The *Super Hornet* has the ability to recover aboard a carrier with optimum

reserve fuel while carrying a load of precision-strike weapons; its carrier-recovery payload is more than 9,000 pounds.

The *Super Hornet* also has the space, power, and cooling capability needed to accommodate valuable but installation-sensitive avionics when they become available, including the Active Electronically Scanned-Array (AESA) radar. Sophisticated systems such as the Integrated Defensive Electronic Countermeasures System (IDECMS), Advanced Targeting Forward Looking Infrared (ATFLIR), Joint Helmet-Mounted Cueing System (JHMCS), JDAM and JSOW, AIM-9X and AIM-120C missiles, APG-79 AESA radar, and advanced mission computers and displays make the F/A-18E/F an extremely capable and lethal strike platform. Future planned upgrades include the AIM-120D, the Advanced Anti-Radiation Guided Missile (AARGM) and various cockpit and display improvements. The first operational F/A-18E *Super Hornet* squadron (VFA-115) deployed on board the USS Abraham Lincoln (CVN 72) on July 24, 2002, for a ten-month initial deployment that included the initial tasks in support of *Operation Iraqi Freedom*. F/A-18E/F *Super Hornets* remain at the forefront of combat operations. *Super Hornet* squadrons have been integrated into all ten Navy air wings, and with future capability upgrades, are well suited to complement the arrival of the F-35 *Lightning II* Joint Strike Fighter.

Status

As of October 2013, there were 234 F/A-18E models and 253 F/A-18F models in U.S. Navy inventory. The F/A-18E/F serves as a replacement for both older model F/A-18 A/C aircraft, and the retired F-14 *Tomcat*. F/A-18E/F program of record completed at 563 aircraft with the last aircraft procured in FY 2013.

Developers

Boeing	St. Louis, Missouri, USA
General Electric	Lynn, Massachusetts, USA

HH-60H *Seahawk* Helicopter

Description

The Navy's HH-60H *Seahawk* achieved Initial Operational Capability in 1989, providing combat search and rescue as well as Naval Special Warfare support as an integral element of the carrier air wing. These capable aircraft are being replaced on board aircraft carriers by the newer MH-60S, but due to remaining airframe life, are being retained in two squadrons, HSC-84 and HSC-85, dedicated to special operations forces (SOF) combat support. The HH-60H provides a proven maritime capability supporting Naval Special Warfare and Marine Special Operations as they refocus to the sea. HH-60s use forward-looking infrared sensors, air-to-ground weapons, and robust communications capabilities to provide critical SOF mobility, fires, and logistics support.

Status
All 35 HH-60H *Seahawks* are scheduled for operational and maintenance capability upgrades to retain combat capability while leveraging MH-60R/S technologies to reduce lifecycle costs.

Developers

Sikorsky Aircraft Corp	Stratford, Connecticut, USA
General Electric	Lynn, Massachusetts, USA

KC-130J *Hercules* Tactical Tanker and Transport Aircraft

Description
The KC-130 is a four-engine turbo-prop, multi-role, multi-mission tactical aerial refueler and tactical transport aircraft that supports all six functions of Marine Aviation and is well suited to meet the mission needs of forward-deployed Marine Air Ground Task Forces (MAGTFs). The *Hercules* provides fixed-wing, rotary-wing, and tilt-rotor tactical air-to-air refueling; rapid ground refueling of aircraft and tactical vehicles; assault air transport of air-landed or air-delivered personnel, supplies, and equipment; command-and-control augmentation; battlefield illumination; tactical aero medical evacuation; combat search and rescue support. When equipped with the Harvest HAWK Intelligence Surveillance Reconnaissance Weapon Mission kit, the aircraft can perform multi-sensor image reconnaissance and provide close air support. With its increase in speed, altitude, range, performance, state-of-the-art flight station, which includes two heads-up displays, night vision lighting, an augmented crew station, fully integrated digital avionics, enhanced air-to-air refueling capability, and aircraft survivability enhancements, the KC-130J will provide the MAGTF commander with multi-mission capabilities well into the 21st Century.

Status
The USMC requirement is 79 KC-130Js. 28 KC-130T model aircraft operated by the Reserves are yet to be replaced. As of October 2013, the USMC KC-130J inventory totaled 46 aircraft.

Developers

Lockheed Martin	Marietta, Georgia, USA

MH-60R/S *Seahawk* Multi-Mission Combat Helicopters

Description
The MH-60R and MH-60S multi-mission combat helicopters are the two pillars of the Chief of Naval Operations' Naval Helicopter Master Plan for the 21st Century. The complementary capabilities of these two helicopters are ideally suited to "hunter-killer" teams, leveraging MH-60R sensors and MH-60S weapons systems to rapidly neutralize surface and subsurface threats. As the Helicopter Master Plan unfolds, *Seahawks* are deploying in companion squadrons as part of carrier air wings embarked in the Navy's

aircraft carriers and as detachments on surface warships, logistics ships, amphibious ships, and at overseas stations. The MH-60R provides anti-submarine and surface warfare capability with a suite of sensors and weapons that include dipping sonar, surface search radar, electronic support measures, advanced forward-looking infrared (FLIR) sensors, precision air-to-surface missiles, and torpedoes. The MH-60S provides surface and mine countermeasure warfare capabilities, as well as robust Naval Special Warfare, search and rescue, combat search and rescue, and logistics capability, with air-to-ground weapons and the same FLIR and Link16 capability as the MH-60R. Airborne mine countermeasure operations will be accomplished using advanced sensor and weapons packages to provide detection, localization, and neutralization of these anti-access threats. MH-60R/S platforms are produced with 85 percent common components (e.g., common cockpit and dynamic components) to simplify maintenance, logistics, and training.

Status

The MH-60R completed its Operational Evaluation in the third quarter of FY 2005. It was authorized to enter Full Rate Production in March 2006. The Navy plans to acquire 280 MH-60Rs. The MH-60S was approved for full-rate production in August 2002 and is undergoing scheduled block upgrades for armed helicopter and airborne mine countermeasures missions. The MH-60R/S programs entered into multi-year contracts with Sikorsky Aircraft Corporation (MYP-8) for the airframe and Lockheed Martin (MYP-2) for the avionics systems for fiscal years 2012 through 2016. The Navy plans to acquire 275 MH-60S helicopters. At the end of FY 2013, there were 169 MH-60R and 229 MH-60S helicopters in the inventory.

Developers

Lockheed Martin	Owego, New York, USA
Sikorsky	Stratford, Connecticut, USA

MH-53E *Sea Dragon* Airborne Mine Countermeasures (AMCM) Helicopter

Description

The MH-53E provides AMCM capability to naval forces through various mine-hunting and mine-sweeping systems. The MH-53E supports undersea warfare by defending the fleet from surface and sub-surface mine threats and ensuring sea lines of communication remain passable for not only carrier and expeditionary strike groups, but also for vital commercial shipping. The MH-53E provides the Navy's only heavy-lift rotary-wing capability enabling over-the-horizon combat logistics support. Secondary missions include Vertical Onboard Delivery, Tactical Aircraft Recovery, Humanitarian Assistance and Disaster Relief, and Naval Special Warfare support.

Status

The MH-53E program is executing an in-service sustainment strategy to ensure continued AMCM and heavy lift support to the sea base until the transition to the Littoral Combat Ship Mine Countermeasures Mission Package is complete. The sustainment strategy addresses fatigue, obsolescence, readiness, and safety issues. A Fatigue Life Extension has been completed, which extended the aircraft service life to 10,000 hours, enabling the Navy to maintain a dedicated AMCM capability through the 2025 timeframe. The USS Ponce has been designated as an interim afloat forward staging base (AFSBI 15) to provide staging for the MH-53E and associated airborne mine-hunting and mine-sweeping systems enabling a more rapid and sustained deployment of AMCM forces.

Developers

Sikorsky Aircraft	Stratford, Connecticut, USA
General Electric	Lynn, Massachusetts, USA

MV-22 *Osprey* Tilt-Rotor Aircraft

Description

The MV-22 *Osprey* tilt-rotor aircraft is an advanced technology vertical/short takeoff and landing (V/STOL), multi-purpose tactical aircraft replacing the Vietnam-era CH-46E *Sea Knight* CH-53D *Super Stallion* helicopters. The MV-22 is a multi-mission aircraft designed for use by the Marine Corps, Navy, and Air Force. The MV-22 joins the Joint High Speed Vessel (JHSV) and Landing Craft Air Cushion (LCAC) as the seabasing connectors necessary to execute expeditionary maneuver warfare. Specific missions for the MV-22 include expeditionary assault from land or sea, medium-lift assault support, aerial delivery, tactical recovery of aircraft and personnel, air evacuation, and rapid insertion and extraction.

The MV-22's design incorporates composite materials, fly-by-wire flight controls, digital cockpits, and advanced manufacturing processes. The MV-22's prop-rotor system, engine, and transmissions are mounted on each wingtip and allow it to operate as a helicopter for takeoff and landing. Once airborne, the nacelles rotate forward 90 degrees, transitioning the MV-22 into a high-speed, high-altitude, fuel-efficient turboprop aircraft. The MV-22 is the cornerstone of Marine Corps assault support capability, with the speed, endurance, and survivability needed to fight and win on tomorrow's battlefields. This combat multiplier represents a quantum improvement in strategic mobility and tactical flexibility for expeditionary forces. The Osprey has a 325-nautical mile combat radius, can cruise at 262 knots, and can carry 24 combat-equipped Marines or a 12,500-pound external load. With a 2,100 nautical-mile single-aerial refueling range, the aircraft also has a strategic self-deployment capability.

Status

The Marine Corps transition from the CH-46E *Sea Knight* and CH-53D *Super Stallion* to the MV-22 continues at the approximate rate of two Ospreys delivered each month and two squadrons transitioned each year. Production of the MV-22 is based on a block production strategy, which is designed to provide continual life-cycle and capability improvements throughout the life of the platform. Block A-series aircraft serve as non-deployable, training aircraft and include software enhancements, nacelle reconfiguration, and reliability and maintainability improvements compared to the original aircraft design.

All 30 Block A-series aircraft were delivered as of 2011. Block B-series aircraft are the deployable configuration of the MV-22 *Osprey*. These aircraft provide improvements in effectiveness and maintainability for operators and maintainers, including improved access to the nacelle for inspection purposes and substantial reliability and maintenance improvements across the entire platform. All 108 Block B aircraft were delivered as of January 2012. Block C aircraft incorporate mission enhancements, increased operational capability and substantially reduced maintenance costs. Enhancements include multiple additions: weather radar; a forward-firing ALE-47 dispenser; improved hover coupled features; an improved environmental conditioning system; and a troop commander situational awareness station. The first Block C aircraft was delivered in January 2012. The last Block C aircraft, which will complete the USMC program of record of 360 aircraft, is slated for delivery in 2023.

Developers

Bell Helicopter Textron	Fort Worth, Texas, USA
Boeing Defense and Space Group, Helicopter Division	Philadelphia, Pennsylvania, USA
Rolls Royce	Indianapolis, Indiana, USA

P-3C *Orion* Modification, Improvement, and Sustainment

Description

The legacy P-3C *Orion* maritime patrol aircraft provides Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), and Intelligence, Surveillance, and Reconnaissance (ISR) capabilities to naval and joint task force commanders and contributes directly to maritime domain awareness across the globe. Squadrons are based in Jacksonville, Florida; Whidbey Island, Washington; and Kaneohe Bay, Hawaii. Due to the P-3's range and endurance and multi-mission capability, the airframe has been in high demand for the past five decades and the aircraft are nearing the ends of their service lives.

The Navy's P-3 roadmap focuses on three areas: airframe sustainment; mission systems sustainment; and re-capitalization by the P-8A *Poseidon* Multi-mission Maritime Aircraft. Regarding the airframe sustainment need, 39 aircraft were grounded in

December 2007, a result of on-going Fatigue Life Management Program analysis that revealed the aft lower surface of the outer-wing (Zone 5) experienced fatigue at higher levels than previously estimated. Subsequently, the Chief of Naval Operations approved a P-3 Recovery Plan, which included a dual-path approach that encompassed Zone 5 modifications, which included limited replacement of outer-wing components, as well as the manufacturing and installation of new outer-wing assemblies. The Mission System Sustainment program will improve aircraft availability through replacement and upgrades of obsolete systems with modern hardware systems and software. These programs will ensure the P-3C continues to meet Navy's ASW, ASUW, and ISR requirements through completion of the transition to the P-8A in FY 2019.

Status

The Navy has successfully implemented its P-3C Fatigue Life Management Program. Through FY 2013, 87 Special Structural Inspections (SSI), 39 Enhanced Special Structural Inspections (ESSI), 54 Special Structural Inspection-Kit (SSI-K), and 61 Zone 5 modifications have been completed. Procurement of outer wing assemblies began in 2008, and installations commenced in 2011. As of the end of FY 2013, 12 outer wing assemblies have been completed, with nine aircraft under rework.

Developers

Lockheed Martin	Marietta, Georgia, USA
	Eagan, Minnesota, USA
	Greenville, South Carolina, USA
	Manassas, Virginia, USA

P-8A *Poseidon* Multi-mission Maritime Aircraft (MMA)

Description

The P-8A *Poseidon* recapitalizes and improves the broad-area Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), and armed Intelligence, Surveillance, and Reconnaissance (ISR) capability resident in the legacy P-3C *Orion*. The P-8A combines the proven reliability of the commercial 737 airframe, powerplants, and avionics with an open architecture that enables integration of modern sensors and communications networks. P-8A will leverage global logistics support infrastructure and commercial training applications to provide both higher operational availability and improved warfighting readiness. The P-8A will be built with incremental upgrades that include improved ASW sensors, network enabled ASW and ASUW weapons, sensor and targeting enhancements, and improved communications capability.

Status

The P-8A program is meeting all cost, schedule, and performance parameters in accordance with the Acquisition Program Baseline. The MMA program received a Milestone A decision in March 2000 and explored concepts for MMA with industry. Included in the concepts was the integration of Unmanned Aerial Vehicles (UAVs)

to augment MMA capability. An Analysis of Alternatives (AoA) began in the summer 2000 and leveraged previous analyses and the results of the industry studies. The AoA concluded that manned aircraft are an essential element of providing broad area maritime and littoral armed ISR, and that UAVs provided a transformational opportunity for obtaining additional capability.

In 2002, the Navy re-engaged industry in Component Advanced Development, concept refinement, architecture design, and requirements validation. The Under Secretary of Defense (Acquisition, Technology and Logistics) approved a revised acquisition strategy to focus MMA on P-3 replacement and not a P-3 Service Life Extension. The Navy and Joint Staff endorsed the Operational Requirements Document/Capability Development Document in preparation for a successful May 2004 Milestone B and entry into System Development and Demonstration. In June 2004, the Navy selected the McDonnell-Douglas Corporation, a wholly owned subsidiary of the Boeing Company, as the single system integrator. P-8A completed Preliminary Design Review in November 2005, Critical Design Review in June 2007, and Design Readiness Review in August 2007. The program successfully passed Milestone C in August 2010 and received permission from USD AT&L to buy three Low Rate Initial Production (LRIP) lots totaling 24 aircraft.

The first LRIP aircraft delivery occurred in March 2012 to Patrol Squadron THIRTY (VP-30) at Naval Air Station Jacksonville, Florida, and the first operational VP squadron commenced transition from the P-3C to the P-8A in July 2012. Increment 1 of the P-8A program is on track for Initial Operational Capability (IOC) in late 2013, when the first squadron will have completed transition and deployed. Increment 2, which includes a series of three Engineering Change Proposals, is planned to achieve IOC in FY 2014, FY 2016, and FY 2017, respectively. Increment 3, which includes integration efforts that will deliver capabilities required to pace future threats, will reach IOC in 2020. The P-8A inventory objective is 117 aircraft.

Developers

The Boeing Company Renton, Washington, USA

Naval Aviation Training Aircraft

Description

Commander, Naval Air Training Command's (CNATRA) mission is to train and produce safely the world's finest combat aviation professionals—Naval Aviators and Naval Flight Officers—and deliver them at the right time, in the right numbers, and at the right cost to the Fleet for follow-on tasking. This mission is essential in order to generate the readiness the fleet requires.

CNATRA's training aircraft inventory includes the T-34 *Turbo Mentor*, T-6 *Texan II*, T-45 *Goshawk*, TH-57 *Sea Ranger*, T-44 *Pegasus*, TC-12 *Huron*, and the T-39 *Sabreliner*.

All Student Naval Aviators begin primary flight training in either the T-34C *Turbo Mentor* or the T-6B *Texan II*.

The T-6B is replacing CNATRA's venerable workhorse, the T-34C, after 30 years of service. Built by Beechcraft Defense Corporation, the T-6B features a Pratt & Whitney PT-6A-68 engine with twice the horsepower of the T-34C, ejection seats for increased safety, cockpit pressurization, onboard oxygen-generating systems, and a completely digital/glass cockpit. Training Air Wing FIVE at Naval Air Station (NAS) Whiting Field completed its transition to the T-6B in 2012, and Training Air Wing FOUR at NAS Corpus Christi is following suit with its transition scheduled to be complete by 2014.

The T-45 *Goshawk*, a carrier-capable derivative of the British Aerospace *Hawk*, is used for intermediate and advanced training in the strike syllabus for (jet) pilots. The conversion from analog (T-45A) to digital cockpits (T-45C) is nearing its completion. Future upgrades include resolution of an engine-surge issue to enhance fuel efficiency and safety, and preservation of current aircraft through Service Life Assessment and Service Life Extension Programs.

The TH-57 *Sea Ranger*, the Navy version of the commercial Bell *Jet Ranger*, is used for advanced training in the rotary-wing (helicopter) pilot syllabus. The TH-57B (visual flight) and the TH-57C (instrument flight) will be receiving minor avionics upgrades that will allow continued operation past 2020.

The T-44 *Pegasus* and the TC-12 *Huron* are twin turboprop, pressurized, fixed-wing aircraft that are used for intermediate and advanced training for multi-engine and tilt-rotor pilots. The TC-12 will be phased out of advanced training by 2016. Continued improvements to the T-44 include the replacement of wing wiring, simulator upgrades, and the conversion from analog (T-44A) to digital cockpits (T-44C). Additionally, the T-44 is receiving new simulators to replace the obsolete legacy instrument flight trainers.

All Undergraduate Military Flight Officers (UMFOs) primary training begins in the T-6B *Texan II*. VFA (attack) and VAQ (electronic warfare) advanced UMFO training is conducted in the T-39 *Sabreliner* and T-45C.

In service since the early 1990s, the T-39 is a multi-purpose low-wing, twin-turbojet aircraft used for radar, instrument and low-level navigation training. The T-45 is used for the tactical maneuvering portion of the VFA and VAQ UMFO syllabus and is replacing the T-39 as the advanced phase radar trainer with the integration of the Virtual Mission Training System (VMTS), an embedded synthetic radar training system.

CNATRA has charted a course to revolutionize UMFO training by employing the T-6A, the T-45C with VMTS, and high-fidelity simulators to train future UMFOs. This new training program capitalizes on cutting-edge technologies while allowing the Navy to divest of the aging T-39 platform. The new training syllabus achieved Initial Operating Capability at NAS Pensacola in FY 2013 and will be fully operational by the end of FY 2014. VP, VQ and VAW advanced UMFO training will be conducted in the Multi-Crew Simulator (MCS). Set to begin in 2014, MCS will focus on

crew resource management, communications, and sensor integration and will provide intermediate and advanced training for all P-3, P-8, EP-3, E-6 and E-2C/D NFOs. With MCS, NFOs will receive all undergraduate training as well as pinning on their Wings of Gold while at Training Air Wing SIX.

Status
The T-6 is in production with a planned inventory objective of 295 aircraft, with the last aircraft to be procured in FY 2014.

Developers

Hawker Beechcraft (T-6)	Wichita, Kansas, USA
Boeing (T-45)	St. Louis, Missouri, USA

Service Secretary Controlled Aircraft/ Executive Airlift (SSCA / EA)

Description
The Department of the Navy maintains Service Secretary Controlled Aircraft/Executive Airlift in accordance with the Department of Defense Directive 4500.56. The SSCA aircraft are designated by the Secretaries of the Military Departments for transportation of their senior Service officials. The offices of the Secretary of the Navy, Chief of Naval Operations, and Commandant of the Marine Corps coordinate with Fleet Logistics Support Squadron ONE (VR-1) for scheduling of Navy and Marine Corps senior leader travel. At the discretion of the Secretary of the Navy, other SSCA/EA aircraft are stationed Outside the Continental United States (OCONUS) to support Navy senior leader travel. In 2014, three C-37Bs (*Gulfstream-550*), one C-37A (*Gulfstream-V*), two C-20Ds (*Gulfstream-III*), and one C-20A (*Gulfstream-III*) provide executive transport services. The C-37A/B aircraft have replaced the VP-3A (SSCA/EA-configured Orion), substantially lowering operating costs. The C-37A/B meets all known international-imposed air traffic management communications, navigation, and surveillance requirements through FY 2014.

Status
The first C-37 aircraft was delivered in 2002, a second aircraft in 2005, and two more in 2006. The first aircraft, the Navy's only C-37A, is based at Hickam Air Force Base, Hawaii, and supports Commander, Pacific Fleet (PACFLT). The C-37Bs and C-20Ds are based at Joint Base Andrews/Naval Air Facility Washington, D.C., and are assigned to Fleet Logistics Support Squadron ONE. Additionally, the Navy acquired a surplus C-20A from the Air Force in order to meet Commander Naval Forces Europe/Commander Naval Forces Africa (COMNAVEUR/COMNAVAF) executive transportation requirements. That aircraft is based at Naval Air Station Sigonella, Italy.

Developers

Gulfstream (General Dynamics)	Savannah, Georgia, USA

VXX Presidential Replacement Helicopter

Description

A replacement is required for the 40-year-old VH-3D and 24-year-old VH-60N helicopters that provide transportation for the President of the United States, foreign heads of state, and other dignitaries as directed by the White House Military Office. The Replacement Presidential Helicopter (VXX) will provide a survivable, mobile command-and-control "VIP" transportation capability and a system-of-integrated-systems necessary to meet presidential transport mission requirements.

Status

The VXX program is in pre-Milestone B. The Joint Requirements Oversight Council (JROC) approved an Initial Capabilities Document in June 2009, and the program received a Material Development Decision on June 7, 2010. An Analysis of Alternatives was completed in April 2012 and the program has been approved to enter at Milestone B in FY 2014. Additionally, a Capabilities Development Document was approved by the JROC in January 2013 and a request for proposals for the VXX aircraft was released in May 2013. Government risk-reduction activities are ongoing to posture the program for success, in conjunction with the program's source selection activity.

Developers

To be determined.

AVIATION WEAPONS

AES-1 Airborne Laser Mine Detection System (ALMDS)

Description

The Airborne Laser Mine Detection System is a Light-Detection and Ranging high-area coverage Airborne Mine Countermeasures (AMCM) system that detects, classifies, and localizes floating and near-surface moored sea mines. The system is deployed from the MH-60S *Seahawk* helicopter and will provide organic AMCM defense to the carrier and expeditionary strike forces. The system represents a capability that does not currently exist in the MCM inventory.

Status

ALMDS completed Operational Assessment in FY 2012. Initial Operational Capability is scheduled for FY 2016, and Pre-Planned Product Improvement delivers in 2018.

Developers

Northrop Grumman	Melbourne, Florida, USA
Arete Associates	Tucson, Arizona, USA

Airborne Mine Neutralization System (AMNS)

Description

The Airborne Mine Neutralization System is a mine-neutralization system deployed from the MH-53E *Sea Dragon* and MH-60S *Seahawk* helicopters using the Archerfish expendable mine-neutralization device. The AMNS (Archerfish) will be deployed from the MH-60S helicopter with the capability to neutralize bottom, near surface and moored mines using an expendable mine neutralization device. These systems will also be deployed from the Littoral Combat Ship (LCS) to provide organic airborne mine neutralization capability as part of the LCS Mine Warfare Mission Module. This capability will be of critical importance in littoral zones, confined straits, choke points, and amphibious objective areas.

Status

AMNS successfully completed Integrated Test in May 2013 and is on-track for FY 2014 Operational Assessment. Initial Operational Capability is scheduled for FY 2016.

Developers

Raytheon	Portsmouth, Rhode Island, USA
BAE Systems	Portsmouth, England

AGM-88E AARGM Advanced Anti-Radiation Guided Missile (AARGM)

Description

The U.S. Navy's AGM-88E AARGM is the latest evolution of the High-Speed Anti-Radiation Mission (HARM) weapon system. HARM is the Navy's only anti-radiation, defense-suppression, air-to-surface missile. Employed successfully in naval operations for decades, HARM can destroy or suppress broadcasting enemy electronic emitters, especially those associated with radar sites used to direct anti-aircraft guns and surface-to-air missiles. Fielded configurations of HARM include AGM-88B (Block IIIA), AGM-88C (Block V), and AGM-88C (Block VA). The HARM program is a Navy-led joint-service (Navy, Air Force, and Marine Corps) and combined (Italian air force) program. The AGM-88E program upgrades some existing HARM missile inventory with a new guidance section and a modified control section to incorporate multi-sensor, multi-spectral, anti-radiation homing detection capability, Global Positioning System/Inertial Navigation System (GPS/INS) guidance, and a millimeter-wave terminal seeker. AARGM also includes a netted situation awareness/targeting capability and weapon impact assessment reporting via direct connectivity with national technical means. The U.S. Department of Defense and the Ministry of Defense of the Republic of Italy have signed an international memorandum of agreement for cooperative development of AGM-88E. The AARGM system provides the U.S. Navy/Air Force/Marine Corps and the Italian air force with a transformational and affordable upgrade to the legacy HARM.

Status

The AGM-88E program completed Initial Operational Testing and Evaluation and reached Initial Operational Capability during the third quarter of FY 2012. The Full Rate Production (FRP) decision was approved and first FRP contract was awarded in the fourth quarter of FY 2012. The AARGM inventory objective is 1,870 tactical rounds for integration on F/A-18C/D/E/F *Hornet/Super Hornet* and EA-18G *Growler* aircraft. The Italian air force will integrate AARGM on the *Tornado ECR* aircraft in accordance with the international cooperative development program agreements.

Developers

ATK — Woodland Hills, California, USA

AGM-154 Joint Standoff Weapon (JSOW)

Description

The JSOW is a family of weapons that permits naval aircraft to attack targets at increased standoff distances using Global Positioning System (GPS)-aided Inertial Navigation System (INS) for guidance. All JSOW variants share a common body, but can be configured for use against area targets, bunker penetration, and ship attack. The JSOW Unitary (JSOW-C) variant adds an Imaging infrared seeker and Autonomous Target Acquisition (ATA) to attack point targets with precision accuracy. Defeating emergent, time-critical threats, whether in close-in proximity or over-the-horizon, requires an all-weather weapon capable of penetrating defended sanctuaries and destroying hostile vessels while minimizing the danger of collateral damage to friendly or neutral shipping. The JSOW-C-1 will incorporate new target tracking algorithms into the seeker for moving targets, giving the joint force commanders an affordable, air-delivered, standoff weapon that is effective against fixed and re-locatable land and maritime targets. Used in conjunction with accurate targeting information and anti-radiation weapons, JSOW-C-1 will provide the capability to defeat enemy air defenses while creating sanctuaries that permit the rapid transition to low-cost, direct-attack ordnance.

Status

AGM-154A reached Initial Operational Capability (IOC) in 1999, and the AGM-154C variant achieved IOC in FY 2005. JSOW C-1 began procurement in FY 2011 and will reach IOC in FY 2015. JSOW C-1 will be procured through 2021.

Developers

Raytheon — Tucson, Arizona, USA

AIM-9X Sidewinder Short-Range Air-to-Air Missile (SRAAM)

Description

The AIM-9X SRAAM is a fifth-generation infrared (IR) "launch-and-leave" missile with superior detection and tracking capability, high off-bore sight capability, robust IR Counter-Countermeasures (IRCCM), enhanced maneuverability, and growth potential via software improvements. The AIM-9X development leveraged existing AIM-9M components to minimize development risk and cost. Various independent obsolescence and Pre-Planned Product Improvements efforts have been ongoing since Initial Operational Capability. A series of independent Engineering Change Proposals provided improved performance in the way of faster processors in the guidance control unit an improved fuze/target detector (DSU-41) and smaller components. These improvements led to the AIM-9X Block II missile program in FY 2011.

Status

The AIM-9X Block II is scheduled to complete Operational Testing in FY 2014. More than 900 AIM-9X Block I All-Up Rounds and 350 Block I Captive Air Training Missiles have been delivered to the Department of the Navy. The AIM-9X Block II procurement began in FY 2011 and in early FY 2014 was in operational test. AIM-9X Block III is in development.

Developers

Raytheon — Tucson, Arizona, USA

AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM)

Description

The AIM-120 AMRAAM is an all-weather, all-environment, radar-guided missile developed by the Air Force and Navy. The missile is deployed on the F/A-18A+/C/D *Hornet*, F/A-18E/F *Super Hornet*, and EA-18G *Growler* and will be deployed on F-35 *Lightning II* Joint Strike Fighter aircraft. Entering service in September 1993, AMRAAM has evolved to maintain air superiority through Pre-Planned Product Improvement programs. This modernization plan includes clipped wings for internal carriage, a propulsion enhancement program, increased warhead lethality, and enhanced Electronic Counter-Countermeasures capabilities through hardware and software upgrades. Additionally, the missile has improved capabilities against low- and high-altitude targets in an advancing threat environment. AIM-120C7 completed production in FY 2008 and AIM-120D production began. With the "sundown" of the AIM-7 Sparrow missile, AMRAAM will be the Services' sole Medium/Beyond Visual Range (M/BVR) missile.

Status

The AIM-120C7 missile variant reached Initial Operational Capability (IOC) in FY 2008. The AIM-120D is in Operational Test in early FY 2014. AIM-120D IOC is scheduled for FY 2014.

Developers

Raytheon — Tucson, Arizona, USA

GBU-31/32/38 Joint Direct-Attack Munition (JDAM) / GBU-54 Laser JDAM

Description

The JDAM is an Air Force-led joint program for a Global Positioning System (GPS)-aided, Inertial Navigation System (INS) guidance kit to improve the precision of existing 500-pound, 1,000-pound, and 2,000-pound general-purpose and penetrator bombs in all weather conditions. JDAM addresses a broad spectrum of fixed and re-locatable targets at medium-range and releasing aircraft at high altitudes. The weapon is autonomous, all weather, and able to be employed against pre-planned targets or targets of opportunity. This weapon system has proven to be a true force multiplier, allowing a single aircraft to attack multiple targets from a single release point, and has proven its value during operations in Iraq, Kosovo, and Afghanistan. In September 2006, the Departments of Navy and Air Force put in place a low-cost, non-developmental enhancement to GBU-38 (500-pound) to address moving targets. Open competition and source selection completed in February 2010 and the contract was awarded to Boeing for a version of Laser JDAM (LJDAM) that provides a Direct-Attack Moving Target Capability (DAMTC). LJDAM (GBU-54) is a 500-pound dual-mode weapon that couples the GPS/INS precision of the JDAM and laser-designated accuracy of the LGB into a single weapon. LJDAM also provides added capability and flexibility to the Fleet's existing inventory of precision-guided munitions to satisfy the ground moving-target capability gap.

Status

LRIP for the 2,000-pound kits began in FY 1997, and Milestone III was reached in FY 2001. The 1,000-pound JDAM kit reached Initial Operational Capability (IOC) in FY 2002, and IOC for the 500-pound weapon occurred during the second quarter of FY 2005. LJDAM reached IOC in FY 2012.

Developers

Boeing	St. Louis, Missouri, USA
Lockheed Martin	Bethesda, Maryland, USA

Paveway II (GBU-10/12/16) LGB/Dual-Mode LGB / Paveway III (GBU-24) Laser-Guided Bomb (LGB)

Description

The Paveway II/III Laser-Guided Bomb program is an Air Force-led joint effort with Navy. LGBs include GBU-10, -12, and -16, using Mk 80/BLU series general-purpose (GP) bomb bodies, and GBU-24, which uses the BLU-109 bomb body with state-of-the-art guidance and control features. GBU-12 is a 500-pound class weapon; GBU-16 is a 1,000-pound class weapon; and GBU-10 is a 2,000-pound class weapon. An LGB has a Mk 80/BLU-series warhead fitted with a laser-guidance kit and computer control group mounted on the bomb nose. Legacy LGBs will remain in the inventory until at least FY 2020. The Dual-Mode LGB (DMLGB) retrofits legacy LGBs through conversion to a dual-mode configu-

ration using common components. This provides increased flexibility to the warfighter by combining proven laser terminal guidance technology with the all-weather, fire-and-forget capability of Inertial Navigation System/Global Positioning System. The DMLGB reached Initial Operational Capability in September 2007 on the AV-8B *Harrier II+* and F/A-18 *Hornet/Super Hornet* aircraft.

Status

Approximately 7,000 DMLGB Kits have been procured. No future funding for DMLGB is planned with the development of the dual-mode Laser Joint Direct Attack Munition (LJDAM).

Developers

Raytheon	Tucson, Arizona, USA
Lockheed Martin	Bethesda, Maryland, USA

AVIATION SENSORS

ALR-67(V)3 Advanced Special Receiver (RWR)

Description

The ALR-67(V)3 will meet Navy requirements through the year 2020. It enables the Navy F/A-18 family of aircraft to detect threat radar emissions, enhancing aircrew situational awareness and aircraft survivability.

Status

The ALR-67(V)3 program successfully completed Engineering and Manufacturing Development phase and operational testing in 1999 and ended full-rate production in FY 2013. Production quantities will eventually outfit all F/A-18 *Hornet/Super Hornet* aircraft.

Developers

Raytheon	Goleta, California, USA
Arete Associates	Tucson, Arizona, USA

APG-79 Active Electronically Scanned Array (AESA) Radar System

Description

The APG-79 AESA Phase I upgrade provides multi-mode function flexibility while enhancing performance in the air-to-air arena (including cruise missile defense) as well as the air-to-ground arena. The Phase II upgrade provides enhanced performance in hostile electronic countermeasure environments and provides significant electronic warfare improvements. Growth provisions will allow for future reconnaissance capability through the use of synthetic aperture radar technology and improved hardware and software. The APG-79 AESA radar is installed on Block II F/A-18E/F *Super Hornet* and all EA-18G *Growler* aircraft.

Status

The APG-79 completed subcontractor competition in November 1999, the Engineering and Manufacturing Development contract was awarded in February 2001, and the radar achieved Initial Operational Capability in 2007. The APG-79 AESA program of record is for 550 systems. AESA Milestone C and Low-Rate Initial Production approvals were received in January 2004, for initial delivery with Lot 27 *Super Hornets* in FY 2005. Full Rate Production was achieved in June 2007, following completion of the Initial Operational Test and Evaluation in December 2006. The first deployment of the AESA system was with VFA-22 in 2008. Retrofit installations into Block II Lot 26-29 F/A-18E/Fs began in 2013.

Developers

Boeing	St. Louis, Missouri, USA
Raytheon	El Segundo, California, USA

ASQ-228 Advanced Targeting Forward-Looking Infrared (ATFLIR) Sensor

Description

The ATFLIR provides the F/A-18A+/C/E/F *Hornet* and *Super Hornet* aircraft with a significantly enhanced capability to detect, track, and attack air and ground targets, compared to the legacy AAS-38/46 NITEHAWK Targeting Forward-Looking Infrared (FLIR) system. Laser-guided and Global Positioning System standoff weapons systems and higher-altitude attack profiles require the improved performance of the ATFLIR. The ATFLIR provides a significant improvement in operational effectiveness to support precision-strike mission requirements. Improved reliability and maintainability increase operational availability while reducing total ownership costs. The ATFLIR consists of a mid-wave FLIR and electro-optical sensor, laser spot tracker, and a tactical laser for designation and ranging. Improvements to the ATFLIR include the addition of an infrared marker, ROVER data link, and moving target track improvements.

Status

ATFLIR completed Phase I Operational Test and Evaluation in September 2003 and was determined to be operationally suitable and effective and was recommended for further fleet introduction. ATFLIR achieved Initial Operational Capability in September 2003 and has demonstrated its combat capability during *Operations Iraqi Freedom* and *Enduring Freedom*. The ATFLIR production contract is complete with a program of record of 410 pods.

Developers

Boeing	St. Louis, Missouri, USA
Raytheon	El Segundo, California, USA

AVIATION EQUIPMENT AND SYSTEMS

AAQ-24 Department of the Navy Large Aircraft Infrared Countermeasures (DoN LAIRCM)

Description

The AAQ-24(V) 25, DoN LAIRCM System combines advanced, two-color infrared missile warning and directed laser countermeasures to defeat shoulder-launched missiles. The system is being deployed on Marine Corps CH-53E *Super Stallion* and CH-46E *Sea Knight* assault helicopters to meet the Marine Corps urgent need for a state-of-the-art, reliable, aircraft carrier- and land-based missile-warning system (MWS) and IR countermeasure. The DoN LAIRCM system consists of five major components: IR MWS sensors; a dedicated processor; a Control Indicator Unit (CIU) for cockpit display; and Guardian Laser Tracker Assemblies (GLTA) consisting of a four-axis stabilized gimbaled system, a Fine Track Sensor (FTS), and a ViperTM laser. The Naval Air Systems Command began DoN LAIRCM integration on Navy C-40 Clipper and USMC KC-130J *Hercules* platforms in FY 2012. The program will complete the Advanced Threat Warning (ATW) upgrade in FY 2013, which increases MWS performance and adds laser warning and hostile-fire warning to address high priority threats and enhance overall survivability. The DoN LAIRCM Program Office works closely with its counterpart Air Force program to leverage contracts, test and evaluation, and sustainment efforts.

Status

DoN LAIRCM Initial Operational Capability (IOC) was achieved in May 2009 and a Full Rate Production decision was approved in January 2010. The program is in Full-Rate Production. Advanced Threat Warning Operational Test and Evaluation began in FY 2013; fleet delivery begins in FY 2014; and IOC is slated for FY 2014.

Developers

Northrop Grumman Rolling Meadows, Illinois, USA

ALQ-214 Integrated Defensive Electronic Counter-Measures (IDECM)

Description

The IDECM system is employed on the F/A-18 series *Hornets* and used to defend the host aircraft against radar-guided surface-to-air missile (SAM) systems and air-to-air missile systems. Through either a towed decoy or several onboard transmitters, the ALQ-214 produces complex waveform radar jamming that defeats advanced SAM systems.

Status

IDECM has been developed in three phases: (1) ALQ-165 On Board Jammer and ALE-50 towed decoy (Initial Operational Capability in FY 2002); (2) ALQ-214 On Board Jammer and ALE-50 towed decoy (IOC FY 2004); and (3) ALQ-214 On Board Jammer and ALE-55 Fiber Optic

Towed Decoy (IOC FY 2011). The ALQ-214 and ALE-50 (towed decoy) combination is in full-rate production, and the ALE-55 Fiber Optic Towed Decoy entered Full Rate Production in July 2011. IDECM is entering a fourth phase with development of the Block 4 ALQ-214 On Board Jammer for the F/A-18C/D/E/F *Hornet/Super Hornet* aircraft, which will reach IOC in FY 2015.

Developers

BAE Systems	Nashua, New Hampshire, USA
ITT	Clifton, New Jersey, USA

Joint and Allied Threat Awareness System (JATAS)

Description

JATAS is an advanced missile-warning system designed to replace the legacy AAR-47(V) Missile-Warning System and increase the survivability of Marine Corps and Navy tilt-rotor and rotary-wing aircraft against infrared (IR) threats. The system will provide aircrew with warnings of laser-enabled weapon systems such as range finders, illuminators, and beam riders. JATAS will interface with the in-service ALE-47 Countermeasures Dispensing System, APR-39 Radar Warning Receiver, Department of the Navy Large Aircraft Infrared Countermeasure (LAIRCM) system, and other compatible Directed Infrared Countermeasures (DIRCM) systems as part of an integrated electronic countermeasures response to attacking IR missiles. Additionally, JATAS will be upgradeable to provide Hostile Fire Indication (HFI) of small arms, rockets, and other unguided threats. JATAS will be deployed on the MV-22B *Osprey* (lead platform) tilt-rotor aircraft and AH-1Z, UH-1Y, and MH-60R/S helicopters. In accordance with the approved JATAS Acquisition Strategy, JATAS will be developed in two increments. Increment I, Phase I includes the missile warning and laser warning capabilities. Increment I, Phase II will add HFI capability against evolving threats during engineering and manufacturing development, if technology maturity permits. Increment II, when future technology advancements and funding permit, will develop HFI capability against Type II threats.

Status

JATAS is in Engineering and Manufacturing Development phase with MV-22B Initial Operational Capability scheduled for FY 2017.

Developers

ATK	Clearwater, Florida, USA
ITT	Clifton, New Jersey, USA

Joint Mission Planning Systems (JMPS)

Description

JMPS is the core of the Naval Mission Planning Systems (NavMPS) portfolio. JMPS enables weapon system employment by providing the information, automated tools and decision aids needed to plan missions; to load mission data into aircraft, weapons, sensors and avionics systems; and to conduct post-mission analysis. Navy and Marine Corps aircrew use JMPS for mission planning at different classification levels for a variety of Navy/Marine Corps aviation platforms and air-launched weapons. JMPS software is fielded as a platform-tailored mission planning environment that combines a common JMPS framework with NavMPS applications (e.g., WASP and TOPSCENE) and components that support platform-specific capabilities and tactical missions. JMPS improves on legacy mission planning system capabilities, increases commonality between platforms, and integrates new technologies and algorithms to support evolving platform capabilities and interoperability requirements.

Status

JMPS is fielded in approximately 40 aircraft type/model/series: all F/A-18 variants, EA-18G, EA-6B, AV-8B MV-22B, C-2A, E-2C/D, P-3C, EP-3E, Navy helicopters (MH-53E, HH-60H, SH-60B/F, MH-60R/S); Marine helicopters (AH-1W/Z, UH-1N/Y, CH-46E, CH-53E, VH-3D, VH-60N); and Naval Aviation training aircraft. Future JMPS platforms include the CH-53K helicopter and MQ-4C *Triton* Unmanned Aerial System. JMPS was designated the single MPS for Naval Aviation in 2006, replacing legacy, platform-unique MPS. Upgraded platform-tailored JMPS MPEs with a new JMPS framework and Windows 7 operating system will begin fielding in 2014 to comply with DoD Information Assurance mandates. In 2015, JMPS will begin transitioning from a 32- to a 64-bit architecture to meet increasing memory and processing requirements. In the near future, the JMPS program will also field Electronic Kneeboard devices to aircrew for in-flight planning and mission execution of warfighting requirements, as well as to meet paperless cockpit initiatives.

Developers

BAE Systems	Rancho Bernardo, California, USA
DCS Corporation	Lexington Park, Maryland, USA
Northrup Grumman	San Pedro, California, USA

Military Flight Operations Quality Assurance (MFOQA)

Description

MFOQA is knowledge-management process using data collected during flight to conduct post-flight analysis of aircrew and aircraft systems performance. MFOQA requires no additional equipment to be mounted on the aircraft platform and no additional tasking is added to the aircrew during flight. After each flight event, the aircrew can remove the data-collection card, take it to the squadron ready room, and load in the data to squadron computers. Applying MFOQA software already loaded in the computer, the aircrew can replay the flight in animation, noting geographic position, instrument readings, and aircraft performance parameters. In addition, maintenance personnel can perform diagnostic analysis of the aircraft systems, aircrews can self-evaluate their performance, and squadron leadership can review and counsel on flight procedures and safety and training issues. The ultimate payoff is increased readiness through improved safety, better training, and faster maintenance troubleshooting. Flight operations quality assurance has been used in the commercial aviation industry for years. Surveys from the airline industry have yielded high praise for the process and benefits to the Navy's Maintenance, Operations, Safety, and Training (MOST) paradigm.

Status

MFOQA completed Milestone B in the first quarter 2007 and is scheduled for Milestone C in the second quarter of FY 2014, with Initial Operational Capability shortly thereafter. The Navy plan will implement MFOQA capability for 22 Type/Model/Series aircraft over a phased approach. The lead platforms are the F/A-18C/D/E/F *Hornet/Super Hornet* and the EA-18G *Growler* aircraft. Follow-on phases will provide MFOQA capability to the MH-60R/S Seahawk, MH/CH-53E/K heavy-lift helicopters, AH-1Z, and UH-1Y helicopters; the T-45 *Goshawk* jet trainer; and MV-22B Osprey tilt-rotor aircraft, with additional platforms to follow. Platform priorities are driven by several factors, including mishap rates, system architecture to support data collection, and fleet concerns.

Developers

Expected to be multiple sources following competition.
Partnering developers include Rockwell Collins, Northrop Grumman, SAIC.

SURFACE WARFARE

The U.S. Navy surface force accomplishes a range of missions that contribute to each of the Navy's core capabilities. Today's mix of surface combatants include fully integrated multi-mission guided-missile cruisers and destroyers, modular multi-role littoral combat ships, frigates, and patrol coastal ships. Together, these ships ensure the Navy can meet demands for high-and low-end surface warfare missions and tasks. Operating forward, these ships provide credible presence to stabilize key regions, conduct maritime security operations, and respond to man-made and natural disasters. If necessary, they can also provide offensive and defensive capabilities to help ensure U.S. joint forces can gain and sustain access to critical theaters to deter and defeat aggression and project power.

SURFACE SHIPS

CG 47 *Ticonderoga*-Class Aegis Guided-Missile Cruiser Modernization

Description

The *Ticonderoga*-class guided-missile cruisers provide multi-mission offensive and defensive capabilities and can operate independently or as part of carrier strike groups, expeditionary strike groups, and surface action groups in support of global operations. *Ticonderoga*-class cruisers have a combat system centered on the Aegis Weapon System and the SPY-1B/(B)V multi-function, phased-array radar. The combat system includes the Mk 41 Vertical Launching System that employs Standard Missile surface-to-air missiles, Tomahawk land-attack cruise missiles, advanced undersea and surface warfare systems, embarked sea-control helicopters, and robust command, control, and communications systems in a potent, multi-mission warship. The Cruiser Modernization program includes hull, mechanical, and electrical upgrades as well as improved quality of life, mission-life extension, integrated ship's control, all-electric auxiliaries, and weight and moment modifications. Combat systems upgrades include an open-architecture computing environment. Specific improvements include upgrades in air dominance with Cooperative Engagement Capability, SPY radar upgrades, maritime force-protection upgrades with the Close-In Weapon System Block 1B, Evolved SeaSparrow Missile, Nulka decoy and SPQ-9B radar, and the SQQ-89A(V)15 anti-submarine warfare suite. Open architecture cruiser modernization warfighting improvements will extend the Aegis Weapon System's capabilities against projected threats well into the 21st Century.

Status

Combat systems modernization commenced in FY 2008 with the USS Bunker Hill (CG 52). Seven ships have completed Advanced Capability Build (ACB) 08 combat systems modernization, and three have completed ACB-12 combat systems modernization.

Developers

Huntington Ingalls Industries	
Ingalls Shipbuilding	Pascagoula, Mississippi, USA
Lockheed Martin	Moorestown, New Jersey, USA

DDG 51 *Arleigh Burke*-Class Aegis Guided-Missile Destroyer

Description

The *Arleigh Burke*-class guided-missile destroyers combat system is centered on the Aegis Weapon System and the SPY-1D(V) multi-function, phased-array radar. The combat system includes the Mk 41 Vertical Launching System, an advanced anti-submarine warfare system, advanced anti-air warfare missiles, and Tomahawk land-attack cruise missiles. Incorporating all-steel construction and gas turbine propulsion, DDG 51 destroyers provide multi-mission offensive and defensive capability, oper-

ating independently or as part of a carrier strike group, surface action group, or expeditionary strike group. Flight IIA variants incorporate facilities to support two embarked helicopters, significantly enhancing the ship's sea-control capability. A Flight III variant, which will incorporate the advanced Air and Missile Defense Radar (AMDR), is in development. Studies are ongoing to identify additional technology insertions to improve capability in other warfare area missions for Flight III.

Status

The USS Michael Murphy (DDG 112) commissioned in October 2012 and completed the original DDG 51 acquisition program. DDG 112 is fitted with Aegis combat system Baseline 7 Phase 1R, which incorporates Cooperative Engagement Capability, Evolved SeaSparrow Missile, improved SPY-1D(V) radar, and an open-architecture combat system using commercially developed processors and display equipment. The DDG 51 line was restarted in FY 2010 to continue production of this highly capable platform. Contracts for four Flight IIA ships were awarded from FY 2010 through FY 2012. A multi-year contract was awarded for DDG 51s in FY 2013 through FY 2017 on June 2013. This contract is for ships in the Flight IIA configuration. The Navy intends to modify these contracts via Engineering Change Proposals to the DDG Flight III configuration starting in FY 2016. The Flight III configuration will include incorporation of the AMDR, power and cooling enhancements to support AMDR, and additional technology insertions to improve capability and life cycle costs in other warfare area missions.

Developers

General Dynamics Bath Iron Works	Bath, Maine, USA
Huntington Ingalls Industries	
Ingalls Shipbuilding	Pascagoula, Mississippi, USA
Lockheed Martin	Moorestown, New Jersey, USA

DDG 51 *Arleigh Burke*-Class Aegis Guided-Missile Destroyer Modernization

Description

Arleigh Burke-class guided-missile destroyers commenced mid-life modernization in FY 2010 with DDGs 51 and 53. The program was originally accomplished in two phases. The first phase concentrated on hull, mechanical, and electrical (HM&E) systems and included new gigabit Ethernet connectivity in the engineering plant, a Digital Video Surveillance System, an Integrated Bridge System, an advanced galley, and other habitability and manpower-reduction modifications. A complete open-architecture computing environment is the foundation for warfighting improvements in the second phase of the modernization for each ship. The upgrade plan consists of an improved Multi-Mission Signal Processor, which integrates air and ballistic missile defense capabilities, and enhancements improving radar performance in the littoral regions.

Upon the completion of the modernization program, the ships will have the following weapons and sensors: Cooperative Engagement Capability; Evolved SeaSparrow Missile; Close-In Weapon System Block 1B; Surface Electronic Warfare Improvement Program; and Nulka decoys. The *Arleigh Burke*-class Mk 41 Vertical Launching System is upgraded to support SM-3 and newer variants of the Standard Missile family. These two phases are accomplished on each ship approximately two years apart. Modernized DDG 51-class guided-missile destroyers will continue to provide multi-mission offensive and defensive capabilities with the added benefit of sea-based ballistic missile defense (BMD).

Status

The HM&E modernization modifications have been designed into the most recent new-construction *Arleigh Burke*-class destroyers. Incorporating modernization design in new construction optimizes risk reduction and proof of alteration in the builder's yards, reducing overall risk in the modernization program. DDG Modernization initially concentrates on the Flight I and II ships (hulls 51-78), but is intended as a modernization program for the entire class. DDG 53 has completed the first Advanced Capability Build (ACB-12/BMD 5.0) process of providing software upgrades for combat systems modernization.

Developers

General Dynamics Bath Iron Works	Bath, Maine, USA
Lockheed Martin	Moorestown, New Jersey, USA

DDG 1000 *Zumwalt*-Class 21st-Century Destroyer

Description

The DDG 1000 *Zumwalt*-class guided-missile destroyer is an optimally crewed, multi-mission surface combatant tailored for land attack and littoral dominance. This advanced warship will provide offensive, distributed, and precision fires in support of forces ashore and will provide a credible forward naval presence while operating independently or as an integral part of naval, joint or combined expeditionary strike forces. To ensure effective operations in the littorals, it will incorporate signature reduction, active and passive self-defense systems, and enhanced survivability features. It will field an undersea warfare suite capable of in-stride mine avoidance, as well as robust self-defense systems to defeat littoral submarine threats, next-generation anti-ship cruise missiles, and small boats. Additionally, it will provide valuable lessons in advanced technology, such as the integrated power system and advanced survivability features, which can be incorporated into other ship classes.

Status

Zumwalt (DDG 1000) fabrication commenced in February 2009, and the ship is scheduled to deliver in FY 2014 and reach Initial Operational Capability in FY 2016. At the start of fabrication,

detail design was more than 80 percent complete and surpassed any previous surface combatant in design fidelity. Detail design is now 100 percent complete. Zumwalt (DDG 1000) was christened in FY 2014. Michael Monsoor (DDG 1001) fabrication commenced in February 2010; as of early FY 2014 the physical progress is greater than 70 percent complete, and the ship is scheduled to deliver in FY 2016 with sail away in FY 2017. Fabrication of Lyndon B. Johnson (DDG 1002) commenced in April 2012, and the ship is scheduled to deliver in FY 2018 with sail away in FY 2019. General Dynamics and Huntington Ingalls Industries are building the three-ship DDG 1000 class, with final assembly conducted at General Dynamics Bath Iron Works.

Developers

BAE Systems	Minneapolis, Minnesota, USA
General Dynamics Bath Iron Works	Bath, Maine, USA
Huntington Ingalls Industries	
Ingalls Shipbuilding	Pascagoula, Mississippi, USA
Raytheon Systems	Sudbury, Massachusetts, USA

FFG 7 *Oliver Hazard Perry*-Class Guided-Missile Frigate Modernization

Description

Oliver Hazard Perry-class frigates are capable of operating as integral parts of carrier strike groups or surface action groups. They are primarily used today to conduct maritime interception operations, presence missions, and counter-drug operations. A total of 55 *Perry*-class ships were built; 51 for the U.S. Navy and four for the Royal Australian Navy. Of the 51 ships built for the United States, 15 remain in active commissioned service in early FY 2014.

Status

Oliver Hazard Perry–class frigates completed modernization in FY 2012. Improvements assist the class in reaching its 30-year expected service life, correcting the most significant class maintenance and obsolescence issues, which included replacing: four obsolete ship-service diesel generators (SSDG) with commercial off-the shelf (COTS) SSDGs; obsolete evaporators with COTS reverse-osmosis units; and track-way boat davits with COTS slewing arm davits. Other major hull, mechanical, and electrical alterations have included ventilation modifications and number-three auxiliary machinery room fire-fighting sprinkler modifications.

Developers

General Dynamics Bath Iron Works	Bath, Maine, USA

Littoral Combat Ship (LCS)

Description

The Littoral Combat Ship (LCS) is a fast, agile, shallow-drafted and networked surface combatant optimized for warfighting in the highly trafficked littoral (near-shore) regions of the world. Designed to address warfighting capability gaps against asymmetric anti-access threats, LCS will play a vital role in American maritime security, eventually comprising about one-third of the Navy's future surface combatant fleet. Through its innovative design, LCS can be reconfigured for surface warfare (SUW), anti-submarine warfare (ASW), and mine countermeasures (MCM). This versatility enables Navy to provide warfighters with the most capable, cost-effective solutions to gain, sustain, and exploit littoral maritime supremacy.

Designed with ground-breaking modularity, there are two classes of LCS: the *Freedom* class (all odd-numbered) and the Independence class (all even-numbered ships). The *Freedom* class is a steel semi-planing monohull with an aluminum superstructure, constructed by Lockheed Martin in Marinette Marine Corporation's shipyard in Marinette, Wisconsin. The Independence class is an aluminum trimaran, constructed by Austal USA (formerly teamed with General Dynamics) in Mobile, Alabama. Both ship classes are designed with an open architecture and capable of employing each of the three interchangeable Mission Packages. The ship's open architecture allows for the rapid upgrade of weapon systems and sensors without having to make expensive ship modifications, or taking the ship offline for extended periods of time.

Status

Begun in February 2002, the LCS program represents a significant reduction in time to design, build, and acquire ships when compared to any previous Navy ship class. In May 2004, the Navy awarded two contract options to Lockheed Martin and General Dynamics/Austal to build the first research-and-development LCS ships. Through highly effective competition between industry bidders in 2009, the LCS program created an opportunity for significant savings with a fixed-price dual-block buy of 20 LCS (ten of each class) through FY 2015.

Altogether, in early FY 2014 the Navy has 24 LCS (12 of each class) either at sea, under construction, or under contract. LCS 1-3 have been commissioned and are home-ported in San Diego, California. The USS Coronado (LCS 4) will be commissioned in April 2014. LCS 5-9 are under construction.

In 2010, the USS Freedom (LCS 1) conducted a successful deployment to the U.S. Southern Command area of operations. In 2013, Freedom executed its first-ever overseas-based deployment to the Western Pacific. Operating from Singapore's Changi Naval Base, Freedom participated in maritime security exercises with regional partners (Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, and Thailand). This deployment provided the Navy the opportunity to evaluate LCS manning, training, maintenance,

and logistics concepts in an overseas operational environment. The Navy plans to incorporate the lessons learned from Freedom's deployment to improve production and deliver increased cost-efficiencies on future ships.

Developers

Lockheed Martin and Marinette Marine	Marinette, Wisconsin, USA
Austal USA	Mobile, Alabama, USA

PC 1 *Cyclone*-Class Patrol Coastal Modernization Program

Description

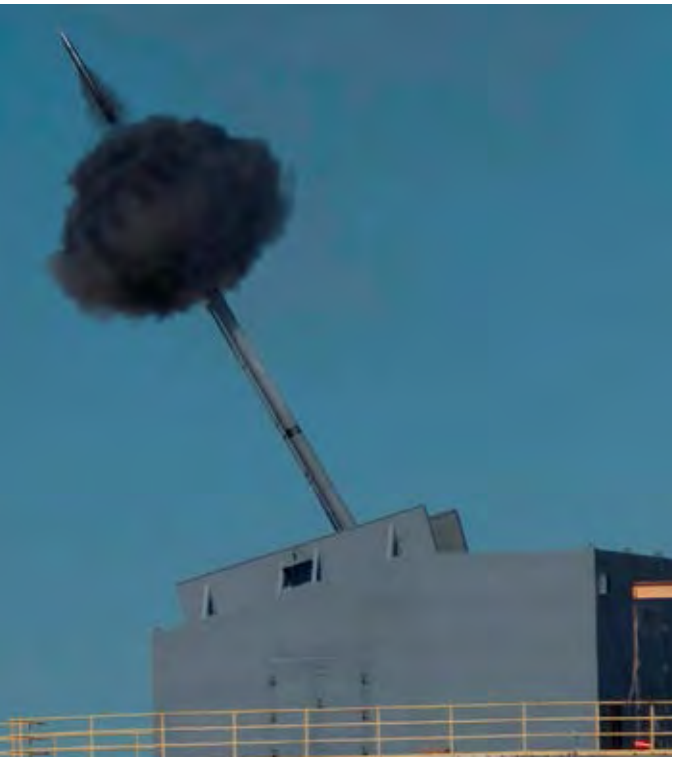
The *Cyclone*-class Patrol Coastal ships are essential for conducting theater security cooperation tasks, maritime security operations, and intelligence, surveillance, and reconnaissance. PCs are uniquely suited to operating with maritime partner navies, particularly in the green-water/brown-water "seam." Fourteen *Cyclone*-class ships were built; 13 are operating in the Navy, and one was transferred to the Philippine navy in 2004. The PC Modernization improvements correct the most significant maintenance and obsolescence issues and will extend the life of the class by 15 years, to a 30-year expected service life. The program supports significant alterations, such as a main propulsion diesel engine pool and upgrading diesel generators and reverse-osmosis units. Additional hull, mechanical, and electrical modifications and updates to the weapons systems and C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) suite are also included. As part of the Navy's Counter-Swarm Strategy, for example, a 7.62mm coaxial mount Gatling gun is integrated into the forward and aft Mk 38 Mod 2 25mm electro-optical/infrared machine gun system to augment the PCs' surface warfare capabilities for layered self-defense. In addition to the Mk 38 Mod 2 upgrade, the Griffin missile system installation is planned for all ten PCs to be deployed to Bahrain.

Status

The 13-ship *Cyclone*-class modernization program commenced in FY 2008; it is fully funded and scheduled for completion by FY 2017. Eight PCs are forward deployed to Bahrain; the remaining five PCs are home-ported in Little Creek, Virginia. The Navy plans to forward deploy an additional two PCs to Bahrain, bringing the total PC complement to ten by FY 2014. The forward and aft Mk 38 Mod 2 upgrade was completed on all ten Bahrain PCs, with the remaining three PCs planned for completion in FY 2017.

Developers

Bollinger Shipyards	Lockport, Louisiana, USA



SURFACE WEAPONS

Advanced Gun System (AGS)

Description

The 155mm (6-inch) Advanced Gun System is being installed in the three *Zumwalt* (DDG 1000)-class destroyers to provide precision, volume, and sustained fires in support of distributed joint and coalition forces ashore. The AGS is a fully integrated, automatic gun and magazine weapon system that will support the *Zumwalt*-class naval surface fire support mission. Each system will be capable of independently firing up to ten rounds per minute. The AGS program includes development of the global positioning system (GPS)-guided 155mm Long-Range Land-Attack Projectile (LRLAP), the first of a family of AGS munitions. The DDG 1000 AGS was designed to meet optimal manning and radar-signature requirements.

Status

AGS manufacturing is underway at three facilities—Cordova, Alabama; Fridley, Minnesota; and Louisville, Kentucky—and is meeting ship-production schedules. AGS magazines and guns have been installed on DDG 1000. For DDG 1001, two magazines have been delivered to General Dynamics Bath Iron Works and are being installed; the first and second guns are in storage and will be delivered and installed in FY 2014. DDG 1002's magazine and gun production is in progress to meet in-shipyard need dates: FY 2014 and FY 2015 (magazines) and FY 2017 and FY 2018 (guns).

Developers

BAE Systems	Minneapolis, Minnesota, USA

Long-Range Land-Attack Projectile (LRLAP)

Description

The Long-Range Land-Attack Projectile is a 155mm (6-inch) gun-launched, rocket-assisted guided projectile developed for the Advanced Gun System (AGS) on the three *Zumwalt* (DDG 1000)-class ships. The LRLAP is an advanced round that uses a global positioning system-based guidance system and a unitary warhead to hit land-based targets at long ranges. It is the only round that the AGS is designed to fire and the only gun-launched, extended-range guided-projectile program of record.

Status

LRLAP is completing the engineering, manufacturing, and development phase, with initial production in FY 2014. Development efforts are funded under the DDG 1000 research, development, test, and evaluation budget.

Developers

BAE Systems	Minneapolis, Minnesota, USA
Lockheed Martin Missile and Fire Control	Louisville, Kentucky, USA

Mk 15 Phalanx Close-In Weapon System (CIWS)

Description

The Mk 15 Mod 21-28 Phalanx Close-In Weapon System is an autonomous combat system that searches, detects, tracks (radar and electro-optic), and engages threats with a 20mm Gatling gun capable of firing 4,500 tungsten penetrator rounds per minute. Integral to ship self-defense and the anti-air warfare defense-in-depth concept, CIWS provides terminal defense against anti-ship missiles and high-speed aircraft penetrating other fleet defenses. Phalanx CIWS can operate autonomously or be integrated with a ship's combat system.

The Block 1B configuration provides expanded defense against asymmetric threats such as small, fast surface craft, slow-flying aircraft, and unmanned aerial vehicles through the addition of an integrated forward-looking infrared system. Block 1B also incorporates an optimized gun barrel (OGB) for tighter ordnance dispersion. Enhanced-lethality cartridges can be used with the OGB for improved target penetration.

Mk 15 Mod 29 CIWS is the Land-based Phalanx Weapon System (LPWS) configuration developed to counter rocket, artillery, and mortar attacks. LPWS uses the inherent capabilities of CIWS Block 1B mounted on a trailer with portable power-generation and cooling systems. The LPWS is deployed as part of the U.S. Army's Counter-Rocket, Artillery, and Mortar (C-RAM) program at several forward operating bases (FOBs), defending U.S. personnel and assets as part of *Operation Enduring Freedom*.

Mk 15 Mod 31 is the SeaRAM CIWS system. SeaRAM also is based on the Block 1B Phalanx configuration, with the gun subsystem replaced by an 11-round Rolling Airframe Missile (RAM) launcher. SeaRAM can be integrated with ship's combat system, but is capable of autonomously searching, detecting, tracking, and engaging threats with the RAM.

Status

More than 250 Mk 15 Phalanx CIWS systems are deployed in the Navy. By the end of FY 2015, all ships are scheduled to have Block 1B, and all ships are scheduled to complete an upgrade to Baseline 2 by the end of FY 2019. The Army has procured 45 LPWS systems for Forward Operating Base defense under the C-RAM program. SeaRAM CIWS systems have been installed on the USS Independence (LCS 2) and the USS Coronado (LCS 4).

Developers

Raytheon (Production/Depot)	Louisville, Kentucky, USA
Raytheon (Engineering)	Tucson, Arizona, USA

Mk 38 Mod 2 Stabilized 25mm Chain Gun

Description

The Mod 2 program upgrades the Mk 38 Mod 1 25mm chain gun by adding stabilization, remote operation, fire control, and an electro-optical sensor. These additions significantly expand the effective range, lethality, and nighttime capability of the weapon. The program reduces risk for surface ship self-defense by engaging asymmetric threats to ships at close range. It provides the capability to bridge current and future targeting and weapons technology in a close-range force protection environment, including protection in port, at anchor, transiting choke points, or while operating in restricted waters.

Status

The Navy initiated the Mk 38 Mod 2 program in 2003 to improve ship self-defense by developing and fielding a mid-term capability for surface ships that is simple, stabilized, and affordable. By early FY 2014, the program fielded 61 percent of the planned total of gun upgrades. The Mk 38 Mod 2 machine gun system is being permanently installed on aircraft carriers, guided-missile cruisers, guided-missile destroyers, guided-missile frigates, amphibious warfare ships (LHD, LHA, LPD, LSD), patrol coastal ships, and command ships (LCC). The Navy plans to expand Mk 38 fielding to submarine tenders as part of the Task Force Defense Initiative.

Developers

BAE Systems	Louisville, Kentucky, USA
Rafael USA, Inc.	Bethesda, Maryland

Mk 45 Mod 4 5-Inch/62-Caliber Gun System Upgrade

Description

The Mk 45 Mod 4 5-inch/62-caliber gun is a modification of the 5-inch/54-caliber gun with higher firing energies to support long-range munitions. The gun retains the functionality of the 5-inch guns, including ability to fire all existing 5-inch rounds. The modified design also improves maintenance procedures and provides enhanced anti-surface and anti-air warfare performance. Modifications include a longer (62-caliber) barrel, an ammunition recognition system, and a digital control system.

Status

The Mk 45 Mod 4 gun was added to the *Arleigh Burke* (DDG 51)-class of destroyers, starting with the USS Winston S. Churchill (DDG 81). Thirty destroyers and nine cruisers are equipped with the 5-inch/62 gun as of early 2014.

Developers

BAE Systems	Minneapolis, Minnesota, USA

Mk 54 Lightweight Torpedo (LWT)

Description

The Mk 54 Lightweight Torpedo is a modular upgrade to the lightweight torpedo inventory and adds the capability to counter quiet diesel-electric submarines operating in the littoral. Mk 54 LWT combines existing torpedo hardware and software from Mk 46, Mk 50, and Mk 48 Advanced Capability (ADCAP) programs with advanced digital commercial off-the-shelf electronics. The resulting Mk 54 LWT offers significantly improved shallow-water capability at reduced life-cycle costs. The Mk 54 LWT modernization plan will introduce new hardware and software updates providing stepped increases in probability of kill, while reducing life-cycle cost and allowing the torpedo to remain ahead of the evolving littoral submarine threat. Mk 54 is replacing the Mk 46 as the payload in the Vertical-Launch Anti-Submarine Rocket (VLA).

Status

Mk 54 torpedoes are being delivered for fleet use to meet the total munitions requirement. Mk 46 torpedo maintenance has been augmented to supplement LWT inventory while Mk 54 inventory is built up. The Mk 54 Block Upgrade is undergoing operational testing, with Initial Operational Capability (IOC) projected in FY 2014. The MK 54 VLA achieved IOC in March 2010. The Navy is planning to procure 600 MK 54 torpedoes from FY 2015 through FY 2019.

Developers

Raytheon	Mukilteo, Washington, USA

Mk 60 Griffin Missile System (GMS)

Description

The Griffin Missile System (GMS) combines a lightweight laser and global positioning system/inertial navigation system (GPS/INS) guided-missile system that has been adapted for use on forward-deployed *Cyclone* (PC 1)-class Patrol Coastal ships. The GMS was originally designed as an air-to-ground precision-engagement missile for U.S. Air Force MC-130 gunships, and was modified for employment on PCs to improve small-vessel engagement capacity as a Rapid Deployment Capability in support of fleet operational needs. The Griffin Block II is a 5.5-inch missile with a 13-pound blast-fragmentation warhead and semi-active laser seeker. The GMS uses the Brite Star II Electro-Optic Infrared Laser Designator sensor ball mounted on the PC's mast to provide target identification and illumination. GMS has proven effective against small vessel threats in Navy testing.

Status

At-sea testing completed in July 2013. The first four operational systems were installed on PCs in 2013. The remaining forward-deployed PCs will have the GMS installed by 2017.

Developers

Naval Surface Warfare Center	
Dahlgren Division	Dahlgren, Virginia, USA
Raytheon	Tucson, Arizona, USA

RGM/UGM-109E Tomahawk Land-Attack Missile (TLAM)

Description

Deployed on surface warships and attack and guided-missile submarines, Tomahawk Land-Attack Missile is the Department of Defense's premier, all-weather, long-range, subsonic land-attack cruise missile. The Block IV Tactical Tomahawk (TACTOM—RGM-109E/UGM-109E) preserves Tomahawk's long-range precision-strike capability while significantly increasing responsiveness and flexibility. TACTOM improvements include in-flight retargeting, the ability to loiter over the battlefield, in-flight missile health and status monitoring, and battle damage indication imagery providing a digital look-down snapshot of the battlefield (via a satellite data link). TACTOM also facilitates rapid mission planning and execution via Global Positioning System (GPS) onboard the launch platform and features improved anti-jam GPS. Future alternative payloads could include smart sub-munitions, a penetrator warhead, and a multiple-response warhead. Plans call for the Navy to procure more than 3,000 TACTOM missiles prior to program termination. TLAM Block III missiles will be retired from service by 2020.

Status

A full-rate production contract was signed in August 2004. It was Navy's first multi-year contract for TACTOM procurement, producing more than 1,500 missiles. This contract ended in FY 2008, and all missiles have been delivered. Tomahawk Block IV procurement in FY 2009 to FY 2011 was executed via firm, fixed-price contracts. The Navy will complete procuring TACTOM in FY 2015. A limited depot will be established in FY 2015 and a recertification depot in the FY 2019-2023 timeframe.

Developers

Raytheon — Tucson, Arizona, USA

RIM-7, MK57 NATO SeaSparrow Surface Missile System (NSSMS) and RIM-162 Evolved SeaSparrow Missile (ESSM)

Description

The Mk 57 NATO SeaSparrow Surface Missile System (NSSMS) and its associated RIM-7P NSSM or RIM-162 Evolved SeaSparrow Missile serves as the primary surface-to-air ship self-defense missile system. NSSMS is deployed on aircraft carriers, surface warships, and landing helicopter dock amphibious assault ships, and is being installed on the newest class of landing helicopter assault ships. The Mk 57 Target Acquisition System is a combined volume-search radar and control element that determines threat evaluation and weapon assignment.

A kinematic upgrade to the RIM-7P missile, the ESSM is the next-generation SeaSparrow missile that serves as a primary self-defense weapon on aircraft carriers and large-deck amphibious warships and provides layered-defense for cruisers and destroyers.

ESSM Block 1 upgrades include a more powerful rocket motor, tail control section for quick response on vertical launch system ships, upgraded warhead, and a quick-reaction electronic upgrade. Enhanced ESSM kinematics and warhead lethality leverage the robust RIM-7P guidance capability to provide increased operational effectiveness against high-speed, maneuvering, hardened anti-ship cruise missiles at greater intercept ranges than the RIM-7P. Operational in FY 2004, ESSM continues to be procured as part of the North Atlantic Treaty Organization (NATO) Sea-Sparrow Consortium involving ten NATO countries. In order to pace evolving threats, the next-generation ESSM Block 2 is being developed cooperatively by seven countries, replacing the missile guidance section with an active/semi-active dual-mode seeker.

Status

The NSSMS remains in production for America (LHA 6) and Gerald R. Ford (CVN 78). ESSM Block 1 is fielded on *Ticonderoga* (CG 47)-class cruisers, Flight IIA *Arleigh Burke*-class destroyers, and in-service aircraft carriers. It will be deployed on Zumwalt (DDG 1000) and LHD 6, 7, and 8, to be followed by the remaining cruisers, destroyers, and amphibious assault ships (LHDs) through the planned modernization program. By 2025, 114 Navy ships will be armed with ESSM. ESSM joint universal weapon link (JUWL) development is on track, and interrupted continuous wave illumination (ICWI) has already been incorporated. DDG 1000 and CVN 78 will require a unique variant of ESSM, incorporating both ICWI and JUWL. ESSM Block 2 development is in risk-reduction phase. ESSM Block 2 is anticipated to reach Milestone B in FY 2015 and achieve Initial Operational Capability in 2020.

Developers

Raytheon — Tucson, Arizona, USA

RIM-66C Standard Missile-2 Blocks III/IIIA/IIIB

Description

The RIM-66C Standard Missile (SM)-2 is the Navy's primary air-defense weapon. SM-2 Block III/IIIA/IIIB configurations are all-weather, ship-launched, medium-range, surface-to-air missiles in service with the Navy and 15 allied navies. SM-2 enables forward naval presence, littoral operations, and projecting and sustaining U.S. forces in anti-access and area-denied environments. SM-2 Block III/IIIA/IIIB missiles are launched from the Mk 41 Vertical Launching System (VLS) installed in Aegis cruisers and destroyers.

Block III features improved performance against low-altitude threats and optimizes the trajectory-shaping within the Aegis command guidance system by implementing shaping and fuse altimeter improvements. Block IIIA features improved performance and lethality against sea-skimming threats due to a new directional warhead and the addition of a moving-target-indicator fuse design. Block IIIB adds an infrared-guidance mode capability developed in the Missile Homing Improvement Program to improve performance in a stressing electronic countermeasure envi-

ronment. Blocks IIIA/IIIB will be the heart of the SM-2 inventory for the next 20 years. The latest generation of Block IIIB missiles includes a maneuverability upgrade (SM-2 Block IIIBw/MU2) to enhance Block IIIB performance against low-altitude, supersonic maneuvering threats.

Status

The SM-2 program is in the sustainment phase. The Navy has established a limited depot (FY 2013) and rocket motor regrain program (FY 2014) to maintain the inventory out to the 2030 timeframe. This will allow the SM-2 inventory to keep pace with Navy's 30-year shipbuilding plan, keep infrastructure in place to convert SM-2 Block IIIA missiles to the unique interrupted continuous wave illumination/joint universal weapon link (ICWI/JUWL) variant for the three *Zumwalt* (DDG 1000)-class warships, and support projected increases in fleet proficiency firings.

Developers

Raytheon Tucson, Arizona, USA

RIM-116A Rolling Airframe Missile (RAM)

Description

The RIM-116A Rolling Airframe Missile is a high rate-of-fire, low-cost system, based on the AIM-9 Sidewinder, designed to engage anti-ship cruise missiles (ASCMs). RAM is a five-inch diameter surface-to-air missile with passive dual-mode radio frequency/infrared (RF/IR) guidance and an active-optical proximity and contact fuse. RAM has minimal shipboard control systems and is autonomous after launch. Effective against a wide spectrum of existing threats, RAM Block 1 IR upgrade incorporates IR "all-the-way-homing" to improve performance against evolving passive and active ASCMs. Plans are for RAM to evolve and keep pace with emerging threats. RAM Block 2, in the System Development and Demonstration phase, will provide increased kinematic capability against highly maneuvering threats and improved RF detection against low probability of intercept threats. The RAM program is a cooperative partnership with Germany, and the Block 2 missile is being developed jointly (50/50) with Germany.

Status

As of early FY 2014, RAM is installed in the *Tarawa* (LHA 1)- and *Wasp* (LHD 1)-class amphibious assault ships, *Whidbey Island* (LSD 41)- and *Harpers Ferry* (LSD 49)-class dock landing ships, aircraft carriers, and *San Antonio* (LPD 17)-class landing platform dock ships. RAM is also installed on the USS Freedom (LCS 1), the Lockheed Martin variant of the Littoral Combat Ship (LCS). In 2001, the Navy submitted an Engineering Change Proposal to develop a SeaRAM configuration. SeaRAM removed the Phalanx Gun System from the Close-In Weapon System (CIWS) and incorporated an 11-round RAM missile launcher system. Modifying the Phalanx radar to detect low-elevation, low-radar cross-section threats at an increased range increased the battlespace. No missile modifications were required. General Dynamics selected SeaRAM as part of the combat system for the

Independence (LCS 2)-class warship. The Block 2 missile is in the second year of low-rate initial production and is scheduled to achieve Initial Operational Capability in FY 2014.

Developers

Raytheon	Tucson, Arizona, USA
RAMSYS GmbH	Ottobrunn, Germany

SM-6 Standard Missile 6 Extended-Range Active Missile (ERAM) Block I/II

Description

The Standard Missile 6 (SM-6) Extended-Range Active Missile (ERAM) is the U.S. Navy's next-generation extended-range anti-air warfare interceptor. The introduction of active-seeker technology to air defense in the Surface Fleet reduces the Aegis Weapon System's reliance on illuminators. It also provides improved performance against successive "stream" raids and targets by employing advanced characteristics such as enhanced maneuverability, low-radar cross-section, improved kinematics, and advanced electronic countermeasures. The SM-6 acquisition strategy is characterized as a low-risk development approach that leverages SM-2 Block IV/IVA program non-developmental items and Raytheon's Advanced Medium Range Air-to-Air Missile Phase 3 active seeker program from Naval Air Systems Command. The SM-6 missile will be fielded on in-service *Arleigh Burke* (DDG 51)-class destroyers and *Ticonderoga* (CG 47)-class cruisers.

Status

The Navy established the SM-6 Extended-Range Air Defense program in FY 2004. In March 2013, the Resources and Requirements Review Board directed a program of record increase from 1,200 missiles to 1,800. The SM-6 program inventory objective increase results from current fleet threat analysis and evolving mission sets, as well as anticipated new threats. The program improves fleet defense and ensures sufficient missile inventory is available. The SM-6 was authorized to enter into Full Rate Production in July 2013 and is expected to reach Initial Operational Capability in FY 2014.

Developers

Raytheon	Tucson, Arizona, USA

U.S. Coast Guard Navy-Type / Navy-Owned (NTNO) Program

Description

The Navy-Type / Navy-Owned Program provides new and in-service Coast Guard cutters with sensors, weapons, and communications capabilities needed to execute assigned naval warfare tasks and ensure interoperability with the Navy. Examples include the Mk 110 57mm naval gun system, the Mk 38 25mm machine gun system, and the SLQ-32 Surface Electronic Warfare Improvement Program, to name just a few of the more than 20 systems that comprise the NTNO program.

Status
In addition to supporting the Coast Guard's legacy fleet of more than 81 in-service platforms ranging from high- and medium-endurance cutters, to its patrol boat fleet, the NTNO program is an integral part of the Coast Guard's ongoing modernization efforts. As the Coast Guard fields the National Security Cutters, Fast Response Cutters, and Offshore Patrol Cutters, the NTNO program continues to provide the systems necessary to help ensure the interoperability and naval warfare mission readiness of the Coast Guard cutter fleet.

Developers
Multiple Sources

SURFACE SENSORS AND COMBAT SYSTEMS

Aegis Ashore

Description
On September 17, 2009, the President announced the plan to provide regional missile defense to U.S. deployed forces and allies called a Phased Adaptive Approach (PAA). The PAA tailors U.S. ballistic missile defense (BMD) capabilities to specific theater needs to enhance integrated regional missile defenses against medium-and intermediate-range ballistic missiles. Aegis Ashore is an adaptation of Navy's proven Aegis BMD capability and uses components of the Aegis Weapons System that are installed in modular containers and deployed to prepared sites of host nations, thus providing a shore-based BMD capability. The Department of Defense Missile Defense Agency (MDA) is the Aegis Ashore material developer and funds development, procurement, and installation of BMD systems, peripherals, and Standard Missile (SM-3) missiles. The Director, MDA is designated the Acquisition Executive for the U.S. Ballistic Missile Defense System, and in this capacity MDA exercises all source-selection and milestone decision authorities for all elements of the BMDS up to, but not including, production issues.

Status
The first Aegis Ashore site, Aegis Ashore Missile Defense Test Complex at Pacific Missile Range Facility, Kauai, Hawaii, will be completed in FY 2014. The first forward operating site in Romania will be operational in late 2015 with a second site in Poland operational by late 2018. The Naval Sea Systems Command and MDA established an Aegis Ashore Hybrid Program Office within the Aegis BMD Directorate, which is closely coordinating the efforts with Program Executive Office for Integrated Warfare Systems, which oversees Aegis Ashore development and deployment.

Developers

Black & Veatch Corporation	Overland Park, Kansas, USA
Carlson Technology, Inc.	Livonia, Michigan, USA
Gibbs & Cox, Inc.	Arlington, Virginia, USA
Lockheed Martin Maritime Sensors and Systems	Moorestown, New Jersey, USA

Aegis Combat System (ACS)

Description

The Aegis Combat System is a centralized, automated, command-and-control, and weapons control system. ACS integrates combat capabilities, developed in other Navy programs, into the *Ticonderoga* (CG 47)-class and *Arleigh Burke* (DDG 51)-class warships, providing effective capability to counter current and future air, surface, and sub-surface threats. ACS is an element of the Aegis Shipbuilding Acquisition Category (ACAT) I program of record.

Status

ACS has been in the Fleet since 1983 and continues to serve as the foundation platform for new capabilities, weapons, and sensor systems. The Aegis Modernization (AMOD) program is producing system upgrades via the Advanced Capability Build (ACB) process being implemented as part of the Cruiser and Destroyer Modernization, DDG 51 Restart, and DDG 51 Flight III programs to keep pace with evolving threats and challenging littoral environments.

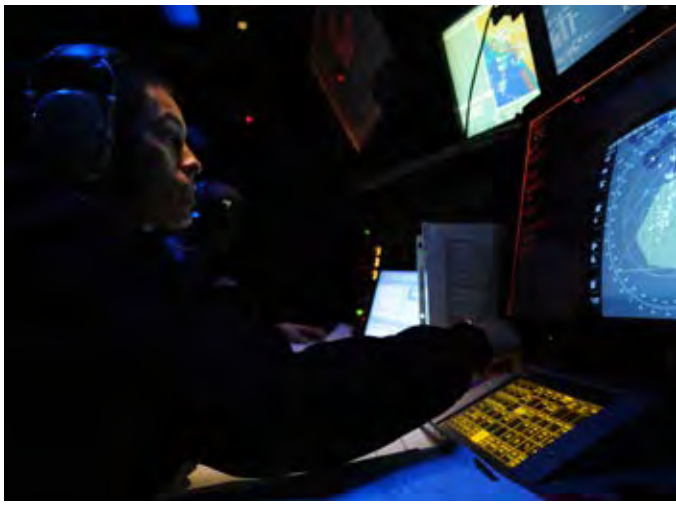
The first iteration of this process, ACB-08 / Technology Insertion (TI) 08, brought CGs 52 through 58 increased warfighting capabilities during modernizations that began in 2009. ACB-08 separated hardware from software, allowing for commercial-off-the-shelf computer processors, and re-uses elements of the Aegis Baseline 7.1R computer program code, while integrating improved system capabilities.

The ongoing Advanced Capability Build, ACB-12, has transitioned to Aegis Baseline 9 and brings increased warfighting capability with regard to Integrated Air and Missile Defense (IAMD), Naval Integrated Fire Control-Counter Air (NIFC-CA), the SM-6 missile, the Evolved SeaSparrow Missile (ESSM), Close-In Weapon System Block 1B, and Multi-Mission Signal Processor.

The follow-on to ACB-12 is ACB-16, which will integrate the following additional capabilities: Improved IAMD capability with new Standard Missile; SPQ-9B radar; MH-60R helicopter; Surface Electronic Warfare Improvement Program Block II with radar-designated decoy launch; and updates to Total Ship Training Capability (TSTC) training, interoperability, and C4I (command, control, communications, computers, and intelligence) capabilities.

Baseline 9 initiated a Common Source Library (CSL) program for Aegis and brought in the first third-party developed software element, the Track Manager/Track Server, as well as the competitively awarded Common Display System and Common Processor System. The CSL enables software reuse and commonality across all modernized and new-construction Aegis Combat System configurations. Specifically, the Aegis CSL allows for the use of common tactical software across four different Aegis configurations: air-defense cruisers; IAMD destroyers with integrated air and ballistic missile defense (BMD) capabilities; new-construction IAMD destroyers; and Aegis Ashore with integrated BMD capability.

ACBs are bringing new capabilities to existing ships in single packages vice the legacy method of installing capability improvements through individualized deliveries. The Navy awarded a contract



in March 2013 for an Aegis Combat System Engineering Agent, which will fully integrate these capabilities into the Aegis Combat System for maximum effectiveness. In addition, there will be greater commonality across ACBs. This will ultimately result in improved capability deliveries at a reduced cost.

Developers

Lockheed Martin Mission Systems and Training	Moorestown, New Jersey, USA
Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia, USA
Naval Surface Warfare Center, Port Hueneme	Port Hueneme, California, USA

Image courtesy of Raytheon.

Air and Missile Defense Radar (AMDR)

Description

The Air and Missile Defense Radar advanced radar system is being developed to fill capability gaps identified by the Maritime Air and Missile Defense of Joint Forces Initial Capabilities Document. AMDR is a multi-function, active-phased array radar capable of search, detection, and tracking of airborne missile targets and ballistic missile targets for engagement support. The AMDR suite consists of an S-band radar (AMDR-S), an X-band radar (AN/SPQ-9B for the first 12 shipsets), and a radar suite controller. The radar will be developed to support multiple ship classes, the first being the *Arleigh Burke* (DDG 51) Flight III warships. The multi-mission capability will be effective in air dominance of the battle space (area air defense) and defense against ballistic missiles. In addition to its integrated air and missile defense capability, AMDR will support requirements for surface warfare, anti-submarine warfare, and electronic warfare.

Status

AMDR is an ACAT 1D program with Milestone B approval and is currently in the Engineering and Manufacturing Development Phase. The Technology Development phase commenced in early FY 2011 and completed at the end of FY 2012. Milestone B was conducted in October 2013.

Developers

To be determined.

Littoral Combat Ship Mission Packages

Description

Unlike legacy surface combatants, Littoral Combat Ships (LCS) have interchangeable, rather than fixed, mission systems. Prioritizing payloads over platforms, LCS can be configured to fill three anti-access capability gaps: surface warfare (SUW); mine countermeasures (MCM); and anti-submarine warfare (ASW). This versatility gives the Navy the operational flexibility to meet changing warfighting requirements, as well as rapidly field upgrades, or incorporate new technology to meet emerging threats. A Mis-

sion Package (MP) consists of Mission Modules (MM), a Mission Package Detachment, and an Aviation Detachment (AVDET). The MM combines mission systems (vehicles, sensors, and communications and weapon systems), support containers, and support equipment.

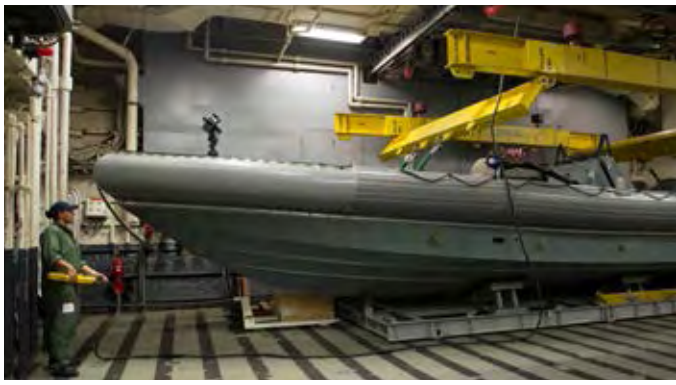
The SUW MP provides the ability to perform the full portfolio of maritime security operations while delivering effective firepower, including offensive and defensive capabilities against multiple groups of fast-attack-craft and fast-inshore-attack craft. The SUW MP consists of the Maritime Security Module (two 11m Rigid-Hull Inflatable Boats for Level 2 visit, board, search, and seizure), the Gun Mission Module (two Mk 46 30mm gun systems), an MH-60R Seahawk helicopter armed with Hellfire missiles, and a vertical-takeoff and landing tactical unmanned aerial vehicle (VTUAV). In the future, a Surface-to-Surface Missile Module will be added.

The MCM MP will provide capabilities to detect and neutralize mines throughout the water column using systems deployed by off-board manned and unmanned vehicles. The MCM MP consists of Remote Multi-Mission Vehicles equipped with the AQS-20A mine hunting sonar, an MH-60S helicopter equipped with ASQ-235 Airborne Mine Neutralization System or the AES Airborne Laser Mine Detection System, and a VTUAV with the Coastal Battlefield Reconnaissance and Analysis mine detection system. In the future the MCM MP will include an Unmanned Influence Sweep System and Knife Fish Unmanned Underwater Vehicle. By using off-board assets, the MCM MP will dramatically improve the speed an area can be searched and cleared of mines, while not putting the LCS and its crew at risk—a major improvement over existing legacy capabilities.

The ASW MP enables the LCS to conduct detect-to-engage operations against modern submarine threats. The package includes active and passive towed sonar arrays to conduct area search and high-value unit-escort missions, and a torpedo countermeasure system to enhance survivability in an ASW environment. ASW mission systems also include: the MH-60R helicopter with Airborne Low-Frequency Sonar, sonobuoys, and Mk 54 Lightweight Torpedo; the Lightweight Towed Torpedo Defense and Countermeasures Module; the SQR-20 Multi-Function Towed Array; and variable-depth sonar.

Status

The Phase II SUW MP was embarked on board the USS Freedom (LCS 1) in the Western Pacific in 2013. As of early FY 2014, four SUW MPs and three MCM MPs have been delivered. Initial delivery of the ASW MP is planned for FY 2016. Three phases of MCM MP Developmental Testing (DT) have been completed and Initial Operational Test and Evaluation (IOT&E) will begin in FY 2015. The second phase of the SUW MP DT began in September 2013. Technical Evaluation and IOT&E are on track to be conducted on the USS Fort Worth (LCS 3) in FY 2014.



Developers
Mission Package Development and Integration:
Northrop Grumman
Integrated Systems — Falls Church, Virginia, USA
Multiple suppliers.

Maritime Integrated Air and Missile Defense Planning System (MIPS)

Description
Maritime Integrated Air and Missile Defense Planning System is an operational-level Integrated Air and Missile Defense (IAMD) planning tool supporting the Joint Force Maritime Component Commander (JFMCC) staff in rapidly developing optimized courses of action for the deployment of Navy air and missile defense assets. MIPS provides the JFMCC an automated tool to allocate Navy IAMD resources effectively and assess operational risks in a timely manner. The MIPS output is an operational-level plan detailing optimized use of forces developed with the warfighter's knowledge and judgment. MIPS is deployed on selected warships and in the numbered fleet maritime operations centers.

Status
MIPS is undergoing technical refresh to replace legacy and obsolete hardware. The technical refresh will be followed by two software capability development efforts, MIPS Increment 1 and Increment 2. Both increments will include enhanced planning capabilities and capacity for IAMD as well as an improved interface between the Aegis Ballistic Missile Defense Mission Planner and the Command, Control, Battle Management, and Communications (C2BMC) System. MIPS Increment 1 will achieve Initial Operational Capability in FY 2014. The MIPS program was designated a Navy ACAT III acquisition program on February 11, 2011.

Developers
General Dynamics Advanced
Information Systems — Fairfax, Virginia, USA

Navigation Systems

Description
Navigation systems provide position, altitude, and timing information for use across all surface ships, aircraft carriers, and amphibious ships. The program consists of inertial navigators, gyrocompasses, speed logs, fathometers and Electronic Chart Display and Information System-Navy (ECDIS-N). In addition to supporting safety of navigation, shipboard navigation systems provide altitude information to Tomahawk land-attack cruise missiles and ballistic missile defense weapons systems.

Status
Modernization efforts are ongoing across the portfolio of navigation equipment. Legacy inertial navigators are being upgraded to the current standard of WSN-7/7B while development of the next generation of inertial navigation system is beginning. ECDIS-N systems are being fielded across the fleet to support navigation with electronic charts throughout the Navy.

Developers
Northrop Grumman
Sperry Marine — Charlottesville, Virginia, USA

Navy Aegis Ballistic Missile Defense (ABMD)

Description
Aegis ballistic missile defense includes modifications to the Aegis Weapons System by developing and upgrading the Standard Missile (SM-3) with its hit-to-kill kinetic warhead. This combination gives select Aegis cruisers and destroyers the capability to intercept short-, medium-, and intermediate-range ballistic missiles in the midcourse phase of exo-atmospheric trajectories. Additionally, Aegis BMD provides surveillance and tracking capability against long-range ballistic missile threats. Together, these capabilities contribute to robust defense-in-depth for U.S. and allied forces, critical political and military assets, population centers, and large geographic regions against the threat of ballistic missile attack. The Missile Defense Agency and the Navy initially deployed the Aegis BMD long-range surveillance and tracking capability as an element of the U.S. Ballistic Missile Defense System (BMDS) in October 2004. The Aegis BMD engagement capability was certified for operational use in August 2006.

Status
As of early FY 2014, 33 cruisers and destroyers have been modified to conduct BMD, with additional warships to be modified in the future. The Aegis BMD 3.6.1 program capability has been installed on 24 Aegis warships; BMD 4.0.1 has been installed on two cruisers; and BMD 4.0.2 has been installed on two destroyers. BMD ships have long-range surveillance and tracking capability to provide cueing in defense of the homeland, and a BMD engagement capability using the SM-3 missile to conduct active defense against short-to-intermediate-range ballistic missiles. The SM-2 Block IV inventory has been modified for the terminal ballistic-missile defense mission. This capability provides an endo-atmospheric, "lower-tier" capability, resulting in a more lethal, layered defense against enemy ballistic missiles. Navy and MDA are collaborating to provide an increased level of BMD capability for the Fleet by developing a capability upgrade to the Integrated Air and Missile Defense computer program for more efficient SM-3

employment. This will provide a more robust sea-based terminal-intercept program for improved lower-tier capability. The Aegis Modernization program will eventually provide BMD capability to additional Aegis destroyers.

Developers

Lockheed Martin Maritime Sensors and Systems	Moorestown, New Jersey, USA
Raytheon	Tucson, Arizona, USA

S-Band Volume Search Radar (VSR)

Description

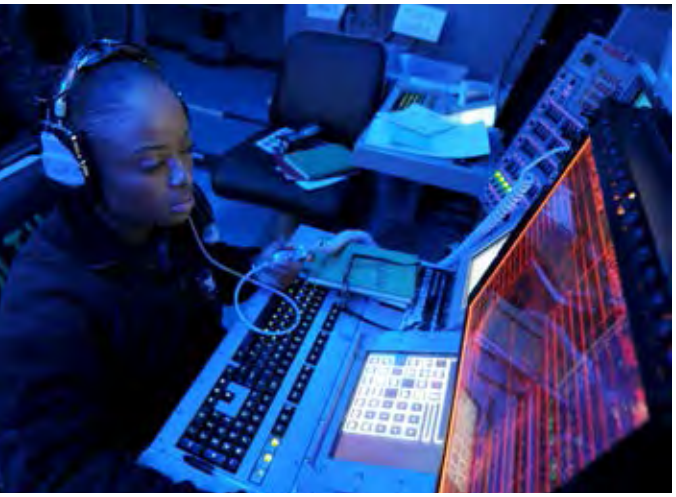
The Volume Search Radar (VSR) is an S-band active phased-array radar designed to meet all above-horizon detection and tracking requirements for 21st-Century ships without area air-defense missions, specifically the *Ford* (CVN 78)-class ships. VSR will provide long-range situational awareness with above-horizon detection and air control functionality, replacing in-service SPS-48E and SPS-49 radars. A non-rotating phased-array radar, VSR provides the requisite track revisit times to address fast, low/small, and high-diving missile threats, and provides cueing for the SPY-3 Multi-Function Radar (MFR) to execute tracking and fire control functions above the horizon.

Status

Along with the SPY-3 MFR, VSR underwent radar test and integration events that completed at the end of FY 2010. VSR production arrays are in construction and testing at Lockheed Martin facilities in Moorestown, New Jersey. VSR will be deployed with SPY-3 MFR, as an integrated radar suite, referred to as the Dual-Band Radar (DBR) on CVN 78, scheduled to deliver in FY 2015.

Developers

Lockheed Martin Maritime Sensors and Systems	Moorestown, New Jersey, USA
Raytheon Electronic Systems	Sudbury, Massachusetts, USA



Ship-Self Defense System (SSDS)

Description

The Ship Self Defense System is a centralized, automated, command-and-control system for non-Aegis warships. An upgrade of the Advanced Combat Direction System, SSDS provides an integrated combat direction system for aircraft carriers and all amphibious ships, enabling them to keep pace with evolving anti-ship cruise missile (ASCM) threats. The SSDS open architecture system integrates detection and engagement elements of the combat system with automated weapons control doctrine, Cooperative Engagement Capability (CEC), and tactical data links for enhanced battle space awareness. SSDS provides a robust self-defense capability to warships not configured with the Aegis Combat System.

Status
SSDS Mk 1 began full-rate production following operational testing in 1997 and is fielded in all *Whidbey Island* and *Harpers Ferry* (LSD 41/49)-class ships. SSDS Mk 2, which provides strike group interoperability via CEC and Tactical Data Information Link Joint (TADIL-J), achieved Initial Operational Capability (IOC) in 2005 and continues fleet installation. The Navy plans to upgrade periodically the SSDS federated and technically decoupled architecture via commercial-off-the-shelf (COTS) technology insertion and preplanned product improvement.

SSDS Mk 2 is programmed for all aircraft carriers, amphibious assault ships (LHD/LHA), and *San Antonio* (LPD 17) class ships. SSDS Mk 2 will replace SSDS Mk 1 on LSD 41/49 class ships beginning in FY 2014 and is scheduled for complete fielding by 2016. Advanced Capability Build (ACB) 12 is in development, with Gerald R. Ford (CVN 78) as the lead ship. Follow-on ACB development will integrate into SSDS the Surface Electronic Warfare Improvement Program Block 2, MH-60R, *Seahawk* helicopters, Close-In Weapon System, and Identify Friend or Foe Mode 5/S.

Developers
Raytheon — San Diego, California, USA

SPQ-9B Radar Anti-Ship Cruise Missile (ASCM) Radar

Description
The SPQ-9B is a phased-array, rotating radar that significantly improves a ship's ability to detect and track low-altitude anti-ship cruise missiles in a heavy-clutter environment. This capability is in addition to and improves upon the surface search and gunfire control capability retained from previous versions of the SPQ-9 radar. It is a high-resolution track-while-scan, X-band, pulse-doppler radar that enables track detection at ranges that allow combat systems to engage subsonic or supersonic sea-skimming missiles at the outer edge of a ship's engagement envelope. Additional modifications are in developmental testing to add a periscope-detection and discrimination capability to the radar's surface-search capability.

Status
SPQ-9B is an integral part of the Cruiser Modernization Program, providing an ASCM cue to the Aegis Combat System. SPQ-9B integrates with Ship Self Defense Surface (SSDS) Mk 2 on aircraft carriers and amphibious assault ships, enabling those ships' ASCM defense capabilities to pace the evolving worldwide threat. The radar is Navy Type/Navy Owned equipment on the U.S. Coast Guard's new-construction Legend (WMSL 750)-class National Security Cutters. The SPQ-9B is planned for deployment in conjunction with future guided-missile destroyer modernizations and the initial DDG 51 Flight III destroyers.

Developers
Northrop Grumman — Baltimore, Maryland, USA

SPY-1 (Series) Aegis Multi-Function Phased-Array Radar

Description

The SPY-1 S-Band radar system is the primary air and surface radar for the Aegis Combat System installed in the *Ticonderoga* (CG 47)- and *Arleigh Burke* (DDG 51)-class warships. The SPY-1 is a multi-function, passive phased-array radar capable of search, automatic detection, tracking of air and surface targets, and missile-guidance support. The SPY-1A, SPY-1B, and SPY-1B(V) variants are fielded in cruisers, and the SPY-1D and SPY-1D(V) variants are fielded in destroyers. The latest variant of this radar, SPY-1D(V), improves the radar's capability against low-altitude and reduced radar cross-section targets in littoral clutter environments and in the presence of intense electronic countermeasures. Radars in selected Aegis cruisers and destroyers can also detect, track, discriminate, and support engagement of ballistic missile threats.

Status

The SPY-1D(V) littoral radar upgrade superseded the SPY-1D in new-construction Flight IIA destroyers. Initial operational testing and evaluation was completed in the fall 2005. Full rate production decision occurred in 2012. SPY-1D (V) is, or will be, installed in DDGs 91 through 122. A new Multi-Mission Signal Processor (MMSP) was developed to deliver SPY-1D (V) equivalent capability to SPY-1D radars in support of integrated air and missile defense tasks, including ballistic-missile defense requirements. The MMSP upgrades are installed during Destroyer Modernization program combat system upgrade availabilities. The MMSP upgrade is likewise integrated with the SPY-1D(V) radar in new-construction destroyers, starting with DDG 113, and in Aegis Ashore ballistic-missile defense systems. Outfitted with the MMSP upgrade to the AN/SPY-1D Radar in 2013, the USS John Paul Jones (DDG 53) was the first destroyer to complete the combat system radar modernization upgrade. DDG 53 will complete testing and certification in 2015.

Developers

Lockheed Martin Maritime Sensors and Systems	Moorestown, New Jersey, USA
Raytheon Electronic Systems	Sudbury, Massachusetts, USA

SPY-3 Advanced Multi-Function Radar (MFR)

Description

The SPY-3 Multi-Function Radar is an X-band active phased-array radar designed to meet all horizon-search and fire-control requirements for the 21st-Century Surface Fleet. SPY-3 is designed to detect the most advanced anti-ship cruise missile threats and support fire-control illumination requirements for the Evolved SeaSparrow Missile, the Standard Missile (SM-2), and future missiles. SPY-3 also supports the new ship-design requirement for reduced radar cross-section, significantly reduced manning (no operators), and total ownership cost reduction. SPY-3 is planned

for introduction on board the *Zumwalt* (DDG 1000)-class destroyers and as a component of the Dual-Band Radar on the next-generation *Ford* (CVN 78)-class aircraft carriers. For DDG 1000, SPY-3 will be modified to provide above horizon and volume search capability.

Status

In 2006, SPY-3 Engineering Development Model radar arrays were installed and tested at the Wallops Island Engineering Test Center, Wallops Island, Virginia, and on board the Navy's Self-Defense Test Ship. The S-band Volume Search Radar (VSR) was also installed at the Wallops Island facility for radar test and SPY-3 integration events that completed at the end of FY 2010. SPY-3 development, testing, and production schedules are planned to support equipment delivery schedules for DDG 1000- and CVN 78-class ships.

Developers

Raytheon Electronic Systems Sudbury, Massachusetts, USA

SQQ-89 Anti-Submarine Warfare (ASW) Combat System

Description

The SQQ-89 anti-submarine warfare combat system suite provides cruisers and destroyers with an integrated undersea warfare detection, classification, display, and targeting capability. SQQ-89 is the Surface ASW system of systems that integrates sensors, weapons, and underwater self-defense capabilities. The latest variant, the A(V)15, is planned for all guided-missile destroyers (DDGs) and forward-deployed Baseline 3 and 4 cruisers. A(V)15 will be installed as part of the Aegis Modernization Program or as part of the A(V)15 program of record. The A(V)15 program will install multi-function towed arrays (MFTAs) on all DDGs, including new construction warships. The AN/SQQ-89 A(V)15 is a modularized, open architecture system using commercial off-the shelf (COTS) technology processing to provide revolutionary ASW warfighting improvements, and continuous upgrades to the following subsystems of the ASW detect-to-engage sequence: MFTA; Mk 54 lightweight torpedo; Mk 54 Vertical Launch Anti-Submarine Rocket; and fire-control algorithms. These include the Echo tracker classifier and active classification algorithms, sonar performance and prediction algorithms, environmental models, Computer-Aided Dead-Reckoning Table interfaces, and Torpedo Detection Classification and Localization. The integrated high-fidelity Surface ASW Synthetic Trainer (SAST) AN/SQQ-89 A(V)15 provides revolutionary ASW warfighting improvements for deep-water as well as shallow-water littoral environments.

Status

The first A(V)15 installation was completed in the USS Mason (DDG 87) in September 2009. It included the addition of the MFTA and marked the first towed-array installation in a DDG Flight IIA warship. By the end of FY 2013, 26 production A(V)15 systems had been installed. The Advanced Capability Build (ACB)

process of providing software upgrades every two years and tech inserts on a four-year cycle will mitigate COTS obsolescence and facilitate future capability upgrades. The first ASW ACB-11 was installed on the USS Bulkeley (DDG 84) in FY 2012. It included SAST and major upgrades that improve surface ships ability to detect threat torpedoes. SAST is also installed as part of the ACB-11 trainers at the Fleet ASW Training Center in San Diego, California, and is planned for incorporation into the future design of the shore-based ASW trainers.

Developers

Advanced Acoustic Concepts	Hauppauge, New York, USA
Lockheed Martin	Syracuse, New York, USA
SAIC	Arlington, Virginia, USA

Surface Ship Torpedo Defense (SSTD)

Description

The Surface Ship Torpedo Defense system comprises a layered approach and a family-of-systems acquisition strategy to provide anti-torpedo soft-kill and hard-kill capability. Softkill capability resides in the SLQ-25 Nixie towed system and Acoustic Device Countermeasure (ADC) Mk 2 Mod 4 countermeasures, which are deployed on board aircraft carriers, cruisers, destroyers, frigates, amphibious ships, and combat logistics force (CLF) ships. The Nixie system is a towed acoustic and non-acoustic persistent countermeasure system. ADC Mk 2 Mod 4 is a hand-deployed acoustic countermeasure system.

Hardkill capability is achieved with the Torpedo Warning System (TWS) provides Torpedo Detection, Classification, and Localization (TDCL) capability on carriers and CLF ships. TWS prepares launch solutions, presets, and operator interfaces to launch Anti-Torpedo Torpedoes (ATTs) to deliver a hard-kill capability. The Countermeasure Anti-Torpedo (CAT) integrates the ATT with self-contained launch energetics in all-up-round equipment to defeat primary stern-sector threat salvoes. Both TWS and CAT will facilitate future software upgrades.

Status

SLQ-25C Nixie system is installed on all in-service aircraft carriers, cruisers, destroyers, frigates, amphibious ships, CLF ships and will be installed on *Zumwalt* (DDG 1000)-class ships. The SLQ-25C (equivalent to 25A with engineering changes through EC-16) installations will be completed in FY 2015 to improve reliability and acoustic countermeasure capability, provide a new littoral tow cable, and add enhanced non-acoustic improvements to counter threat torpedoes.

AN/SLQ-25C EC-2 is under development and will provide a technology refresh of the current AN/SLQ-25 architecture and an interface to the TWS for system interoperability. EC-2 upgrades will be completed by FY 2024.

ADC Mk 2 Mod 4 requirements are determined by the non-nuclear ordnance requirement (NNOR) process. Based on planned

procurement rates, the ADC inventory is scheduled to reach NNOR required levels in FY 2016. TWS/CAT is being developed for high-value units and will achieve Initial Operational Capability (IOC) in FY 2019.

A hybrid-prototype system was installed on CVN 77 in March 2013. An at-sea demonstration conducted on CVN 77 in May 2013 validated TWS/CAT ability to launch against enemy torpedoes. During the test TWS was used to launch seven ATTs against surrogate threat torpedoes. One roll-on/roll-off system will be delivered in FY 2014. Four Engineering and Development Model systems are programmed with two CVN installations per year during FY 2015 and FY 2016. TWS prototype systems will be installed with eight CATs each. TWS achieved provisional Milestone B in September 2011. Milestone C and Low Rate Initial Production for TWS and CAT are planned for FY 2016. CAT will seek Milestone C approval to enter System Development and Demonstration in FY 2014.

Developers

Anti-Torpedo Torpedo:

Penn State Applied Research Laboratory	State College, Pennsylvania, USA
SAIC	Arlington, Virginia, USA

Tactical Tomahawk Weapon Control System (TTWCS)

Description

Tactical Tomahawk Weapon Control System initializes, prepares, and launches Block III and Block IV Tomahawk land-attack cruise missiles. TTWCS also provides capability for firing units to plan Block III and Block IV global positioning system-only missions, retarget Block IV missiles to alternate targets, and monitor missiles in flight. The initial release of TTWCS reduced equipment racks required on board surface ships, introduced common software for the various Tomahawk-capable platforms (U.S. Navy guided-missile cruisers and destroyers, attack submarines, and guided-missile submarines, and Royal Navy attack submarines), and reduced overall reaction and engagement planning timelines. The TTWCS Viability Build, Version 5.4.0.2, improves the TTWCS system architecture to maintain existing Tomahawk Weapons System functionality, provides for future growth, and enhances command-and-control interoperability. Version 5.4.0.2 maintains interoperability with evolving systems and modernizes interfaces in accordance with joint mandates (e.g., Internet Protocol Version 6). Version 5.4.0.2 also improves operator interaction with the system, reduces system complexity, and provides an integrated training capability at all levels.

Status

TTWCS V5 incorporates Tomahawk Integrated Training Architecture, changes for Aegis Cruiser Modernization, and the addition of *Ohio* (SSGN 726)-, *Seawolf* (SSN 21)-, and *Virginia* (SSN 774)-class guided-missile/attack submarines to the common weapon control system build. The Initial Operational Capability

(IOC) of v5.4.0 was the first step toward TTWCS viability, refreshing hardware and porting resource intensive software executing on x86 processors with a Linux operating system. The next software version of the weapons control system, v5.4.0.2, will improve C4I (command, control, communications, computer, and intelligence) interoperability, refresh the hardware and software to improve performance, introduce a new human-computer interface, and align TTWCS with Department of Defense mandates.

Developers

Lockheed Martin Maritime Sensors and Systems	Valley Forge, Pennsylvania, USA
Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia, USA
Naval Undersea Warfare Center, Keyport	Newport, Rhode Island, USA
Southeastern Computers Consultants, Inc.	Austin, Texas, USA

Tomahawk Command and Control System (TC2S)

Description

Under the umbrella of the Theater Mission Planning Center (TMPC), the Tomahawk Command and Control System (TC2S) provides subsystems for precision targeting, route planning, mission distribution, and strike management for Tomahawk land-attack cruise missile (TLAM) missions. The TMPC is the mission-planning and execution segment of the Tomahawk Weapon System (TWS) and optimizes all aspects of the TLAM mission to engage a target. TC2S develops and distributes missions for the Tomahawk missile; provides command information services for TWS; provides strike planning, execution, coordination, control, and reporting; and provides maritime component commanders the capability to plan or modify TLAM missions. TC2S has evolved into scalable configurations deployed in five configurations at 177 sites: three Cruise Missile Support Activities; three Tomahawk Strike Mission Planning Cells with Fifth, Sixth and Seventh Fleets; 133 carrier strike groups and firing units; 11 command and control nodes; five laboratories; and six training classrooms. TC2S or its components are employed by the United Kingdom under two separate Foreign Military Sales cases (TLAM and Storm Shadow). TC2S allows planners to exploit the full capabilities of the Tomahawk in either deliberate planning conditions or for battlefield time-sensitive planning operations, including executing all post-launch missile control operations.

Status

TC2S version 4.3, which achieved Initial Operational Capability (IOC) on May 26, 2012, featured improved system usability and complete the migration of the precision targeting workstation (PTW) functionality to the service oriented architecture-based targeting and navigation toolset, permitting the retirement of the PTW. In addition, TC2S 4.3 includes more than 1,000 modifications proposed by users. In October 2011, the last TC2S 4.2.2 was installed in Seventh Fleet. The next version of TC2S 5.0.1 will reach IOC in 2014, with primary focus on human-computer interface updates for improved usability. All Tomahawk missiles

fired operationally from Operation Desert Storm through *Operation Odyssey Dawn* have been planned and executed with TC2S components.

Developers

BAE Systems	San Diego, California, USA
Boeing	St. Louis, Missouri, USA
COMGLOBAL	San Jose, California, USA
SAIC	McLean, Virginia, USA

SURFACE EQUIPMENT AND TRAINING SYSTEMS

Authorized Equipage Lists (AEL) and Naval Security Forces Vest (NSFV)

Description

The visit, board, search, and seizure (VBSS) authorized equipage list provides equipment to perform compliant and non-compliant vessel VBSS missions integral to expanded maritime interception operations, maritime counter-proliferation interdiction, and maritime domain awareness. The anti-terrorism/force protection physical security equipment AEL provides individual personal protection, training and entry control point equipment for use by the ship's self-defense forces when in port and transiting littoral and restricted maneuverability environments. Naval Security Forces Vest (NSFV) is body armor designed for a Navy threat environment providing protection against ballistic and fragmentation standards. NSFV is designed to operate with enhanced small arms protective inserts (ESAPI) for increase protection.

Status

NSFV will replace both the concealable tactical response carrier and Navy flak vest for consolidation and uniformity among fleet AELs. It is a Navy design for the maritime threat environment providing protection against ballistic and fragmentation threat standards and designed to operate with ESAPI for increased protection. NSFV is government-designed, -tested and quality-assured. First Article Testing (FAT) commenced September 2013. On completion of FAT, a production contract will be awarded, with a total quantity of 13,000 units to be fielded to all afloat assets. Initial fielding started in FY 2014 with full fielding anticipated for June 2015.

Developers

Naval Surface Warfare Center, Crane	Crane, Indiana, USA

Battle Force Tactical Trainer (BFTT)

Description

Battle Force Tactical Trainer integrates the family of embedded combat system trainers, providing aircraft carriers, cruisers, destroyers, and amphibious ships the capability to maintain readiness requirements across multiple warfare areas. These areas include air defense, electronic warfare, anti-submarine warfare, and integrated air and ballistic missile defense.

Status

BFTT began full-rate production following operational testing in 1997. It is fielded in all aircraft carrier (CVN 68/78), cruiser (CG 47), destroyer (DDG 51), dock landing ship (LSD 41/49), and amphibious transport dock (LPD 17) class ships. BFTT achieved initial operational capability in 1999 and continues with fleet upgrades through 2015. The BFTT system is the combat system scenario generator on surface combatants and is undergoing modernization to improve ship training system reliability network interfaces to meet Navy continuous training environment requirements. This includes development of an integrated, total-ship training capability (TSTC) aligned with advanced capability build deliveries. In addition to modernizing the BFTT system, the T46D variant will be the key enabler permitting integration of anti-submarine warfare, navigation, and engineering-embedded trainers in a first step toward fielding a TSTC. BFTT systems and associated interfaces maximize limited underway days and support Unit and Integrated synthetic training requirements as delineated in the U.S. Fleet Cyber Command Fleet Training Continuum and the Commander Naval Surface Forces Surface Force Training Manual.

Developers

Lockheed Martin	Chesapeake, Virginia, USA
Naval Surface Warfare Center, Dam Neck	Dam Neck, Virginia, USA
NOVONICS	Arlington, Virginia, USA
SYS Technologies	San Diego, California, USA

Biometrics / Identity Dominance System (IDS)

Description

The Personnel Identification Version One (PIv1), also known as the PX-1 Identity Dominance System (IDS), provides enhanced biometric and limited forensic collection capabilities for VBSS teams conducting maritime interception operations. The program expands naval force capabilities by enabling visit, board, search, and seizure (VBSS) teams to rapidly capture identity information of unknown individuals, and improves capacity to manage and share trusted information between agencies and international partners. PIv1 collects facial images ("mugshots"), iris images, fingerprints, contextual data, and cell phone media for exploitation, and matches iris images and fingerprints against an onboard biometrics enabled watchlist of known or suspected terrorists and persons of interest.

Status

Fleet VBSS teams use commercial-off-the-shelf biometric collection devices to collect and transmit biometric information to the DoD's authoritative biometric database for intelligence analysis, and "match/no-match" analysis. Approximately 200 of these kits were procured in FY 2006-2007 and fielded to VBSS-capable ships. Initial fielding provided stopgap biometrics capability to naval forces. Research and development efforts continue to develop a

robust multi-modal biometric, document, and media exploitation capability through the Personnel Identification Version One (PIv1). The PIv1 System expands current biometrics capabilities through use of a rugged, lightweight system capable of collecting multiple biometric modalities and electronic media for further matching and analysis. The Joint Requirements Oversight Council approved the IDS Capabilities Development Document in September 2008 and the IDS achieved Milestone B in the fourth quarter of FY 2010. The Navy approved the PIv1 Capabilities Production Document in November 2012, and PIv1 achieved Milestone C in FY 2013. Initial Operational Capability was achieved in FY 2013, and Full Operational Capability should occur by FY 2017.

Developers

Aware Inc.	Bedford, Massachusetts, USA
Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia, USA

CBRN Dismounted Reconnaissance, Sets, Kits and Outfits (CBRN DR SKO)

Description

Chemical, biological, radiological, and nuclear (CBRN) dismounted reconnaissance sets, kits, and outfits (DR SKO) are an organic suite of specialized CBRN detection and protection equipment. The equipment provides Navy boarding teams with additional CBRN capability to conduct efficient and thorough CBRN reconnaissance survey and monitoring missions on boarded vessels in response to CBRN threats. It provides visit, board, search, and seizure (VBSS) forces with the capability to detect the presence of weapons of mass destruction (WMD) in support of WMD interdiction (WMD-I) missions. Specifically, in addition to individual personnel protective equipment (IPPE) and integrated radio/wireless communications, the DR SKO provides detection and identification capability for radiological and nuclear material, chemical biological warfare agents, toxic industrial chemicals/toxic industrial materials (TIC/TIM), oxygen levels and combustible gases, and some explosives and drugs.

Status

The Navy's participation in this program is a response to Commander, U.S. Naval Forces Central Command's urgent operational need to provide VBSS teams with the capability to identify and detect CBRNE/WMD material. Approximately 163 radiation detection/hazardous atmospheric kits were procured in FY 2007-2008. Each kit consists of six UDR-15 personal radiation detectors (PRD), six handheld radiation monitors (HRM), one Thermo IdentiFinder Ultra NGM (used to identify isotopes), one Chameleon TIC vapor and gas detector, one GAMIC 4 gas analyzer, and one nIK drug testing kit. The Navy is fielding this equipment to deploying VBSS-capable ships as an interim capability until the DR SKO program reaches Initial Operational Capability planned for FY 2014.

Developers

FLIR/ICx	Elridge, Maryland, USA
Joint Program Manager NBC CA	Aberdeen Proving Ground, Maryland, USA

Chemical, Biological, Radiological and Nuclear Defense–Individual Protection Equipment–Readiness Improvement Program (CBRND–IPE–RIP)

Description

The Individual Protective Equipment-Readiness Improvement Program (IPE-RIP) for forces afloat manages millions of individual pieces of equipment for Sailors deploying into potential chemical, biological, radiological, and nuclear (CBRN) threat environments. Through centralized management, this program ensures that afloat and deployed expeditionary Sailors are provided with correctly maintained and properly fitted individual protection ensembles and a chemical protective mask, ready for immediate retrieval in response to the dictated mission oriented protective posture (MOPP) condition. Historically, maintenance and logistics functions required to maintain the material readiness of this equipment required an extraordinary number of organizational man-hours that could be better used supporting operations and training. Ninety-day pre-deployment readiness visits by the Naval Sea Systems Command (NAVSEA) RIP Team relieve the ships of this burden. The cornerstone of the RIP is the NAVSEA Consolidated Storage Facility located at Ft. Worth, Texas.

Status

This program continues to improve fleet CBR readiness. In addition to IPE and gas masks, the RIP manages interceptor body armor, dorsal auxiliary protective systems, and lightweight helmets for expeditionary forces; provides protective CBRN equipment to the Navy's individual augmentees as they process through designated Army training centers; manages CBR and nuclear defense IPE for the Military Sealift Command; and manages the Navy's afloat anti-terrorism/force protection (AT/FP) equipment. In addition, the Navy shifted from the traditional lifecycle replacement program and implemented a condition-based obsolescence program to sustain the Fleet's CBRN-defense equipment. The Joint Program Executive Office adopted this efficiency plan for Chemical and Biological Defense, which recommended the plan to be the model Service-wide.

Developers

Battelle Memorial Institute	Columbus, Ohio, USA
General Dynamics Information Technology	Fairfax, Virginia, USA
Gryphon Technologies	Washington, D.C., USA
Naval Surface Warfare Center, Panama City	Panama City, Florida, USA

Improved (Chemical Agent) Point Detection System (IPDS)–Lifecycle Replacement

Description

The Improved (Chemical Agent) Point Detection System-Lifecycle Replacement is a fixed-point detection system that monitors external air in order to detect and identify chemical vapors while providing an alert to ship personnel in a timely manner to take protective measures. The IPDS-LR is a fit, form, and function life-cycle replacement for legacy IPDS providing an automated chemical (vapor) point detection capability afloat with improved detection and reliability.

Status

IPDS-LR achieved Initial Operational Capability (IOC) in March 2013 with more than 30 systems fielded, to include shipboard installations, training facilities, and spares.

Developers

Bruker Billerica, Massachusetts, USA

Joint Biological Tactical Detection System (JBTDS)

Description

The Joint Biological Tactical Detection System (JBTDS) provides a portable biological warfare agent detection and collection capability for naval platforms during a full range of military operations. The Navy will use the JBTDS to replace all Dry Filter Unit 1000s and augment the existing surface fleet biological detection and collection capabilities provided by the Joint Biological Point Detection System and the Joint Biological Agent Identification and Diagnostic System. Since it will be portable, the JBTDS detector/collector can be located at specific locations onboard ships in response to heightened threat levels.

Status

The JBTDS will reach Milestone C in FY 2016 and fielding is planned for multiple ship classes (e.g., CG 47, DDG 1000, DDG 51, LCS 1 and 2, LHA 6, LHD 1, LPD 17, LSD 41/49, MCM 1, T-AKE 1, LCC 19, and CVN 68/78).

Developers

Multiple sources.

Next-Generation Chemical Detection (NGCD)

Description

The NGCD program is designed and developed for Chemical Warfare Agents (CWAs), Toxic Industrial Chemicals (TICs), and Non-Traditional Agents (NTAs). It will provide the Joint Force with improved chemical detection capabilities, allowing for the timely detection of chemical warfare agents (CWA) and selected toxic industrial chemicals in vapor, liquid, aerosols and

particulate physical states, and then alert personnel of chemical threats. NGCD will presumptively identify a single chemical hazard sample and support both field confirmatory identification of multiple-phase samples and decontamination confirmation. NGCD supports characterization of the chemical threat and provides data to support protection decisions. This information will support integrated warning, enhanced situational awareness, and battle management for our visit, board, search, and seizure teams. The Navy anticipates that four variants will be developed via Technology Development (TD) Phase Contracts; these include: Multi-Sample Identifier (multi-phase analysis, remote sample collection); Surface Contaminant Locator (scanning surfaces locate and survey contamination); Platform/Site Air Monitor (rapid air monitor, continuous post encounter monitor); Individual (air/environmental monitor).

Status
The acquisition strategy for this program is technology driven. The Joint Project Manager for Nuclear, Biological and Chemical Contamination Avoidance (JPM NBC CA) is procuring prototypes for the program's Technical Development (TD) phase. The TD phase will consist of a breadboard test event (experimental test model) followed by a brassboard test (demonstration test model in a field setting) and finally a final prototype test. The Joint Project Manager NBC CA will use the results of brassboard testing and final prototype testing to determine if the program is sufficiently mature for its Milestone B decision.

Developers
Multiple sources.

Next-Generation Diagnostics System (NGDS)

Description
The Next-Generation Diagnostics System will provide a capability that identifies and supports the diagnosis of disease caused by traditional, enhanced, and emerging biological agents. Information produced by the system will be used to mitigate the impact of biological warfare agent (BWA) attacks and infectious diseases (ID) by supporting health-support services and force health protection decision-making processes, warning and reporting, and by augmenting situational awareness through medical surveillance. NGDS is expected to replace the currently fielded Joint Biological Agent Identification Detection System that provides confirmatory BWA ID through environmental sampling. NGDS will be fielded with both diagnostic and environmental identification capabilities.

Status
NGDS is currently in the Technology Development phase. Navy expects to achieve initial operational capability in FY 2017.

Developers
Multiple sources.

SUBMARINE FORCE

The submarine force, the Navy's "silent service," contributes significantly to many of the Navy's core capabilities. The concealment provided by the sea enables U.S. submarines to conduct undetected and non-provocative operations, to be survivable, and to attack both land and sea targets. Nuclear-powered attack submarines (SSNs) enable sea control, providing unseen surveillance of far-flung regions of ocean along with the ability to attack and sink hostile surface ships and submarines. The power-projection capabilities of nuclear-powered guided-missile submarines (SSGNs) include precision strike from land-attack cruise missiles and insertion of Special Operations Forces (SOF) to conduct reconnaissance and direct-action missions in hostile environments. The Navy's fleet of nuclear-powered ballistic-missile submarines (SSBNs) provides the ability to conduct nuclear offensive strike, contributing to the core capability of deterrence at the national strategic level.

SUBMARINES AND UNDERSEA VEHICLES

SSBN 726 *Ohio*-Class Replacement (OR) Fleet Ballistic-Missile Submarine (SSBN)

Description

The fleet ballistic-missile submarine supports the Nation's strategic nuclear-deterrence triad by providing a flexible and survivable deterrent with the ability to provide assured response. Starting in 2027, the oldest *Ohio*-class SSBN will reach the end of its service life with the remaining hulls retiring at a rate of approximately one per year thereafter. The highest priority is to ensure a successful and seamless transition to the *Ohio* Replacement SSBN to fulfill the national imperative of strategic deterrence. The 12 *Ohio* Replacement submarines will provide strategic deterrent capabilities well into the 2080s, at a responsible cost. The class will be designed to ensure survivability against expected threats into the late 21st Century.

The *Ohio* Replacement SSBN includes the Common Missile Compartment (CMC) that is being developed jointly with the United Kingdom, continuing the long-standing SSBN partnership between the U.S. Navy and the Royal Navy. Concurrent with the *Ohio*-Class Replacement program, the United Kingdom will recapitalize its sea-based strategic deterrent platforms, the *Vanguard*-class SSBN, which also hosts the Trident II (D5) submarine-launched ballistic missile (SLBM). Under cost-sharing agreements, the United States and United Kingdom jointly develop CMC components to reduce design and construction costs. Additional ownership and production cost reduction initiatives include a life-of-ship reactor core, modular construction techniques, and the re-use/re-hosting of current submarine systems including continued use of the Trident II (D5LE) SLBM.

Status

In January 2011, Milestone A was approved and the program entered the Technology Development phase. In August 2012, the Navy approved the *Ohio*-Class Replacement Capabilities Development Document to guide technology development efforts. Early research and design efforts include prototyping and construction technique demonstration for the first new-design SLBM tubes built since the delivery of the USS Louisiana (SSBN 743) in 1997. Specifications for the U.S. and U.K. CMC quad-pack were approved in August 2012.

Developers

General Dynamics Electric Boat Corporation	Groton, Connecticut, USA
Huntington Ingalls Industries Newport News	Newport News, Virginia, USA

SSN 774 *Virginia*-Class Nuclear-Powered Attack Submarine

Description

The *Virginia*-class submarine is specifically designed for multi-mission operations in the littoral while retaining the submarine force's strength in traditional open-ocean anti-submarine and anti-surface missions. These submarines have advanced acoustic stealth technology that allows unimpeded operation within an adversary's defensive perimeter—defeating his anti-access/area-denial strategies. Using this asymmetric access, *Virginia*-class submarines are configured to conduct sea control, land attack, mine reconnaissance, Special Operations Forces (SOF) insertion/extraction, intelligence collection, and surveillance missions that enable successful access and follow-on operations by larger general-purpose forces. The *Virginia* class can serve as host for various SOF delivery methods, including mini-submersibles and raiding craft via an embarked dry-deck shelter, or directly to sea via integral lockout chambers. *Virginia*-class submarines are built under an innovative teaming arrangement between General Dynamics Electric Boat and Huntington Ingalls Industries/Newport News using a modular construction process in which each shipyard builds portions of each ship with integration and delivery of completed submarines alternating between the shipyards. Modular construction also allows for assembly and testing of systems prior to installation in the hull, thereby reducing costs, minimizing rework, and simplifying system integration. The modular design and extensive use of open architecture electronics systems facilitates technology insertion in both future ships during new construction and ships in the fleet, enabling each *Virginia*-class submarine to keep pace with emerging threat capabilities throughout its 33 year service life.

Status

In 2008, the Navy negotiated a multi-year procurement contract for a total of eight submarines between 2009 and 2013. In 2010, the *Virginia*-class program completed Milestone C review, receiving Full Rate Production authority and achieving Full Operational Capability. In 2011, the Navy increased the procurement rate to two submarines per year, the first time the Navy procured two submarines in the same year since 1991. The USS *Mississippi* (SSN 782), the ninth *Virginia*-class submarine, delivered one year early in May 2012. And the Pre-Commissioning Unit (PCU) Minnesota (SSN 783), the tenth ship of the class, also delivered ahead of schedule in June 2013, continuing the trend of constructing submarines ahead of schedule and under budget. SSN 784 through SSN 791 will comprise the third block of *Virginia*-class submarines and began construction in 2009. *Virginia* Block III captures learning-curve efficiency initiatives that will help lower production costs. The first Block III ship, the PCU North Dakota (SSN 784) is on track to deliver in February 2014 after only 60 months in construction. In late CY 2013, the Navy was negotiating the contract for ten *Virginia* Block IV submarines (SSN 792 through SSN 801) that will include improvements to reduce total ownership costs. The Navy also received funds from Office of the Secretary of Defense for research, development, and design efforts for *Virginia* Block V, which will incorporate the *Virginia* Payload Module (VPM). VPM will increase Tactical Tomahawk land-attack cruise-missile strike capacity and provide capability for follow-on payloads. The *Virginia*-class submarine inventory objective is 46.

Developers

General Dynamics Electric Boat Corporation	Groton, Connecticut, USA
Huntington Ingalls Industries Newport News	Newport News, Virginia, USA

Submarine Rescue Systems

Description

The Navy's submarine rescue capability is provided by two systems: the venerable Submarine Rescue Chambers Fly-away System (SRCFS) and the more capable Submarine Rescue Diving and Recompression System (SRDRS). Both are ground-, sea-, and air-transportable for rapid worldwide deployment on vessels of opportunity in the event of a submarine accident. The SRCFS provides non-pressurized shallow-water rescue to a depth of 850 feet. The SRDRS consists of three distinct systems: (1) Assessment Underwater Work System (AUWS); (2) Pressurized Rescue Module System (PRMS); and (3) Surface Decompression System (SDS). AUWS includes the Atmospheric Diving System (ADS2000), a one-atmosphere, no-decompression manned diving system capable of depths to 2,000 feet for clearing and preparing a submarine hatch for seating a rescue platform. The PRMS is a manned, tethered, remotely piloted vehicle capable of rescuing personnel from a stricken submarine to depths of 2,000 feet. The SDS will enable transfer under pressure for surface decompression of personnel rescued from a pressurized submarine environment. The SRDRS is a government-owned, contractor-operated system, maintained at the Navy's Undersea Rescue Command (URC).

Status

The AUWS was introduced to the Fleet in 2007, and URC maintains four ADS2000 suites. However, replacement of ADS2000 with remotely operated vehicles has been approved and phased-replacement is to begin FY 2014. The PRMS became operational in 2008, replacing the Navy's legacy deep submergence rescue vehicle capability. The SDS is scheduled to deliver to the Fleet in FY 2014 and reach Initial Operational Capability in FY 2015. The legacy SRCFS is programmed for continued service to the Fleet.

Developers

Environmental Tectonics Corporation	Southampton, Pennsylvania, USA
Oceaneering International	Upper Marlboro, Maryland, USA
OceanWorks International	Vancouver, California, USA
Southwest Research Institute	San Antonio, Texas, USA

SUBMARINE WEAPONS

Mk 48 Advanced Capability (ADCAP) Common Broadband Advanced Sonar System (CBASS) Torpedo

Description

The Mk 48 Advanced Capability heavyweight torpedo is the Navy's sole submarine-launched weapon for anti-submarine and anti-surface warfare. The ADCAP torpedo was authorized for full-rate production in 1990, and the final production all-up-round torpedo was delivered to the Navy in 1996. Since then, the Navy has employed an open-architecture model to provide software and hardware improvements to the ADCAP torpedo inventory. The ADCAP torpedo features sophisticated sonar, all-digital guidance and control systems, digital fuzing systems, and improved torpedo acoustic stealth compared to the legacy Mk 48 torpedo. The Mod 7 Common Broadband Advanced Sonar System (CBASS) is a two-phase incremental improvement that includes a new broadband sonar system for shallow-water performance enhancement. The CBASS upgrade to the ADCAP torpedo is part of an ongoing Armaments Cooperative Program with the Royal Australian Navy (RAN). In addition to the RAN, the Brazilian, Canadian, and The Netherlands navies also acquired versions of the Mk 48 torpedo through the Navy's Foreign Military Sales program.

Status

Phase I of the CBASS program, with the new Broadband Sonar Analog Receiver, achieved Initial Operational Capability and was introduced to the Fleet in 2006. Phase II of the CBASS program, with Advanced Processor Build (APB) Spiral 4 software improvements and common sonar upgrades leveraged from the Mk 54 Lightweight Torpedo program, achieved Full Operational Capability in May 2013. The Navy continues to procure CBASS hardware for eventual conversion of all ADCAP torpedoes through the life of the program. In parallel, the APB program continues to improve torpedo performance through software upgrades and Technology Insertions (TI) in challenging areas, such as the shallow-water diesel submarine threat. A 2012 approved Capabilities Development Document has established requirements for follow-on APB 5 and APB 6/TI-1 software and hardware upgrades.

Developers

Lockheed Martin Sippican	Marion, Massachusetts, USA

UGM-133A Trident II/D5 Submarine-Launched Ballistic Missile (SLBM)

Description

The Trident II/D5 is the sixth generation of the Navy's Fleet Ballistic Missile (FBM) program, which started in 1955. The D5 is a three-stage, solid propellant, inertial-guided submarine-launched ballistic missile (SLBM) with a range greater than 4,000 nautical miles and accuracy measured in hundreds of feet. Trident II missiles are carried by all 14 *Ohio* (SSBN 726)-class nuclear-powered ballistic-missile submarines (SSBNs), each of which carries 24 SLBMs. The New Strategic Arms Reduction Treaty of 2010 limits the numbers of delivery vehicles and warheads on all strategic systems including Trident II and is to be implemented by February 2018. The Navy continues to address future deterrence requirements against weapons of mass destruction and disruption, and the Trident II/D5 will ensure that the United States has a modern, survivable strategic deterrent. In that regard, the Navy has embarked on a Trident II Life Extension Program (D5LE) that will upgrade missile systems and maintain D5s in the Fleet into the 2040s, bridging the transition from *Ohio*-class SSBNs to *Ohio* Replacement (SSBN) submarines. The initial payload of the *Ohio* Replacement SSBNX will be the Trident II/D5 D5LE SLBM.

Status

Full missile procurement ended in FY 2012, with a total acquisition of 108 additional missiles. Life extension kits and replacement solid rocket motors are procured throughout and beyond the future years defense program to refurbish obsolete electronics and expiring rocket motors on existing missiles.

Developers

Lockheed Martin — Sunnyvale, California, USA

SUBMARINE SENSORS

BQQ-10 Submarine Acoustic Systems

Description

Submarine Acoustic Systems modernization enables rapid warfighting capability enhancements at reduced costs, while providing for affordable sustainment. Acoustic Rapid Commercial Off-the Shelf (COTS) Insertion (ARCI) upgrades legacy sonar systems and significantly expands processing capability for existing sensors and enables future sensors through Advanced Processor Builds (APBs) and Technology Insertions (TIs). This model allows development and use of complex algorithms that were previously well beyond the capability of legacy processors. Additionally, the open architecture design of the ARCI system allows for the rapid insertion of new sensor systems and processing techniques at minimal cost. For example, the TB-34 Next-Generation Fat-Line Array sonar uses COTS-based telemetry to reduce cost and will allow concurrent processing with hull-mounted arrays with extended frequency response compared to the in-service TB-16

towed sonar arrays. The Low-Cost Conformal Array also provides enhanced situational awareness and collision avoidance capability.

Status

BQQ-10 ARCI is common across all submarine classes—*Los Angeles/Improved Los Angeles* (SSN 688/688I), *Seawolf* (SSN 21), *Virginia* (SSN 774), and *Ohio*-class guided-missile (SSGN) and ballistic-missile (SSBN) submarines. These submarines receive biennial software APBs and quadrennial hardware TIs for improving and sustaining sonar capability. Maintaining the APB/TI upgrade rate of 10-12 submarines per year is critical to meeting capability and sustainment requirements. TIs support a maintenance APB and a capability APB that provide processing growth while minimizing lifecycle costs. ARCI has transitioned technology for detection, tracking, situational awareness, contact management, mine countermeasures (detection and avoidance), and ranging. The next TI will focus on multi-mission anti-surface warfare improvements.

Developers

Applied Research Lab, University of Texas at Austin	Austin, Texas, USA
General Dynamics Advanced Information Systems	Fairfax, Virginia, USA
Lockheed Martin	Manassas, Virginia, USA
Progeny Systems Corporation	Manassas, Virginia, USA

SUBMARINE EQUIPMENT AND SYSTEMS

Submarine Survivability

Description

Today's submariners use passive means to remove carbon dioxide from a disabled submarine's atmosphere, enabling survival up to seven days. Oxygen-generating chlorate candles and atmosphere monitoring equipment are also used for submarine survivability. Survival improvements include introduction of new "flat-sheet" lithium hydroxide (LiOH) canisters for high-performance passive scrubbing.

Status

Passive carbon dioxide scrubbing curtains, granular lithium hydroxide, oxygen generating chlorate candles and atmosphere monitoring equipment are installed on all submarines. Phased outfitting of flat-sheet LiOH canisters on all *Virginia*-class submarines is nearing completion.

Developers

Analox Sensor Technology, Ltd.	Stokesley, United Kingdom
Casco Manufacturing Solutions, Inc.	Cincinnati, Ohio, USA
Micropore, Inc.	Newark, Delaware, USA
Tangram Company LLC	Holtsville, New York, USA

BYG-1 Submarine Combat Control System

Description

BYG-1 is the common submarine combat control system across all U.S. Navy submarine platforms except *Ohio*-class fleet ballistic-missile submarines. BYG-1 is a Commercial Off-the-Shelf (COTS), open systems architecture (OSA) system that incorporates organic sensor fusion, target solution development, combined tactical picture, weapon control, and Tactical Local Area Network functions into a single procurement program. The use of COTS/OSA technologies and systems enables frequent periodic updates to both software and hardware with little or no impact on submarine scheduling. COTS-based processors allow computer power growth at a rate commensurate with that of commercial industry. Additionally, the open architecture design of the BYG-1 system allows for the rapid integration of new sensors and processing techniques at minimal cost. BYG-1 allows the submarine force to update rapidly the ship safety tactical picture, integrates the common tactical picture into the battle group, improves torpedo interfaces, and provides Tactical Tomahawk land-attack cruise missile capability.

Status

BYG-1 has been installed on all U.S. attack (SSN) and guided-missile (SSGN) submarines. Submarines receive periodic improvements through Technology Insertions (TIs) of hardware and Advanced Processor Builds (APBs) of software. While TI upgrades are designed and produced biennially, individual submarines normally receive a TI every-other cycle. This nominal four-year refresh of hardware keeps each submarine's processing power on pace with the state of the computing industry while ensuring that the COTS components are upgraded before commercial obsolescence. Biennial APBs allows for rapid insertion of improved processing algorithms and increased capabilities requested by Navy type commanders to address emerging challenges. Navy research, development, testing, and evaluation will continue to develop processing algorithms from the surveillance, tactical, and advanced R&D communities as well as perform laboratory and at-sea testing.

Developers

General Dynamics Advanced Information Systems	Fair Lakes, Virginia, USA
General Dynamics Advanced Information Systems	Pittsfield, Massachusetts, USA
Progeny Systems Corporation	Manassas, Virginia, USA
Lockheed Martin	Eagan, Minnesota, USA

EXPEDITIONARY FORCES

The Navy's expeditionary forces carry out a wide range of responsibilities and provide a robust set of capabilities. The Navy's vast and geographically dispersed logistics network, including its fleet of amphibious ships, enable Navy and Marine Corps forces to sustain forward presence, exert sea control over large areas, and project power ashore. These survivable ships, equipped with aviation and surface-assault capabilities, rapidly close, decisively employ, and sustain Marines from the sea. Mine warfare ships operate forward to ensure operational access to key maritime crossroads, while coastal riverine forces operate in the littorals and inland waterways, protecting ships and maritime infrastructure. In addition, Joint High-Speed Vessels, hospital ships, and Mobile Construction Battalions (Seabees) provide humanitarian assistance, disaster relief, and build partner-nation capacity.

EXPEDITIONARY FORCES

Coastal Riverine Force (CRF)

Description

In 2012, Navy Expeditionary Combat Command merged the Riverine Force and the Maritime Expeditionary Security Force to form the Coastal Riverine Force (CRF). This new force is organized into three active squadrons with four companies each, and four reserve squadrons with three companies each. The CRF comprises 4,400 active duty and 1,900 Reserve personnel. The CRF delivers task-organized units that are aligned to be effective, flexible, and responsive to meet fleet and combatant commander demands and seamlessly operate with the other Navy, joint, interagency, and coalition partners. The CRF performs combat and maritime security operations on inland waterways, harbors, and in the coastal environment, bridging the maritime gap between land forces and the Navy's traditional blue-water forces. The primary unit of action for the CRF is the squadron, but the force maintains the capability to disaggregate into companies. Each Coastal Riverine Squadron (CORIVRON) can conduct 24-hour operations in varying weather conditions and climates, including the arctic, tropical areas, or deserts. It is the only U.S. force capable of conducting sustained combat operations on inland waterways. The CRF is responsible for protecting and defending the littoral operating area for the Navy and is adaptive to mission requirements, scalable, and agile. Units conduct force protection of critical maritime infrastructure, strategic sealift vessels and naval vessels operating in the inshore and coastal areas, anchorages and harbors. CRF units currently deploy worldwide to defend an area, unit, or high-value asset against determined enemies and when necessary conduct offensive operations.

Status

The CORIVRON Table of Allowance (ToA) was produced by merging legacy Maritime Expeditionary Security Force equipment with the three baseline ToAs of the Riverine Force. CRF outfitting was designed to address the broad capabilities set that CORIVRONs must maintain. Procurement of a new line of combatant craft that is capable of spanning the spectrum of anticipated operations is key to the future viability of this force.

Developers

Multiple sources.

Explosive Ordnance Disposal (EOD) / Mobile Diving and Salvage (MDS)

Description

The Explosive Ordnance Disposal community is operationally organized into two deploying EOD groups, each headed by a Navy captain. Each group comprises multiple EOD Mobile Units, a Mobile Diving and Salvage Unit (MDSU), a Training and Evaluation Unit, and an Expeditionary Support Unit.

EOD units provide the Fleet, joint services, and the interagency community with the capability to detect, identify, render safe, recover, exploit, and dispose of ordnance that has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, people, or material. Commonly operating in platoons and smaller elements, these EOD units ensure access to key objectives by opening lines of communication in the sea-to-shore interface as well as blue-water and land-based operations. This can require diving operations, parachute insertion, or helicopter insertion and extraction. These mobility skills, along with responsibility for all underwater ordnance, make Navy EOD unique in the joint force. The Secretary of the Navy is the Single Manager for EOD Technology and Training, carrying out these duties primarily through the Navy EOD Technology Center and the Naval School Explosive Ordnance Disposal, where all U.S. Armed Services and select foreign-partner military EOD technicians receive the same initial training to defeat conventional land and air ordnance as well as improvised explosive devices. Navy EOD also has capabilities with regard to chemical, biological, radiological, nuclear, and enhanced-explosive weapons, including terrorist "dirty" bombs.

MDSUs conduct operations as a commander task group or commander task unit, planning, coordinating, and directing combat harbor-clearance, anti-terrorism and force-protection diving missions, salvage and recovery operations, and other assigned mission areas. MDSUs operate in direct support of naval, joint, or combined task forces, conducting operations afloat or ashore during combat or national emergencies in climate extremes—arctic, tropical, or desert environments. In addition to expeditionary salvage, search, and recovery operations, they perform harbor clearance to remove obstructions restricting access to ports, piers, and waterways; assist vessels in distress; de-beach and salvage of ships, submarines, and aircraft; locate and recover high-value objects; cut and weld underwater; conduct limited underwater ship repair, ship husbandry, and anti-terrorism and force-protection dive support for ships in port and port facilities.

Status

Both EOD and MDSU recapitalized their authorized equipment inventories with new Tables of Allowance (ToA). Based on a complete review of their mission requirements, each ToA aligned with their force structures and standardized equipment, where possible, across the Navy Expeditionary Combat Enterprise. Specialty equipment—such as man-transportable robotic systems, unmanned underwater vehicles, and Mk 16 underwater breathing apparatus—were included for EOD units.

Developers

Multiple sources.

Naval Beach Group

Description

The two Naval Beach Group Commanders—Naval Beach Group One and Naval Beach Group Two—serve as the immediate superior in command for all amphibious enabling forces: Assault Craft Units (ACUs) for both displacement landing craft and air-cushion assault craft; Beach Master Units (BMUs); and Amphibious Construction Battalions (ACBs). Components of each of these commands could be embarked in amphibious ships in support of landing force operations or deployed on strategic air and sealift platforms to support other operations. Naval Beach Groups also facilitate amphibious assault, ship-to-shore movement, logistics-over-the-shore units, and provide required unit level training and readiness assessments for all amphibious ships. Naval Beach Group One is also responsible for this function for all forward-deployed naval forces amphibious forces in Sasebo, Japan. NBG missions include wartime forward littoral operations in support of Marine Corps amphibious assault, follow-on USMC and joint combat missions, and peacetime forward littoral and humanitarian assistance. Each Naval Beach Group Commander is capable of rapid worldwide deployment to serve as Navy logistics over-the-shore commander supporting the offload of Navy Maritime Prepositioned Squadron ships and the offload in stream of supporting maritime shipping.

Status

Naval Beach Group One is located in Coronado, California and has oversight of ACU-1, ACU-5, BMU-1, and ACB-1; Group One also supports Naval Beach Unit 7 in Sasebo, Japan. Naval Beach Group Two is located in Little Creek, Virginia, and has oversight of ACU-2, ACU-4, BMU-2, and ACB-2.

Developers

Multiple sources.

Naval Mobile Construction Battalion (NMCB) Seabees

Description

Naval Construction Force Elements—"Seabees"—are the Navy's deployable engineer and construction force providing support to Marine Air-Ground Task Force (MAGTF), Navy commanders, and joint forces and combatant commanders. The force comprises Naval Construction Regiments, Naval Mobile Construction Battalions, Construction Battalion Maintenance Units, and Underwater Construction Teams. The Navy/Marine Corps Team projects power from the sea with a rapid flow of maneuver forces ashore, using roads, expeditionary airfields, force-protection structures, intermediate staging bases, and advanced logistics bases. Forward deployment of Seabees enables the surge of task-tailored engineer forces and equipment sets to enhance the MAGTF and other naval and joint forces on land. Seabee capabilities include bridge erection, roadway clearing and construction, pier and wharf repair, forward operating base construction, airfield repair and construction, water well installation, and

building construction such as schools and medical clinics. In operations other than war, forward-deployed Naval Mobile Combat Battalions hone construction skills through humanitarian assistance and disaster-relief operations; participate in foreign engagement exercises; and complete construction projects that support sustainment, restoration, and modernization for Navy and Marine Corps forward bases and facilities.

Status
The Navy has developed a long-range plan to recapitalize the Tables of Allowance (ToA) of all Seabee units. The initial priority is to correct existing inventory deficiencies and replace aging tools and equipment that are no longer supportable. During the next several years, Naval Mobile Construction Battalions' ToAs will be outfitted with modern and recapitalized tactical vehicles, construction and maintenance equipment, communications gear, infantry items, and field support equipment.

Developers
Multiple sources.

Naval Special Warfare (NSW) SEALs

Description
The Naval Special Warfare community—Navy Sea, Air, Land (SEAL) forces—is the Maritime Component of the U.S. Special Operations Command and the Special Operations Component of the Navy. The Commander, Naval Special Warfare Command is responsible for strategic vision; doctrinal, operational, and tactical guidance; and training, organizing, and equipping operational support components of the community. NSW forces provide a highly effective option across the spectrum of hostilities, from peacetime operations to limited and general war. They focus on the conduct of the principal mission areas of special operations: counter-terrorism; counter-proliferation, unconventional warfare; direct action; special reconnaissance; military information support operations; and security force assistance and civil affairs. NSW forces also conduct collateral missions such as counter-drug activities, humanitarian assistance, and personnel recovery.

The NSW community is organized under several major commands, which include five operational commands, one training command, one tactics and technology development command, and one Reserve Component command.

The major operational components of NSW are Naval Special Warfare Groups (NSWGs) One, Three, and Eleven in San Diego, California; and NSWGs Two, Four, and Ten in Little Creek, Virginia. The NSWG mission is to equip, support, and provide command and control elements as well as trained and ready SEAL platoons/troops, SEAL delivery vehicle (SDV) platoons, Special Boat Teams (SBT) combatant craft detachments, and other forces to the combatant commanders. Two of the NSWGs also provide administrative control to a total of four NSW units and one detachment that are home ported forward, and are under operational control of

a theater Special Operations Command. The primary deployable operational component of the community is the NSW Squadron (NSWRON). A NSWRON is a task-organized unit centered on a SEAL Team and led by a SEAL Team commanding officer. When a NSWRON is provisionally established, the deploying SEAL Team will normally be augmented by a combatant craft detachment; a support activity troop; an explosive ordnance disposal platoon; communications, intelligence, and tactical cryptological support detachments; Navy Seabees; and personnel or other detachments tailored for specific missions.

Status
Funding continued for NSW in accordance with Fiscal Guidance.

Developers
Multiple sources. Resources to support the NSW community are principally provided by U.S. Special Operations Command, but the Navy retains resourcing of responsibilities for service common capabilities.

Navy Expeditionary Intelligence Command (NEIC)

Description
The Commander, Navy Expeditionary Combat Command (COMNECC) established the Navy Expeditionary Intelligence Command to provide tactical indications and warning and force protection intelligence enabling Navy and joint commanders to conduct missions across the full spectrum of expeditionary operations. NEIC activities are framed around its overall function to man, train, and equip Intelligence Exploitation Teams (IETs) in support of naval component commanders and joint force commanders' operational requirements. NEIC activities can be categorized as Command Element, Command Support Staff, Active Component operational units, and a Reserve Component. IETs are multi-intelligence, surveillance and reconnaissance (ISR) collection platforms that operate at the tactical level, with unique access to areas and environments—from "blue" to "green" water, the coastal littoral, and far inland—that are constrained by more traditional ISR assets. NEIC capabilities give expeditionary, maritime, naval, joint and combined forces timely, relevant and actionable intelligence to deny the enemy sanctuary, freedom of movement, and use of waterborne lines of communication while enabling friendly forces to find, fix and destroy the enemy within the operation environment.

Status
COMNECC approved NEIC's reorganization into IETs in September 2010. NEIC's updated Table of Allowance was approved mid-2012.

Status
Multiple sources.

Navy Expeditionary Logistics Support Group (NAVELSG)

Description

The Navy Expeditionary Logistics Support Group consists of Navy Expeditionary Logistics Regiments (NELRs), Navy Cargo Handling Battalions (NCHBs), a Training and Evaluation Unit (TEU), and an Expeditionary Support Unit (ESU). NAVELSG is responsible for providing expeditionary logistics capabilities for the Navy, primarily within the maritime domain of the littoral. The NELRs and NCHBs are capable of rapid, worldwide deployment and are trained and equipped to provide shore-based logistical support to Navy, Marine Corps, and joint force commanders for peacetime support, crisis response, humanitarian assistance, and combat service-support missions. NCHBs can assume control of pier and terminal operations, surface or air cargo handling, and ordnance handling and management. Specialized capabilities include expeditionary fuel operations, pier and air terminal operations, cargo processing (including bulk mail), heavy-lift crane operations, customs inspections, expeditionary communications, short-haul trucking, and expeditionary warehousing.

Status

The ELSG Table of Allowance (TOA—an equipment allowance document that prescribes basic allowances of organizational equipment, and provides the control to develop, revise, or change equipment authorization inventory data) was approved March 2010. The Navy has developed a long-range plan to recapitalize the ToA and replace aging tools and equipment that are no longer parts supportable.

Developers

Multiple sources.

Maritime Civil Affairs and Security Training (MCAST) Command

Description

Maritime Civil Affairs and Security Training Command is a "soft power" enabling force that works within a combatant commander's area of operations to promote regional security and stability. The MCAST mission is to assess, plan and evaluate civil/military affairs activities in the maritime environment. MCAST delivers critical maritime civil affairs teams (MCAT) and security force assistance mobile training teams (SFA MTT) with a small footprint across a wide range of civil and military organizations, making them better suited to the capabilities of emerging world partners than larger naval forces, significantly enhancing partnership building. MCATs and MTTs are specially trained with cultural and language skills tailored to specific regions.

The MCAST areas of expertise include traditional civil affairs functions such as public education and health, but are regionally aligned and focused on three maritime-specific functions: commercial port operations; harbor and channel construction and maintenance; and marine and fisheries resources. The MTTs likewise provide a broad range of training, including expeditionary

security, small-boat operations and maintenance, weapons handling, marine engine maintenance, and professional development. MCAST Command assists with planning and coordination for U.S. country teams, non-combatant evacuation operations, refugee operations, host-nation interagency support, and restoration of communications and local infrastructures following military operations or natural disasters. MCAST Command is located in Dam Neck, Virginia.

Status
The MCAST Table of Allowance contains the equipment necessary for MCATs and MTTs to deploy in support of field operations.

Developers
Multiple sources.

EXPEDITIONARY SHIPS AND SPECIAL MISSION CRAFT

LCU 1610 Landing Craft Utility

Description
The Landing Craft Utility 1610 class vessels are self-sustaining craft complete with living accommodations and messing facilities for a crew of 13. An adaptation of the designs pioneered during the Second World War, the LCU 1610 class replaced the venerable Landing Craft Tank (LCT) Mk V starting in 1959. The LCU provides a persistent, long-range and high-capacity landing craft to complement the high-speed over the beach delivery capacity of the Landing Craft Air Cushion vehicle. The steel-hulled, diesel-propelled 1610 craft can carry a 144-ton payload to a nominal range of 1,200 nautical miles. These vessels have bow ramps for onload/offload and can be linked bow to stern gate of amphibious ships to create a temporary pier-like structure for at-sea onload/offload of vehicles and equipment. The LCU's welded steel-hull provides high durability with deck loads of 800 pounds per square foot. Arrangement of machinery and equipment has taken into account built-in redundancy in the event of battle damage. The craft features two engine rooms separated by a watertight bulkhead to permit limited operation in the event that one engine room is disabled. An anchor system is installed on the starboard side aft to assist in retracting from the beach.

LCUs have been adapted for many uses including salvage operations, ferry boats for vehicles, passengers and underwater test platforms, and have proven invaluable in support of humanitarian assistance/disaster response missions, including *Operation Tomodachi* tsunami relief in Japan, Hurricane Katrina, and *Operation Unified Response* in Haiti. They have been critical to non-combatant evacuation operations, such as the evacuation of more than 14,000 Americans from Lebanon in 2006.

Status
The LCU 1610 craft entered service more than 50 years ago. Rugged steel hulls and diesel engines have allowed these craft to

serve effectively well beyond their initial design service life. In early FY 2014, 32 LCU 1610-class craft were stationed at Little Creek, Virginia; Coronado, California; and Sasebo, Japan.

Developers

Christy Corporation	Sturgeon Bay, Wisconsin, USA
General Ship	Baltimore, Maryland, USA
Gunderson Brothers Marine	Portland, Oregon, USA
Marinette Marine	Marinette, Wisconsin, USA

LHA 6 *America*-Class General-Purpose Amphibious Assault Ship

Description

The America (LHA 6)-class general-purpose amphibious assault ships will provide forward presence and power projection capabilities as elements of U.S. expeditionary strike groups. With elements of a Marine landing force, *America*-class ships will embark, deploy, land, control, support, and operate helicopters and MV-22 *Osprey* and F-35B *Lightning II* aircraft for sustained periods. The LHA 6 class will also support contingency-response and forcible-entry operations as an integral element of joint, interagency, and multinational maritime expeditionary forces. The America (LHA 6) is the first of the class and is a variant of the USS Makin Island (LHD 8). The LHA 6 design includes LHD 8 gas turbine and hybrid-electric propulsion plant, diesel generators, and all-electric auxiliaries enhancements. *America* also provides a significant increase in aviation lift, sustainment, and maintenance capabilities: the ship is optimized to support F-35B operations with significantly increased JP-5 fuel capacity (1.3 million gallons compared to 600,000 gallons in LHD 8); LHA 6 has sufficient space to support elements of a Marine Expeditionary Unit or small-scale joint task force staff; the design incorporates substantial survivability upgrades and also increases service-life allowances for next-generation Marine Corps systems. The third of the class will modify the LHA 6 design to reduce JP-5 capacity, incorporate a well deck capable of supporting two LCACs, and a smaller island to allow for seven additional F-35B Joint Strike Fighter flight-deck spots and a topside MV-22 maintenance spot.

Status

Milestone B was reached in January 2006. The LHA 6 detailed design and construction contract was awarded in FY 2007. LHA 6 was launched June 4, 2012 and delivery is planned for early FY 2014. The Navy awarded the contract for LHA 7 on May 31, 2012.

Developers

Avondale Marine	Gulfport, Mississippi, USA
Gryphon Technologies LC	Panama City, Florida, USA
Huntington Ingalls Industries	
Ingalls Shipbuilding	Pascagoula, Mississippi, USA

LHD 1 *Wasp*-Class Amphibious Assault Ship

Description

The LHD 1 *Wasp*-class comprises eight 40,650-ton (full load), multi-purpose amphibious assault ships with a primary mission to provide embarked commanders with command and control capabilities for sea-based maneuver/assault operations as well as employing elements of a landing force through a combination of helicopters and amphibious vehicles. The *Wasp* class also has several secondary missions, including power projection and sea control. LHD 1-class lift characteristics include a flight deck for helicopters and vertical/short take-off or landing aircraft (AV-8B *Harrier* and MV-22 *Osprey*) and a well deck for air-cushioned and conventional landing craft. Each ship can embark 1,877 troops and has 125,000 cubic feet of cargo for stores and ammunition and 20,900 square feet for vehicles. Medical facilities include six operating rooms, an intensive-care unit, and a 47-bed ward. LHDs 5 through 7 are modified variants of the class; their design changes include increased JP-5 fuel capacity, fire-fighting and damage-control enhancements, and Women-at-Sea accommodations. The USS Makin Island (LHD 8) incorporates significant design changes including gas turbine propulsion, hybrid-electric drive, diesel generators, and all-electric auxiliaries. Two gas turbines, providing 70,000 shaft-horsepower, replace the two steam plants found on earlier ships in the class while the electric drive propels the ship when operating at low speeds to increase fuel efficiency. All ships in the class will be modified to support F-35B *Lightning II* Joint Strike Fighter operations.

Status

Eight LHDs have been delivered to the Fleet. The Navy commissioned the final ship of the class, Makin Island, on October 24, 2009 in San Diego, California. The USS Wasp will complete modifications to support F-35B operations in FY 2014. The LHD mid-life program is scheduled to begin in FY 2016 with the USS Essex (LHD 2) and will enable LHDs to meet amphibious mission requirements and achieve 40-year expected service lives (FY 2029 through FY 2049). The mid-life program is a key component to achieve LHD 1 Class Wholeness goals for hull, mechanical, and electrical systems, C5I (command, control, communications, computers, combat systems, and intelligence) systems, aviation, and training.

Developers

Huntington Ingalls Industries
Ingalls Shipbuilding — Pascagoula, Mississippi, USA

LPD 17 *San Antonio*-Class Amphibious Transport Dock Ship

Description

The *San Antonio*-class LPD is an amphibious transport dock ship optimized for operational flexibility and meeting Marine Air-Ground Task Force lift requirements in support of the expe-

ditionary maneuver warfare concept of operations. The *San Antonio*-class LPDs are 684 feet in length, with a beam of 105 feet, a maximum displacement of 25,000 long tons, and a crew of approximately 380. Four turbocharged diesels with two shafts and two outboard-rotating controllable-pitch propellers generate a sustained speed of 22+ knots. Other ship characteristics include 20,000 square feet of space for vehicles (about twice that of the *Austin* LPD 4-class that LPD 17 replaces), 34,000 cubic feet for cargo, accommodations for approximately 700 troops (800 surge), and a medical facility with 24 beds and four operating rooms (two medical and two dental). The well deck can launch and recover traditional surface-assault craft as well as two Landing Craft Air Cushion vehicles to transport cargo, personnel, tracked and wheeled vehicles, and tanks. The LPD 17 aviation facilities include a hangar and flight deck (33 percent larger than the LPD 4-class) to operate and maintain a variety of aircraft, including current and future fixed and rotary-wing aircraft. Other advanced features include the Advance Enclosed Mast/Sensor for reduced signature/sensor maintenance, reduced-signature composite-material enclosed masts, other survivability enhancements and self-defense systems, state-of-the-art C4ISR (command-control, communications, computers, intelligence, surveillance, and reconnaissance) systems, a Shipboard Wide-Area Network linking shipboard systems with embarked Marine Corps platforms, and significant quality-of-life improvements.

Status

The initial contract award to design and build the lead ship of the class was awarded to the Avondale-Bath Alliance in December 1996. In June 2002, the Navy transferred LPD 17 class workload from Bath Iron Works to Northrop Grumman Ship Systems; Huntington Ingalls Industries subsequently acquired Grumman Ship Systems. LPD 17 through 25 have been delivered as of early 2014. LPD 26 and 27 will deliver in FY 2016 and FY 2017, respectively.

Developers

Huntington Ingalls Industries	
Avondale Shipyard	New Orleans, Louisiana, USA
Huntington Ingalls Industries	
Ingalls Shipbuilding	Pascagoula, Mississippi, USA
Raytheon	San Diego, California, USA

LSD 41 / 49 *Whidbey Island* / *Harpers Ferry* Dock Landing Ships

Description

The mission of the *Whidbey Island* (LSD 41)- and *Harpers Ferry* (LSD 49)-classes is to transport, launch, and recover amphibious assault vehicles and landing craft with its crews and embarked personnel in an amphibious operation. The key difference between the LSD 49-class and the LSD 41-class is that the LSD 49-class cargo variants have significantly expanded cargo and ammunition stowage facilities compared to those of the LSD 41-class, but at the cost of decreased from four to two Landing Craft Air Cushion

(LCAC) capacity. The *Whidbey Island* class is the primary support and operating platform for LCACs and can also provide limited docking and repair services as a "boat haven" for small ships and craft. Both classes have two primary helicopter spots and can support Navy and Marine Corps helicopters as well as MV-22 tilt-rotor aircraft. Neither class is configured with a helicopter hangar, requiring aircraft fueling and rearming on the flight deck. LSDs are equipped with a vehicle turning area and tactical logistics communication spaces to facilitate and coordinate troop/vehicle movement and logistics. These ships have a doctor and dentist assigned as ship's company, two dental examination rooms, and one medical operating room.

Status

There are 12 LSDs in the fleet in early FY 2014: eight LSD 41-class and four LSD 49-class. Mid-life programs are designed around a 52-week maintenance availability with nine ships completed or in progress. The mid-life program will enable both classes to meet amphibious mission requirements and 40-year expected service lives (ESLs) with the first ship reaching ESL in FY 2025. The mid-life program improves material condition readiness, replaces obsolete equipment, and provides hull, mechanical, and electrical system upgrades.

Developers

Avondale Industries Inc.	New Orleans, Louisiana, USA
Lockheed Shipbuilding	Seattle, Washington, USA
Raytheon	San Diego, California, USA

LX(R) Dock Landing Ship Replacement

Description

LX(R) will replace the *Whidbey Island* (LSD 41) and *Harpers Ferry* (LSD 49) classes of Dock Landing Ships as they reach their 40-year expected service lives, beginning in 2025.

Status

The Navy's long-range shipbuilding plan under the FY 2014 President's Budget identified the LX(R) as an 11-ship program with lead ship procurement in FY 2019. LX(R) will be a recapitalization of the LSD 41/49 class, which will begin reaching the end of service life starting in 2025. Planning for a replacement has already begun to ensure necessary lead-time for program development. The LX(R) initial capabilities have been defined, and in early FY 2014 an Analysis of Alternatives is underway and expected to complete in mid-2014, focusing on analyzing affordability specific to the LX(R) design alternatives.

Developers

To be determined.

MCM 1 *Avenger*-Class Mine Countermeasures Ship Modernization (MCM Mod)

Description

The Avenger (MCM 1)-class surface mine countermeasures ships are used to detect, classify, and neutralize or sweep mines in sea lines of communication and naval operating areas. These ships are one leg of the mine countermeasures triad comprising airborne MCM and explosive ordnance disposal forces. MCM modernization improvements correct the most significant maintenance and obsolescence issues in order to maintain the ships through their full 30-year service lives. The modernization package includes: planned product improvement program upgrades on the Isotta Fraschini main engines and generators for MCM 3, MCM 4, and MCM 6 through MCM 14; replacement of the SLQ-48 mine neutralization vehicle, addressing obsolete components; upgrading the in-service SQQ-32 sonar with high-frequency wide-band capabilities; and replacing the existing acoustic sweep system with the Advanced Acoustic Generator/Infrasonic Advanced Acoustic Generator system. Other major hull, mechanical, and electrical alterations include upgrades to the 400-Hz distribution system, replacement of aft deck hydraulic equipment with electric equipment, replacement of the diesel generator analog voltage regulators with digital voltage regulators, and upgrading the navigation system.

Status

The 13-ship MCM Modernization program commenced in FY 2004 and is scheduled to complete by FY 2016.

Developers

Raytheon — Portsmouth, Rhode Island, USA

Mobile Landing Platform (MLP)

Description

The Mobile Landing Platform is based on commercial float-on/float-off (FLO/FLO) technology to provide a surface interface between large medium-speed roll-on/roll-off prepositioning ships and Landing Craft Air Cushion (LCAC) surface connectors. The MLP is a major component of the Navy-Marine Corps solution for enhancing Maritime Prepositioning Squadrons throughput capability by expanding operating environments and access opportunities. The MLP is 785 feet in length with a beam of 165 feet—more than a third wider than most ships of similar length—making it an extremely stable platform for sea-base operations. MLP 1 and 2 will provide an elevated vehicle staging area and three LCAC lanes that will allow for the transfer of equipment at sea in non-anchorage depths and delivery from over the horizon through restricted access environments. MLP 3 and 4 are an Afloat Forward Staging Base (AFSB) variant and include a forward house (250 berths) outfitted with common spaces to support ready room, command, operations, and logistics functions; operating spots for two MH-53E Sea Stallion Airborne Mine Countermeasures (AMCM) helicopter with parking for two ad-

ditional helicopters, a hangar and ordnance magazines; an underway replenishment capability; and deck space for AMCM or special operations force boats, sleds, and equipment.

Status

The USNS Montford Point (MLP 1) was delivered to the Navy in May 2013 and will join the Fleet in 2015. The USNS John Glenn (MLP 2) will be delivered to the Navy in February 2014. The USNS Lewis Puller (MLP 3) is scheduled to deliver in September 2015. The unnamed MLP 4 is an FY 2014 procurement.

Developers

General Dynamics NASSCO	San Diego, California, USA
Lockheed Shipbuilding	Seattle, Washington, USA
Raytheon	San Diego, California, USA
Vigor Marine	Portland, Oregon, USA

Surface Connector (X) Replacement (SC(X)R)

Description

The Surface Connector (X) Replacement (SC(X)R) is envisioned to recapitalize the capabilities currently derived from the long-serving LCU 1610-class landing craft, first acquired in 1959. SC(X)R will be a self-sustaining craft complete with living accommodations and messing facilities for the crew to enable persistent operation for up to ten days or intra-theater transit of up to 1,200 nautical miles. The SC(X)R will provide additional operational flexibility and a level of persistence that no other asset smaller than an amphibious warfare ship provides to the operational commander. Carrying equipment, troops, and supplies in any combination up to its maximum capacity of 170 tons, the SC(X)R will launch from a well deck-equipped amphibious warfare ship, transit to the surf zone, and land vehicles/cargo to provide organic mobility from the sea base to the shore. The SC(X)R program addresses the gap in heavy sea-to-shore lift that will emerge as a result of the advanced age of the LCU 1610-class craft.

Status

SC(X)R completed Navy Gate 1 in 2013. An Analysis of Alternatives to identify the suitable candidates to replace the LCU 1610 will complete in mid-FY 2014.

Developers

To be determined.

Ship-to-Shore Connector (SSC) / LCAC 100

Description

The Ship-to-Shore Connector/Landing Craft Air Cushion 100 (SSC/LCAC 100) vehicles will provide high-speed, heavy-lift for over-the-horizon maneuver, surface lift, and shipping. The SSC/LCAC 100 is addressing the gap in heavy sea-to-shore lift that will emerge as the upgraded in-service LCACs reach their extended service lives after FY 2015. These older LCACs will undergo additional life extending maintenance between FY 2015 and FY 2022 to prepare them for continued service. The last older LCAC is not expected to leave service until FY 2027. The SSC/LCAC 100 payload design will exceed the legacy LCAC payload. The SSC design targets high failure rate and maintenance intensive systems in LCAC to increase reliability and reduce life cycle costs. SSC/LCAC-100 will also employ enhanced lift fans, propellers, and greater use of composite materials.

Status

The Joint Requirements Oversight Council approved the Initial Capabilities Document in October 2006. An Analysis of Alternatives was approved in early FY 2008, and the Capability Development Document was approved in June 2010. Initial Operational Capability is scheduled for FY 2020. The Navy awarded the contract for the detailed design and construction of the first craft with options to build eight additional craft in July 2012. The first craft is funded by research and development to serve as a crew-transition training platform for LCAC crews to become familiar with LCAC 100 and as an operational test and evaluation platform. The options included in the contract enable the Navy to begin low rate initial procurement of the first cohort of craft to support fleet introduction in the FY 2020 timeframe.

Developers

Alcoa Defense	Pittsburgh, Pennsylvania, USA
L-3 Communications	New York, New York, USA
Textron Marine & Land Systems	New Orleans, Louisiana, USA

EXPEDITIONARY SYSTEMS

AQS-20A Mine-Hunting Sonar

Description

The AQS-20A is an under-water mine-detection sonar that also employs an electro-optic identification sensor capable of locating and identifying bottom, close-tethered, and moored sea mines. The AQS-20A system will serve as the mine-hunting sensor subsystem of the Remote Minehunting System hosted onboard the Littoral Combat Ship.

Status

Improvements to the computer-aided detection/computer-aided classification and environmental data collection capabilities are being implemented via enhanced research and development efforts. AQS-20A Initial Operational Capability is projected for FY 2015.

Developers

Raytheon	Portsmouth, Rhode Island, USA

Assault Breaching System (ABS)

Description

The Assault Breaching System (ABS) program focuses on development of standoff systems to locate and neutralize mine and obstacle threats in the beach and surf zones. The program uses a system of systems approach that includes incremental development of the Coastal Battlefield Reconnaissance and Analysis (COBRA) mine/obstacle detection system and precision craft navigation and lane marking capabilities. The Joint Direct Attack Munition (JDAM) Assault Breaching System (JABS) provides in-service neutralization capability against "proud" (i.e., not buried) mines and obstacles in the beach and surf zones (to water depth of ten feet). The platform for the COBRA system is the Fire Scout Vertical Take-off Unmanned Aerial Vehicle. Platforms for employment of the JABS and future neutralization systems include Navy strike aircraft and Air Force bombers.

Status

The COBRA Block I system achieved Milestone C in FY 2009, and Initial Operational Capability is scheduled for FY 2016. JABS is a fielded capability in the beach and surf zone with a planned expansion to a very-shallow water capability (to 40-foot water depth) by FY 2016.

Developers

Arete	Tucson, Arizona, USA
Boeing	St. Louis, Missouri, USA

Joint Mission Planning System-Expeditionary (JMPS-E)

Description

The Joint Mission Planning System-Expeditionary is a web-based mission-planning system that can be tailored as a decision-support tool for the Amphibious Ready Group (ARG). It is a scalable, distributed planning environment, specifically designed to automate the Rapid Response Planning Process (R2P2) and to increase the mission effectiveness of the ARG with its Amphibious Squadron and Marine Expeditionary Unit. The web-based implementation provides the technological capability for user-ready access to geographically/architecturally disparate systems' data. The system provides an architecture that integrates two decision support tools developed under other government programs with the JMPS framework—the Expeditionary Strike Planning Folder and Expeditionary Decision Support System. The reuse of these two systems provides a capability to conduct crisis action planning from a sea-base for ship–to-objective maneuver. Staff planning effectiveness will increase by reducing the time required to respond to initial tasking and change orders, thus providing more time for contingency planning and mission rehearsal. Time-intensive and tedious processes, such as automated filling of briefing templates and data importing, will become automated, thus contributing

to reduced human error rates and less rework. Shorter planning times will also be facilitated by enabling standardization of the workflow processes, work products, and briefing material through implementation of workflow visual aids, administrative task automation, user alerts and notifications, and near-real time data updates from other systems.

The system bridges Navy and Marine Corps systems with planned interfaces to Portable Flight Planning Software, Global Command and Control System-Maritime, JMPS, and Command and Control Personal Computer, JMPS-E will also operate on several naval networks, including Integrated Shipboard Network System, Consolidated Afloat Networks and Enterprise Services, and the Marine Corps Enterprise Network. System interfaces will facilitate collaboration by sharing a common planning picture thereby increasing situational awareness for all planners.

Status

JMPS-E is fully Information Assurance certified and JMPS-E integrates with current net-centric shipboard capabilities to streamline the R2P2 process, enhance concurrent parallel mission planning, assist in the administrative orders development and message process, and provide an excellent "on map," "real time" briefing tool with automatic export to PowerPoint. JMPS-E reached Full Operational Capability in May 2012. The Navy is coordinating with the Marine Corps to integrate service software planning tools to ensure cross-service planning synchronization.

Developers

BAE (Developer)	Rancho Bernardo, California, USA
SAIC (Technical Support)	McLean, Virginia, USA

KSQ-1 Amphibious Assault Direction System (AADS)

Description

The Amphibious Assault Direction System with Enhanced Position Location Reporting System, integrates the NAVSTAR Global Positioning System to form a jam/intercept-resistant, friendly force tracking and command and control system that supports the surface assault ship-to-shore movement in amphibious operations. AADS provides the capability to launch, monitor, track, and control surface or combined surface and air amphibious assaults up to 100 nautical miles over the horizon (OTH); facilitates seamless integration with USMC tactical radio (PRC-117G) during ship-to-objective-maneuver operations; supports OTH operations; and is integrated with Global Command and Control System-Maritime.

Status

In early FY 2014, AADS is installed across 31 amphibious warships, 78 Landing Craft/Air Cushion vehicles (LCACs), and 32 utility landing craft (LCUs), in addition to Assault Craft Unit (ACU) 4 and 5 control towers, and Expeditionary Warfare Training Group Atlantic/Pacific classrooms. AADS satisfies a CNO Operational Requirement for an Over-the-Horizon Amphibious Assault Command and Control System. Future capability enhancement will include acquisition of Downsized Radio Relay Group to reduce relay-helicopter footprint.

Developers
Naval Surface Warfare Center Panama City Division — Panama City, Florida, USA

Mk 62/63/65 Naval Quickstrike Mines

Description
The in-service Quickstrike family of aircraft-delivered shallow-water bottom mines is being enhanced significantly by procurement of the programmable Target Detection Device (TDD) Mk 71. Engineering development efforts include new advanced algorithms for ship detection, classification, and localization against likely threats, including quiet diesel-electric submarines, mini-subs, fast patrol boats, and air-cushioned vehicles. The Quickstrike series includes one dedicated thin-wall mine—the 2,300-pound Mk 65 weapon—and two mines converted from conventional, general-purpose bombs—the Mk 62 500-pound and Mk 63 1,000-pound mines—using the Conversion Kit Mk 197.

Status
In-service support continues for mine and TDD inventories, and funding is in place for algorithm development and procurement of the TDD Mk 71 and associated hardware for Conversion Kit Mk 197. Aircraft integration and testing is ongoing to certify this new configuration for use on various Navy and Air Force aircraft.

Developers
Sechan Electronics, Inc. — Littiz, Pennsylvania, USA

WLD-1 Remote Minehunting System

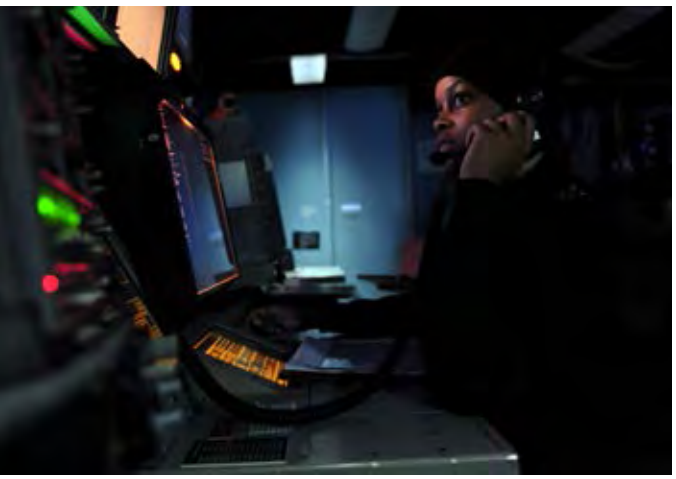
Description
The WLD-1 Remote Minehunting System (RMS) consists of one Remote Multi-Mission Vehicle (RMMV) and one AQS-20A Variable Depth Sonar (VDS). RMS is a high endurance, semi-submersible, unmanned off-board, low-observable vehicle that will be operated from the Littoral Combat Ship (LCS). RMS is launched with a pre-programmed search pattern and will search, detect, classify, and identify non-mine objects and mine threats. RMS is capable of line-of-sight and over-the-horizon operations. Once the mission is completed, RMS will return to the ship and data will be downloaded for post-mission analysis in which targets classified as mines are passed to follow-on systems for neutralization.

Status
The RMS will conduct Developmental Testing and Operational Assessment in the first quarter of FY 2014 and is on track to complete Milestone C also in FY 2014. To support LCS integration, RMS continues to implement upgrades, including the Multi-Vehicle Communication System, launch and recovery improvements, and fleet suitability upgrades. RMS Initial Operational Capability will occur following completion of LCS MCM Mission Package Initial Operational Test and Evaluation in FY 2015.

Developers
Lockheed Martin — Riviera Beach, Florida, USA

INFORMATION DOMINANCE

The Navy's Information Dominance enables assured maritime command and control and superior battlespace awareness to deliver sustained, integrated fires across the full spectrum of 21st Century maritime warfare. The Navy's information capabilities and info-centric communities place the Navy in a better position to meet the challenges and threats of the Information Age. Success in the Information Age will require unmatched mastery of the capabilities, tools and techniques that enable us to collect, process, analyze, and apply information.



COMMUNICATIONS, NETWORKS, AND CIO

Afloat Electromagnetic Spectrum Operations (AESOP)

Description

The U.S. Navy's Afloat Electromagnetic Spectrum Operations Program is the only fielded operational spectrum planning tool that integrates surface radars, combat systems, and communications frequencies to deconflict and reduce the electromagnetic interference (EMI) impacts for ships and strike groups. AESOP also develops the Operational Tasking Communication (OPTASK COMM) and OPTASK Electronic Warfare (EW) Annex K Radar frequency plans that support strike groups and coalition navies in joint exercises, to ensure all systems interoperate and missions are successful. AESOP uses U.S. Navy-approved propagation models that include all strike group emitters—Navy and coalition partners—in order to identify and mitigate potential interoperability issues. In addition, AESOP helps to ensure that systems are in compliance with both national and international spectrum allocations and regulations. AESOP provides many benefits and enables the warfighter to maximize the performance of their systems by reducing system susceptibilities to interference or unintentional jamming, resulting in clear communications, increased detection ranges and intercepts, and enhanced awareness for emission control.

Status

The importance of radio frequency assignments for guided-missile ships dates back to 1963. Since then, guidance has been provided through messages, manuals, and, eventually, software with AESOP v1.0, first released in December 2003. In 2004, Fleet Commanders mandated the use of AESOP for every underway period, deployment, operation, or exercise. In 2005, the Chief of Naval Operations reinforced this mandate in an All Commands message. AESOP v3.0, the version in service in FY 2014, was distributed to the Fleet in 2011 and is fielded and in use by 218 ships and 196 ashore commands.

Accompanying the AESOP software programs are the EMC Criteria for Navy Systems Revision 3 and the Littoral Spectrum Restrictions Revision 4.

AESOP is a man-in-the-loop fleet capability. With its sophisticated models and algorithms, the program creates OPTASK plans in minutes versus a manual process that would require days to complete. The next logical progression for AESOP is to integrate and automate this capability with shipboard sensors and develop a real-time spectrum operations capability. This transition from a static, assignment-based spectrum management system to a fully automated, real-time system is outlined in the Navy's Information Dominance Roadmap for Electromagnetic Spectrum (EMS) Usage. The EMS Usage Roadmap provides plans of action with timelines to drive Navy policy, engagement, and investment decisions regarding the operationalization of the electromagnetic spectrum.

Developers

EOIR Corporation	Dahlgren, Virginia, USA
Naval Surface Warfare Center Dahlgren Division	Dahlgren, Virginia, USA
SENTEL Corporation	Dahlgren, Virginia, USA

Airborne ASW Intelligence (AAI)

Description

Airborne antisubmarine warfare intelligence enables measurement and signature intelligence (MASINT). AAI is responsible for 70 percent of the U.S. Navy's acoustic intelligence collections, 100 percent of active target strength measurement (ATSM) collections, and 100 percent of electromagnetic collections. Additionally AAI enables environmental characterization and rapid development and insertion of advanced ASW capabilities on board fleet assets. AAI products provide input to the Navy's tactical ASW decision aids, oceanographic prediction models, strategic simulations, fleet ASW training, and the development of future ASW sensors. The program additionally supports emergent and special ASW operations.

In-service AAI collection platforms include the P-3C *Orion* fixed-wing aircraft and the SH-60B *Seahawk* helicopters. AAI also will be incorporated on board the P-8A *Poseidon* and MH-60R helicopters. Collection of ASW intelligence provides products to all tactical decision aids and across all ASW engineering disciplines for performance improvements and development of next-generation ASW weapons systems.

Status

The Airborne ASW intelligence program provides and maintains collection suites to support up to 22 P-3C aircraft and 12 SH-60B helicopters. The program modified eight P-3Cs and 12 SH-60Bs in FY 2012 in preparation of squadron forward deployments to Seventh, Sixth, and Fifth Fleet areas of responsibility.

In FY 2014, the program will conduct engineering analysis on P-8A acoustic systems to verify the platform's acoustic-intelligence collection capabilities for certification and will develop platform specific ACINT collection guidelines and calibration procedures. The program will make improvements to the Tactical Acoustic Processing System used to conduct detailed analysis and mission reconstruction of collected acoustic intelligence data against real-world submarines. AAI will recapitalize the Navy Underwater Active Multiple Ping family of sonobuoys that enables calibrated measurement of threat submarines for the improvement of ASW modeling, simulations, and weapons systems that use active sonar emissions.

Developers

EAGLE Systems	Lexington Park, Maryland, USA
ERAPSCO	Columbia City, Indiana, USA
General Scientific Corporation	Lexington Park, Maryland, USA

Automated Digital Network System (ADNS)

Description

The Automated Digital Network System is the key enabler for delivering net-centric capabilities that depend upon robust, dynamic, adaptable, survivable, and secure communications. ADNS is the shipboard network interface that enables connectivity between the ship's internal network and the outside world via radio frequency (RF) spectrum and landline when pier-side. ADNS is also installed in Navy network operations centers (NOCs), enabling the NOCs to transmit and receive voice and data to and from ships. ADNS provides capability that enables unclassified, secret, top secret, and various joint, allied, and coalition services to interconnect to the Defense Information Systems Network. ADNS Increment I combined data from different enclaves and transmits across available communications paths. ADNS Increment II added the capability to manage traffic from multiple enclaves simultaneously over multiple transit paths including RF and terrestrial links, but still did not satisfy the Fleet's need for a higher throughput. Increased throughput and converged Internet Protocol (IP) (voice, video, and data) capabilities were delivered to the Fleet with the deployment of Increment IIa/IIb. ADNS Increment III brings a protected core, reducing the exposure to cyber warfare network infiltration. It supports 25 megabits per second (Mbps) aggregate throughput for submarines and unit-level ships and 50 Mbps aggregate throughput for force-level ships. ADNS Increment III is a key enabler of the Navy's counter anti-access/area-denial capability.

Status

In FY 2005, all active ships and ashore network operations centers facilities were equipped with either ADNS Increment I or II; additionally, all active submarines and broadcast control authority facilities were equipped with Increment I. In FY 2006, ADNS Increment IIa installations began on aircraft carriers, large-deck amphibious assault ships, and fleet commander flagships (force-level ships). In FY 2007, ADNS Increment IIb installations began on unit-level ships. In FY 2008, select airborne platforms were incorporated into ADNS, bringing network connectivity to additional fleet assets. Increment III low-rate initial production began in FY 2009. ADNS Increment III reached IOC in FY 2010. Ashore NOC installations were completed in FY 2010. Increment III will be installed on all ships and submarines and their respective shore facilities. ADNS Increment III is planned to reach Full Operational Capability in FY 2020 and is synchronized with CANES deployment.

Developers

Science Applications International Corporation	Arlington, Virginia, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA
Space and Naval Warfare Systems Command PEO C4I	San Diego, California, USA

Base Communications Office

Description

Base Communications Office provides:

Operations and Maintenance: Manage telephone switching networks and outside cable plant infrastructure.

Telephone Services: Operate, maintain, and manage government and commercial service delivery points providing connectivity to Defense Switch Network (DSN), Public Switched Telephone Network (PSTN), and General Services Administration NETWORX commercial long distance service.

Audio Conferencing Services: Operate and maintain ad-hoc unclassified audio conferencing services.

Billing Support: Provide telephone invoice validation and customer billing, and process customer requests for services.

Voicemail Services: Operate and maintain standard business class voicemail services.

Customer Support: Support of customer requirements; requirements definition and planning; review of military construction and special projects; and move, add, and change telephone services.

Fleet Cyber Command/Tenth Fleet manages the program, and the PEO-C4I/PMW790 Shore Telephony Project Office provides acquisition support to the BCO program, which serves more than 350,000 Navy personnel worldwide. Lifecycle switch replacement provides voice over Internet Protocol capability.

Status

Naval Computer and Telecommunications Area Master Stations BCOs provide base communications services and support to approximately 3,890 Navy and non-Navy shore activities and deployable units. BCOs operate, maintain, and manage the communications infrastructure supporting the transport of switched voice, video, and data in support of 49 BCOs worldwide. BCOs provide services at 114 campuses (base/station/other) and manage 153 government-owned telephone switches and 21 commercial dial tone Combined Enterprise Regional Information Exchange locations worldwide. This program responds to more than 69,000 customer service requests worldwide each year, and its operators and auto attendants handle some 320,000 calls per month.

Developers

Science Applications International Corporation	Arlington, Virginia, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA

Base Level Information Infrastructure (BLII)

Description

Base Level Information Infrastructure provides a fully integrated, interoperable, and secure IT infra-structure that enables the rapid and reliable transfer of voice, video, and data to forward-deployed Outside of Continental United States (OCONUS) bases, stations, homeports, and piers. BLII area of responsibility includes 14 major OCONUS fleet bases, stations, and other remote locations. BLII provides the PEO C4I infrastructure, hardware, and software for the Fleet Cyber Command/Tenth Fleet-managed ONE-NET Network Operations. BLII also sustains Navy pier IT infrastructure capability (CONUS and OCONUS), which includes maintaining pier fiber runs, conduits, junction boxes, brow umbilicals, and associated electronics. Modern pier IT infrastructure enables forward-deployed ships to maintain situational awareness, receive operational and intelligence traffic, and perform maintenance or training on their radio frequency systems while pier-side.

Status

This program provides IT services to 28,000 BLII/ONE-NET seats, supporting approximately 51,000 forward-deployed OCONUS Navy users.

Developers

Booz, Allen and Hamilton	San Diego, California, USA
Deloitte	San Diego, California, USA
Computer Sciences Corporation	San Diego, California, USA
Science Applications International Corporation	San Diego, California, USA

Battle Force Tactical Network (BFTN)

Description

The Battle Force Tactical Network provides high-frequency internet protocol (HFIP) and subnet relay (SNR) to allied, coalition, and national naval and maritime units with a direct platform-to-platform tactical networking capability using legacy ultra-high-frequency (UHF) and high-frequency (HF) radios. The two technologies operate efficiently with current legacy equipment providing a cost-effective solution for achieving tactical IP networking at sea. BFTN enables warfighters on Combined Enterprise Regional Information Exchange System-Maritime (CENTRIXS-M) and Secure Internet Protocol Routing Network (SIPRNET) networks to execute and plan in a real-time tactical environment by transporting IP data directly to and from ships, submarines, and aircrafts. BFTN also serves as a primary backup for SIPRNET in the absence of satellite communications. HFIP operates in the HF spectrum and is capable of data rates of 9.6 kbps in single side band and 19.2 kbps in independent side band. SNR operates in the UHF spectrum and is capable of data rates up to 64 kbps. BFTN allows surface platforms the ability to share a single SATCOM resource for reach-back capability. HFIP also supports the hardware/software upgrade requirements for battle force email. BFTN is a key enabler of counter anti-access and area-denial capability.

Status

The USS Harry S. Truman (CVN 75) was the first carrier strike group to deploy with HFIP and SNR. Elements of BFTN have been tested in multiple *Trident Warrior* exercises to experiment with this capability and have been effective in achieving improved data rates. The Milestone C Acquisition Decision Memorandum, approved in September 2011, authorized Low-Rate Initial-Production system procurement to begin. The Navy plans to install BFTN on approximately 255 ships, submarines, and aircraft, with full operational capability planned for FY 2022.

Developers

Quatech	Hudson, Ohio, USA
Rockwell-Collins	Cedar Rapids, Iowa, USA
Science Applications International Corporation	San Diego, California, USA

Commercial Satellite Communications (COMSATCOM)

Description

The Commercial Satellite Communications program augments military satellite communications capabilities in support of surface combatants and includes two elements: the new Commercial Broadband Satellite Program (CBSP) and the legacy Commercial Wideband Satellite Program (CWSP). CWSP will continue in the Fleet until replaced by CBSP. The CBSP terminal is the USC-69(V); the CWSP terminal is the WSC-8(V). The CBSP USC-69(V) terminal has three variants for force-level, unit-level, and small ships. All terminal groups transport voice, video and data, e.g., NIPRNET, SIPRNET, JWICS DCGS-N, and other requirements. The CBSP program also includes the worldwide space segment and end-to-end architecture.

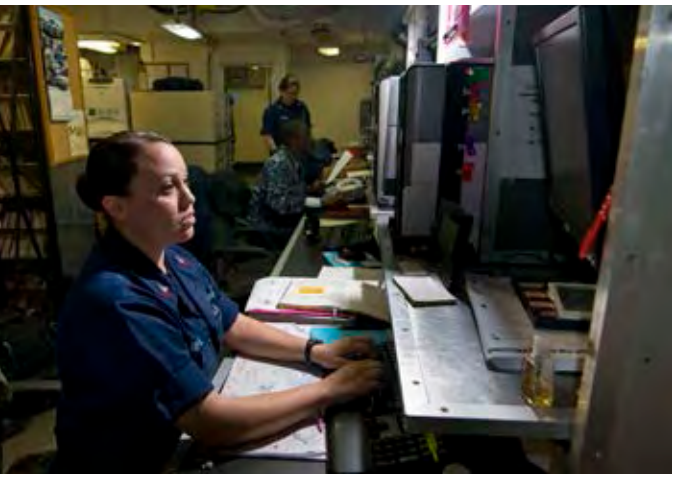
INMARSAT terminals are no longer operational on surface warships. Navy use of Iridium on surface combatants is for emergency communications. Separate from the emergency communications requirement on ships, the Navy has more than 3,000 Iridium devices that are used for various purposes at shore command locations to meet low bandwidth voice and video requirements.

Status

CBSP was established as a rapid deployment capability in March 2007, achieved program Milestone C September 2009, initial operational capability in June 2010, and full rate production in September 2011; full operational capability is estimated for FY 2020. As of December 31, 2011, all ships reliant on INMARSAT transitioned to CBSP. The approved CBSP terminal objective is 192 ships. As of the end of FY 2013, 66 ships were operational with the CBSP terminal, and a total of 148 are funded through FY 2019. The legacy CWSP WSC-8 will continue in the fleet until replaced by the CBSP terminal in the FY 2015-2016 timeframe.

Developers

CVG, Inc. (CBSP)	Chantilly, Virginia, USA
Harris Corporation (CBSP/CWSP)	Melbourne, Florida, USA
Iridium LLC (IRIDIUM)	McLean, Virginia, USA
L3 Communications (JEOD VSAT)	Victor, New York, USA



Consolidated Afloat Network Enterprise System (CANES)

Description

Consolidated Afloat Networks and Enterprise Services is the Navy's program of record to replace existing afloat networks and provide the necessary infrastructure for applications, systems, and services to operate in the tactical domain. CANES is the technical and infrastructure consolidation of existing, separately managed afloat networks. CANES will replace legacy afloat network designs that have reached end of service lives in FY 2012. CANES will provide capacity for enterprise information assurance management. It will also reduce total ownership cost through consolidation and normalization of products and services while employing constant competition to enable efficient acquisition of new fleet requirements and capabilities.

CANES will deliver the next generation of Navy tactical networks through a common computing environment and afloat core services to replace the aging legacy networks currently deployed throughout the Fleet. CANES will provide complete infrastructure, inclusive of hardware, software, processing, storage, and end user devices for unclassified, coalition, secret, and sensitive compartmented information for all basic network services (email, web, chat, collaboration) to a wide variety of navy surface combatants, submarines, maritime operations centers, and aircraft. In addition, approximately 36 hosted applications and systems inclusive of command and control, intelligence, surveillance and reconnaissance, information operations, logistics and business domains require CANES infrastructure in order to operate in the tactical environment.

Integrating these applications and systems is accomplished through Application Integration, the engineering process used to evaluate and validate compatibility between CANES and the Navy-validated applications, systems and services that will use the CANES infrastructure and services. Specific programs, such as Distributed Common Ground System-Navy, Global Command and Control System-Maritime, Naval Tactical Command Support System, and Undersea Warfare Decision Support System, are dependent on the CANES Common Computing Environment to field, host, and sustain their capability because they no longer provide their own hardware. CANES requires Automated Digital Network System to be fielded prior to or concurrently with CANES due to architectural reliance between the two programs. CANES will field on rolling four-year hardware and two-year software baselines. CANES capability is based on the concept of reducing the number of afloat networks and providing greater efficiency through a single engineering focus on integrated technical solutions. This will streamline acquisition, contracting, and test events, as well as achieve lifecycle efficiencies through consolidation of multiple current configuration management baselines, logistics, and training efforts into a unified support structure.

Status

CANES Milestone C was achieved December 2012, authorizing the program to transition to the Production and Deployment phase of the acquisition lifecycle. Initial Limited Deployment fielding of CANES systems commenced with CANES installation on board the USS Milius (DDG 69) in December 2012, with initial operational testing and evaluation scheduled to be completed in FY 2014 to support of a Full Deployment Decision.

Developers

Northrop Grumman Space and Mission Systems Corporation — Reston, Virginia, USA

Defense Red Switch Network (DRSN)

Description

The Defense Red Switch Network is the secure circuit-switched element of the Defense Information System Network, providing reliable and high-quality secure voice, data, and conferencing capabilities to senior national, combatant commander, and fleet commander decision-makers. The DRSN program ensures that operational commanders have immediate access to a flash-precedence, robust, multi-level secure, physically diverse, and survivable voice network. The Department of Defense and select federal agencies have a continuing operational requirement for a separate, controlled, and interoperable multi-level secure communications and conferencing network to support command, control, and crisis-management activities. The DRSN capability satisfies that requirement and comprises a network of circuit switches interconnected by the DISN backbone and commercial transmission links as well as gateway access to the Voice over Secure IP network.

Status

As assigned by the Joint Staff, the Navy has responsibility for operations and maintenance of five switches in the DRSN network: Joint Staff Detachment (Former Commander, Joint Forces Command, Norfolk, Virginia); Commander, Pacific Command (Camp H.M. Smith, Hawaii); Commander, Pacific Fleet (Pearl Harbor, Hawaii); Commander, Naval Forces Europe (Naples, Italy); and Commander, U.S. Naval Forces Central Command (Manama, Bahrain). The Fleet Cyber Command is responsible for facilities, personnel, training, logistics, security and accreditation, and command policy for DRSN assets under Navy operational control.

Developers

Raytheon — Waltham, Massachusetts, USA

DoD Teleport

Description

Department of Defense (DoD) Teleport links the satellite communications space segment with the shore infrastructure and provides tactical users with a worldwide communications interface to the global information grid (GIG). Through multiple military radio frequency paths, DoD Teleport provides inter-theater reachback into the Defense Information Systems Network (DISN) and service C4I (command, control, communications, computers, intelligence, surveillance, and reconnaissance) systems, as well as intra-theater communications support for tactical users. In 2001, DoD designated Navy as the DoD Teleport requirements sponsor with the Defense Information Systems Agency as the Executive Agent. Teleports are located at six primary sites and one secondary site. The Navy operates and maintains Teleports at Wahiawa, Hawaii; Northwest, Virginia; Lago Patria, Italy; and Bahrain. Non-Navy Teleport sites are located at Fort Buckner, Okinawa, Japan; Camp Roberts, California; and Landstuhl/Ramstein, Germany.

Status

DoD Teleport Generation (GEN) I and II are in sustainment, and GEN III has commenced procurement. GEN III comprises three phases. Phase 1 provides advanced extremely high frequency (AEHF)-capable terminals at the Teleports using the Navy Multiband Terminal (NMT). Phase 1 reached Milestone C in Sept 2010, and NMT installs began in the second quarter of FY 2012. Phase 2 upgrades the X/Ka band terminals, using the Army Modernization Enterprise Terminal to ensure compatibility with the Wideband Global Satellite (WGS) constellation. Phase 2 went through a successful Critical Design Review in FY 2011. DoD Teleport Gen III Phase 2 reached Milestone C in the third quarter of FY 2012. Phase 3 provides Mobile User Objective System-to-legacy Ultra-High Frequency (MUOS-UHF) interoperability. DoD Teleport GEN III will reach Full Operational Capability in FY 2018.

Developers

Arrowhead	Alexandria, Virginia, USA
Raytheon	St. Petersburg, Florida, USA
ViaSat	Carlsbad, California, USA

Enterprise Services

Description

Enterprise Services establishes Navy's enterprise-level information technology services that provide opportunities and enhance user capabilities to meet Navy needs while increasing security and achieving cost efficiencies. Enterprise Services provides the capabilities to manage and deliver the Navy's IT services centrally, enabling it to: reduce total ownership costs; promote information sharing and interoperability in the Department of the Navy (DoN) and Department of Defense (DoD); ensure compliance with DoD and congressional IT mandates; and significantly improve the Navy's information assurance (IA) posture. This allows seamless access to resources no matter where they connect to the Navy or DoD. Initial efforts in Enterprise Services focus on consolidating data centers, as well as establishing enterprise software

licensing agreements. Managing services at the enterprise level provides an opportunity to eliminate stovepipe systems that do not communicate with each other and enhance the Navy warfighters' capability to access mission critical information. The DoN has made significant progress eliminating legacy networks, servers, systems, applications, and duplicative data environments. These Enterprise Services will be leveraged across the DoN and our joint partners to provide seamless connectivity to mission-critical information. Future technological demands warrant higher levels of interoperability with our joint partners and allies to achieve operational efficiency and success. Enterprise Services are critical enablers to help the DoN achieve information dominance, offering significant advantages operationally while enhancing our cyber security posture.

Status

The Navy is in the process of consolidating its data centers dispersed throughout the continental United States. The Navy Data Center Consolidation (DCC) initiative will leverage DoN, Space and Naval Warfare Systems Command, Defense Information Systems Agency, and commercial data centers to provide enterprise capabilities to satisfy system, application, and database hosting requirements for the Navy.

The Navy is engaged in implementing various IT infrastructure modernization and cost savings consolidation initiatives in preparation for transitioning to the Joint Information Environment (JIE). Throughout the future years defense program, the Navy will reduce total Navy data centers to 25 or fewer. In addition to DCC, the Navy is actively engaged in other IT efficiency efforts, including Enterprise Software Licensing (ESL), Navy Portal Consolidation, and Application Rationalization.

With the Marine Corps as the lead, the Navy established enterprise service license agreements with major software manufacturers starting in FY 2012. ESL is a strategic effort to leverage the combined buying power of the Navy and Marine Corps to improve the DoN's IT/cyberspace investment decision practices by providing DoN enterprise-level evaluation and management. The Department of Navy awarded an ESL agreement to Oracle Products in June 2013. All of these efforts mutually support and complement the federal DCC efforts and goals.

Developers

Various

EP-3E ARIES II Spiral 3

Description

The EP-3E ARIES II Spiral 3 aircraft is the Navy's premier manned Airborne Intelligence, Surveillance, Reconnaissance, and Targeting (AISR&T) platform supporting naval and joint commanders. EP-3Es provide long-range, high-endurance support to carrier strike groups and amphibious readiness groups in addition to performing independent maritime operations. The current force consists of one active duty squadron based at Naval Air Station Whidbey Island, Washington.

Although optimized for the maritime and littoral environments, capability upgrades have ensured EP-3E mission effectiveness in support of global contingency operations. The fusion of internet protocol (IP) connectivity, the incorporation of imagery intelligence capability, and completion of significant signals intelligence (SIGINT) upgrades enables continued alignment with the Intelligence Community and the early implementation of a distributed SIGINT concept of operations. Multi-"INT" sensors, robust communication and data links, and employment on the flexible and dependable P-3 air vehicle ensure effective AISR&T support to conventional and non-conventional warfare across the range of military operations. With the EP-3E scheduled for retirement in FY 2019, the Navy is focused on sustainment and modernization to pace emerging threats until transitioning the capabilities across the spectrum of manned and unmanned platforms.

Status

EP-3E aircraft are being sustained through a series of special structural inspections (SSIs) and replacement of outer wing assemblies (OWAs). SSIs and OWAs will provide the inspections and repairs necessary to ensure safety of flight until more comprehensive maintenance can be performed. The pre-emptive modification and replacement of critical structural components allows up to 7,000 additional flight hours. These programs ensure sustainment of the EP-3E fleet until the capability is recapitalized across the spectrum of manned and unmanned platforms.

The EP-3E Joint Airborne SIGINT Architecture Modification Common Configuration (JCC) program was designed to accelerate the introduction of advanced capabilities to the AISR&T fleet. The resultant program aligns mission systems to meet the challenges of rapidly emerging threat technology and addresses obsolescence issues. Spiral developments have modernized the aircraft systems, which include capabilities for an IP-based, sensitive compartmented information network, improved electronic intelligence and communication intelligence collection, multi-platform geo-location, advanced special signals collection, and quick-reaction capabilities developed for overseas contingency operations. The aircraft is also equipped with forward-looking infrared and remote reach-back capabilities. Recapitalization capabilities migration will allow continued development of the EP-3E and vital testing of equipment designed for use in the next generation of intelligence, surveillance, reconnaissance, and targeting platforms. The JCC Spiral 3 upgrade enables the EP-3E to pace the enemy threat by providing faster, more precise geo-location capability for better precision targeting, indications and warning, and direct threat warning that can match rapidly developing threat technology.

The first JCC Spiral 3 aircraft was delivered to the Fleet in the summer 2011. Three of these aircraft are deployed in FY 2014.

Developers

Aeronixs	Melbourne, Florida, USA
Argon	Fairfax, Virginia, USA
L3 Communications	Waco, Texas, USA
Ticom Geomatics	Austin, Texas, USA

Global Broadcast Service (GBS)

Description

The Global Broadcast Service is a military satellite communications (MILSATCOM) extension of the global information grid (GIG) that provides worldwide, high-capacity, one-way transmission of voice, data, and video supporting fleet command centers and joint combat forces in garrison, in transit, and deployed to global combat zones. Specific products include unmanned aerial vehicle feeds, imagery, intelligence, missile-warning, weather, joint and service-unique news, education, training, video, homeland defense data, and various other high-bandwidth services. GBS is a joint Acquisition Category (ACAT) 1 program overseen by the Air Force, and Navy GBS is an ACAT 3 program that aligns to joint development. GBS interfaces with other communications systems in order to relieve overburdened and saturated satellite networks and provide information services to previously unsupportable (due to low bandwidth) users. It provides fleet and strike group commanders the highest broadband data rate available afloat, up to 23.5 Mbps per channel on Ultra-High-Frequency Follow-On (UFO) satellites and 45 Mbps with the Wideband Global SATCOM (WGS) constellation. GBS also enables critical delivery of information products required to provide assured command and control in anti-access/area-denial environments.

Status

Navy GBS is fully deployed and is undergoing sustainment and improvement efforts. Installations include aircraft carriers, assault and command ships, submarines, and a limited number of cruisers and destroyers. Architectural enhancements permit improved sharing and reallocation of broadcast coverage and bandwidth between users, information products, media types, and security levels. In FY 2009, Navy GBS began fielding Split Internet Protocol (IP) technology that enables users to request real-time data via an alternate off-ship system for delivery via GBS, significantly enhancing the warfighter's situational awareness. Worldwide SIPRnet Split IP capability was established in FY 2011. During FY 2010, the Navy GBS program completed fielding to *Los Angeles* (SSN 688I)-class submarines, began fielding 26 additional unit-level cruiser/destroyer systems and started to field the initial system-wide Navy GBS technology refresh. All cruisers and destroyers will be equipped with GBS by FY 2018. Current sustainment efforts include the Joint Internet Protocol Modem (JIPM) providing standardized joint encryption.

Developers

Raytheon	El Segundo, California, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA
U.S. Air Force Space and Missile Systems Center	El Segundo, California, USA

Information Systems Security Program (ISSP)

Description

The Navy's Information Systems Security Program ensures protection of Navy and joint cyberspace systems from exploitation and attack. Products and capabilities are provided through development, testing, certification, procurement, installation, and lifecycle support of network and host-based security products and systems, including: Computer Network Defense (CND); Communication Security (COMSEC)/Cryptography (Crypto); Electronic Key Management System (EKMS)/Key Management Infrastructure (KMI); Public Key Infrastructure (PKI); and Information Assurance (IA) Services/Engineering. Cyberspace systems include wired and wireless telecommunications systems, information technology systems, and content processed, stored, or transmitted therein.

The ISSP includes protection of the Navy's National Security Systems and provides for procurement of secure communications equipment for Navy ships, shore sites, aircraft, and Marine Corps and Coast Guard assets. This program also provides IA capabilities to protect information systems from unauthorized access or unauthorized modification and against the denial of service to authorized users. IA and CND comprise a layered protection strategy using commercial off-the-shelf and government off-the-shelf hardware and software products that collectively provide multiple levels of security mechanisms to detect and react to intrusions and assure the confidentiality and integrity of information. IA/CND is critical in protecting our ability to wage network centric warfare; as such, this program supports the entire naval cyberspace domain that includes mobile forward-deployed subscriber, supporting shore information infrastructure, and interconnection with other cyberspace domains. Effective IA and CND capabilities are critical to supporting cyber security activities and must evolve quickly to meet rapidly evolving advanced threats and new vulnerabilities. The Navy's ISSP will continue to provide CND tools, technology, national cryptographic equipment, products, operations, people, and services in alignment with the Department of Defense Cyber Defense Program.

Status

Navy ISSP is a collection of related programs (ACAT, Abbreviated Acquisition Programs, and projects) that provide the full spectrum of IA and CND capabilities. These programs are in various phases of the acquisition process, from concept development through capability sustainment. ISSP provides Navy warfighters the essential information trust characteristics of availability, confidentiality, integrity, authentication, and non-repudiation.

CND Increment 2 reached Initial Operational Capability (IOC) in FY 2012 and is scheduled to reach Full Operational Capability (FOC) by FY 2016.

KMI reached IOC in FY 2013, with FOC scheduled for FY 2018.

The Tactical Key Loader (TKL) reached IOC in FY 2013, with FOC in FY 2015.

VINSON/ANDVT Crypto Modernization (VACM) is planned to reach IOC in FY 2014, with FOC estimated for FY 2019.

Developers

Naval Research Laboratory	Washington, D.C., USA
Northrop Grumman	Los Angeles, California, USA
Raytheon	Torrance, California, USA
Space and Naval Warfare Systems Center Atlantic	Charleston, South Carolina, USA

Integrated Broadcast Service/ Joint Tactical Terminal (IBS/JTT)

Description

The Integrated Broadcast Service is a system-of-systems that will migrate the Tactical Receive Equipment (TRE) and related Tactical Data Dissemination System (TDDS), Tactical Information Broadcast Service (TIBS), Tactical Reconnaissance Intelligence Exchange System (TRIXS), and Near-Real-Time Dissemination (NRTD) System applications into the USD(I) mandated Joint Service Common Interactive Broadcast (CIB) waveform incorporating the Common Message Format (CMF). The IBS will send data via communications paths such as ultra-high frequency SATCOM and networks over super-high-frequency, extremely-high-frequency, and Global Broadcast Service. This program supports special intelligence and target cueing data, including lethal threat indications and warning, surveillance, and targeting data requirements of tactical and operational commanders and targeting staffs across all warfare areas. The Joint Tactical Terminal (JTT) is a multi-channel transmit and receive radio with onboard capabilities to encrypt/decrypt, filter, process, and translate the IBS data for shipboard use on tactical data processors (TDP). The in-service fleet inventory of JTT-Maritime systems is being upgraded to implement the CIB waveform, and CMF, and demand assigned multiple access (DAMA) integrated waveform capabilities for improved bandwidth use.

Status

The Navy commenced shipboard installations of JTT in FY 2001, and 89 JTTs have been fielded as of the end of FY 2013. In order to support the addition of new ships within the Navy, which require access to Near-Real Time (NRT) Over-The-Air (OTA) IBS, the Navy contracted with Raytheon Tactical Communication Systems to reopen the JTT-Senior production line with a multi-year indefinite delivery/indefinite quantity contract for new JTT systems in FY 2012. The transition to the next-generation broadcast services began in FY 2013 with the installation JTT-Senior upgrade kits from the manufacturer.

Developers

L3 Communications (IBS)	Fairfax, Virginia, USA
Raytheon Systems (JTT)	St. Petersburg, Florida, USA

Mobile User Objective System (MUOS)

Description

The Mobile User Objective System is a next-generation narrowband tactical communications system designed to improve communications for U.S. forces on the move. The Navy is responsible for providing narrowband satellite communication for the Department of Defense (DoD), and U.S. Fleet Cyber Command is assigned to serve as the Navy Component Command to U.S Strategic Command (USSTRATCOM) for space, cyberspace, and information operations. The Services are responsible for their procurement of MUOS-capable terminals. In addition to providing reliable communication for all branches of the U.S. military, Navy-delivered space-based narrowband capability provided by MUOS also supports reliable worldwide coverage for national emergency assistance, disaster response, and humanitarian relief when these missions are properly equipped and operated within the bounds of information-assurance policies.

MUOS Satellites have both a legacy ultra-high-frequency (UHF) payload that provides replacement capability similar to legacy UHF satellites, as well as a new MUOS wideband code division multiple access (CDMA) payload that will provide a significant improvement to the number of simultaneous voice and data services required to meet growing warfighter needs. The MUOS constellation will consist of five geo-synchronous satellites, one of which will be an on-orbit spare. The system also includes four ground stations strategically located and interconnected around the globe to provide worldwide coverage and the ability to connect users to DSN, SIPRNET and NIPRNET services. The ground system transports data, manages the worldwide network, and controls the satellites. The MUOS design leverages commercial technology, providing worldwide netted, point-to-point, and broadcast services of voice, video, and data. Target users are unified commands and joint task force components, DoD and non-DoD agency mobile users who required communications on the move, and allied and coalition legacy users. Legacy narrowband communication system users have to be stationary with an antenna up and pointed toward a satellite. MUOS will provide more than ten times the worldwide capacity and allow the warfighter to move around the battlespace while communicating.

Status

MUOS was designated a DoD major acquisition program in September 2004. Key decision point Milestone-C occurred in August 2006, and build approval was granted in February 2008. The first satellite was launched in February 2012 and was accepted for initial operational use supporting legacy terminal users in November 2012. The second satellite was launched in July 2013 and is undergoing on-orbit testing. Remaining MUOS satellites are on contract and in production. After completion of Multi-Service Operational Test and Evaluation-2, projected to complete in June 2014, MUOS will provide military users simultaneous voice, video and data capability by leveraging 3G-mobile communications technology. The

MUOS constellation is expected to achieve full operational capability in FY 2017, extending narrowband availability well past 2026.

Developers

Boeing	El Segundo, California, USA
General Dynamics	Scottsdale, Arizona, USA
Lockheed Martin	Sunnyvale, California, USA

Navy Multi-band Terminal (NMT)

Description

The Navy Multi-band Terminal supports a variety of protected and wideband command and control (C2) communications applications (e.g., secure voice, imagery, data, and fleet broadcast systems). The NMT began replacement of the USC-38/Follow-on Terminal (FOT) and the WSC-6 super high frequency satellite communications (SHF SATCOM) terminals on Navy ships, submarines, and shore stations in FY 2010. NMT provides protected and wideband access to more users and will offer increased protected and wideband throughput. The NMT is more reliable with a 22 percent greater designed reliability requirement than predecessor systems. A completely redesigned user interface will make operator use easier with 85 percent fewer operator terminal interactions. The terminal will reduce operating cost by reducing the number of parts and the terminal footprint onboard ships.

NMT-equipped units will be able to access military EHF and SHF SATCOM satellites, including protected SATCOM services available on Advanced EHF, Milstar, EHF payloads on board ultra-high-frequency follow-on satellites, and interim polar EHF payloads. It provides wideband service using the Wideband Global Service, and Defense Satellite Communications System satellites. The NMT is a key element of the Navy's mitigation of anti-access/area-denial environment concerns and is an enabler of the ballistic-missile defense mission. Three international partners—Canada, the Netherlands, and the United Kingdom—are procuring a variant of the NMT. In addition, the Department of Defense Teleport and Enhanced Polar SATCOM system programs have procured NMTs to provide fleet units with shore reach-back capabilities.

Status

On November 8, 2012, NMT entered full-rate production status. In the first three years of production, 127 of an objective 250 terminals have been placed under contract. Installations began in February 2012 with 32 ship, submarine, and shore installations completed as of August 2013. The USS Roosevelt (DDG 80) completed the Navy's first full deployment of an NMT-equipped ship in 2012.

Developers

Raytheon	Marlborough, Massachusetts, USA

Network Tactical Common Data Link (NTCDL)

Description

Navy Common Data Link systems on force-level ships (e.g., aircraft carriers and amphibious assault ships) include the Network Tactical Common Data Link, and its predecessor, the Communications Data Link System (CDLS), with Hawklink on unit-level ships (e.g., cruisers and destroyers). NTCDL provides the ability to transmit/receive real-time intelligence, surveillance, and reconnaissance (ISR) data simultaneously from multiple sources (air, surface, sub-surface, man-portable) and exchange command and control information (voice, data, imagery, and full-motion video) across dissimilar joint, service, coalition, and civil networks. NTCDL provides warfighters the capability to support multiple, simultaneous, networked operations with in-service Common Data Link (CDL)-equipped aircraft (e.g., F/A-18, P-3, and MH-60R) in addition to next-generation manned and unmanned platforms (e.g., P-8 *Poseidon*, *Triton*, Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) vehicle, Small Tactical Unmanned Aircraft Systems (STUAS), and *Fire Scout*). NTCDL is a tiered capability providing modular, scalable, multiple-link networked communications. NTCDL benefits the Fleet by providing horizon extension for line-of-sight sensor systems for use in time-critical strike missions, supports anti-access/area-denial (A2/AD) through relay capability, and supports Tasking Collection Processing Exploitation Dissemination (TCPED) via its ISR networking capability. NTCDL also supports humanitarian assistance/disaster relief efforts through its ability to share ISR data across dissimilar joint, service, coalition, and civil organizations.

Status

In December 2010, the Chief of Naval Operations directed a solution to address the Navy's requirement for multi-simultaneous CDL mission support within the future years defense plan. Specifically, the task was to replace the existing single, point-to-point shipboard CDLS with a multi-point networking system to support ISR transport. Initial investment in 2013 stood up the NTCDL program of record and funded the requirement for NTCDL on board aircraft carriers, with initial operational capability planned for 2018.

Future investments will fund requirement for large-deck amphibious ships and develop multi-link NTCDL to meet requirements for use on aircraft (e.g., P-8, UCLASS, *Triton*, MH-60R), smaller ships (e.g., cruisers, destroyers, and Littoral Combat Ships), submarines, and shore-based handheld users and mobile platforms. NTCDL will support multi-simultaneous CDL missions; provide capability for ship-ship, ship-air and air-air communication; facilitate download of ISR information to multiple surface commands (ship/shore); support A2/AD portfolio for unmanned aerial vehicles and unmanned aircraft systems fielded, and planned and support TCPED architecture.

Developers

BAE	London, United Kingdom
Cubic	San Diego, California, USA
Harris Corporation	Melbourne, Florida, USA
L3 Communications	New York, New York, USA

Next-Generation Enterprise Network (NGEN)

Description

The Next-Generation Enterprise Network is a Department of the Navy (DoN) enterprise network that will provide secure, net-centric data and services for Navy and Marine Corps personnel. NGEN forms the foundation for DoN's network consolidation strategy. Similar to the Navy and Marine Corps Intranet (NMCI), NGEN will establish secure, standardized, end-to-end, shore-based IT capabilities for voice, video, and data communications within a new service delivery model that will maintain the same level of capabilities of NMCI. NGEN is a government-owned/contractor-operated solution with government oversight for the Navy.

Status

The NMCI Continuity of Services Contract (NMCI CoSC) was awarded on July 8, 2010, to the developers listed below. The NMCI CoSC contract will continue to provide NMCI services until April 30, 2014. CoSC is a bridge contract that will enable the transition to NGEN. A combined Transport Services (TXS) and Enterprise Services (ES) RFP was released on May 2012 and award of the NGEN contracts occurred in June 2013. Planning by the government for the transition to NGEN is ongoing to meet projected milestones. As the transition progresses in 2014 and beyond, the DoN will provide increased support for the expansion of warfighting capabilities, enhanced adaptability, and increased reliability.

Developers

EMC	Hopkinton, Massachusetts, USA
Harris	Melbourne, Florida, USA
HP Enterprise Services	Plato, Texas, USA
Oracle	Redwood Shores, California, USA

OCONUS Navy Enterprise Network (ONE-NET)

Description

The outside the continental United States (OCONUS) Navy Enterprise Network (ONE-NET) provides the manpower and administration services to operate the Base Level Information Infrastructure (BLII) architecture, a fully integrated and interoperable network that consists of standard hardware, software, and information-assurance suites, governed by operational and administrative policies and procedures. ONE-NET is the OCONUS equivalent to the Navy's CONUS-based Enterprise Services and is the medium that enables the rapid and reliable transfer of official classified and unclassified messages, collaboration, e-mail,

and data. ONE-NET manpower provides information technology operations including e-mail, print, storage, directory, and Internet services, as well as help desk and enterprise management for approximately 28,000 seats, delivering vast performance and security improvements compared to legacy networks. ONE-NET manages the enterprise through three Theater Network Operation and Security Centers (TNOSCs) at Yokosuka, Naples, and Bahrain, and 11 Local Network Support Centers (LNSCs) within their respective regions.

Status
The program provides IT services to approximately 28,000 BLII/ONE-NET seats, supporting approximately 51,000 forward-deployed OCONUS Navy users. Fleet Cyber Command operates the three TNOSCs and 11 LNSCs servicing ONE-NET customers. Network is operated and maintained by a blended workforce of active duty, civilian, and contractor personnel.

Developers
Computer Sciences Corporation Falls Church, Virginia, USA

Submarine Communications Equipment

Description
The Submarine Communications Equipment program's mission is to create a common, automated, open-system architecture radio room for all submarine classes. The program provides for the procurement and installation of systems incorporating the technical advances of network centric warfare to allow the submarine force to communicate as part of the strike group. It addresses the unique demands of submarine communications, obsolescence issues, and higher data rate requirements and includes two elements: Common Submarine Radio Room (CSRR) and Submarine Antennas.

CSRR is a network-centric communications gateway that supports interoperable communications and information dominance between on-board subsystems, external platforms, and land-based communications facilities and is interoperable with the planned Department of Defense (DoD) infrastructure. CSRR comprises an open-architecture hardware and software approach for integrating government-off-the-shelf, commercial-off-the-shelf, and non-developmental item hardware and application specific software into a common, centrally managed architecture. CSRR leverages existing Navy and DoD C4I capability-based acquisition programs. CSRR allows common systems, software, and equipment to be installed on all submarine classes, use of common logistics products across all submarine classes, and the uniform training of personnel across all submarine classes, resulting in new capability at a reduced cost.

The Submarine Antennas program supports the development and sustainment of antennas designed to withstand the underwater environment. These antennas cover the frequency spectrum from very low frequency to optical. Programs in the development

phase include OE-538 Increment II Multi-function Mast, Submarine High-Data-Rate (SubHDR) antenna, and Advanced High-Data-Rate (AdvHDR) antenna. The improvements to the OE-538 Multi-Function Mast antenna support Mobile User Objective System (MUOS), Link-16, Global Positioning System (GPS) Anti-Jam, and Iridium capabilities. The improvement to the SubHDR antenna is an improved radome and shock hardening. AdvHDR is intended to replace the SubHDR antenna, providing improved bandwidth.

Status

CSRR Increment I Version 3 began fielding in FY 2011 and is scheduled to complete in FY 2018. OE-538 Increment II is scheduled for a Milestone C decision in FY 2015. SubHDR radome replacement begins fielding in FY 2014. AdvHDR is scheduled for a Milestone B decision in FY 2015.

Developers

Lockheed Martin	Eagan, Minnesota, USA
Lockheed Martin Sippican	Marion, Massachusetts, USA
Naval Undersea Warfare Center	Newport, Rhode Island, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA

Super-High-Frequency (SHF) Satellite Communications

Description

The Super-High-Frequency Satellite Communications program includes: the WSC-6(V) 5, 7, and 9 terminals; the X-Band Kit Upgrade to the Extremely-High-Frequency (EHF) Follow-On Terminal (FOT) installed on submarines; and the Enhanced Bandwidth Efficient Modem (EBEM) installed on surface ships. The SHF SATCOM WSC-6 terminal is the primary SATCOM terminal in the Fleet, providing the bandwidth for voice, video, data, and imagery requirements for the warfighter, including NIPRNET, SIPRNET, JWICS, JCA, video teleconferencing, and telephones. These SHF system terminals have been in the Fleet since the early 1990s and are currently in sustainment. The Navy Multiband Terminal (NMT) WSC-9 began replacing the WSC-6 terminal in FY 2012.

Status

As of the end of FY 2013, there were 124 WSC-6 (V)5,7,9 terminals installed in the Fleet. They are expected to continue in operation until FY 2021, when the next-generation Navy Multiband Terminal (WSC- 9) will replace them. The WSC-6(V)9 terminal on 20 guided-missile destroyers now includes Ka-band. The X-band upgrade to the EHF FOT (USC-38) terminals on 64 submarines was completed in 2010. EBEM is the current modem for static point-to-point operations in conjunction with the WSC-6 terminal, the WSC-8 terminal, the next-generation Navy Multiband Terminal (WSC-9), and the next-generation Commercial Broadband Satellite Program (CBSP) terminal (USC-69). In FY 2009-2010, 275

EBEM modems were installed in the operating forces. SHF systems discussed are in sustainment while the Navy Multiband Terminal is procured and deployed.

Developers

Harris (WSC-6(V)9)	Melbourne, Florida, USA
Raytheon (WSC-6(V)5, 7)	Marlborough, Massachusetts, USA
Raytheon (X-Band Kit Upgrade)	Marlborough, Massachusetts, USA
Viasat (EBEM)	Carlsbad, California, USA

Telephony

Description

The Navy's Telephony program procures and installs fully integrated, interoperable, information assurance-certified telephony systems, and peripherals in support of Defense Switch Network (DSN) telephone switches and connectivity to the commercial telephone network at Fleet Cyber Command (FCC) shore installations. Telephony provides system sustainment, obsolescence management, and technology refresh for shore telephone switches that service worldwide forces necessary to ensure regulatory compliance and prevent capability degradation. The majority of the Navy's telephone switches are DSN switches. These switches provide on-base access to local and long-distance commercial calling service as well as worldwide DSN connectivity.

Specific Telephony capabilities include the following: Voice (Analog, Digital, Integrated Services Digital Network (ISDN); Voice over Internet Protocol (VoIP); Conferencing; Voicemail; Call Centers; Telephony Management System (TMS); Telephone End Office equipment used to provide trunking to support unclassified voice Video Teleconferencing (VTC), and dial-up data services to customers ashore and afloat; C2 voice communications to the Navy warfighter, including Multi-Level Precedence and Preemption (MLPP); Telecommunications Engineering support for Base Communications Office (BCO) locations; C2 shore-to-ship dial tone (POTS—Plain Old Telephone Service) and pier side lines via tactical networks and infrastructure; Voice over Internet Protocol (VoIP); and future enterprise capabilities.

Telephony suite replacement and modernization funding ensures that all telephony equipment under Navy's purview in the Continental United States (CONUS) and Outside CONUS (OCONUS) are replaced in accordance with industry life cycle standards and that software is upgraded in a systemic manner to ensure compatibility with DoD and commercial telephone systems. Technology insertions and upgrades of FCC/C10F-owned switches (approximately 153 CONUS/OCONUS) have been implemented.

Status

Telephony is replacing Time Division Multiplex switches with VoIP technology in response to TDM technology obsolescence. As Telephony capabilities migrate to VoIP they will become increasingly reliant on Navy Enterprise Services.

Developers

Booz, Allen and Hamilton	Norfolk, Virginia, USA
Booz, Allen and Hamilton	San Diego, California, USA
Prosoft	Norfolk, Virginia, USA
Secure Mission Solutions	Norfolk, Virginia, USA

USC-61(C) Digital Modular Radio (DMR)

Description

The USC-61(C) Digital Modular Radio is the Navy's first software-defined radio to have become a communications system standard for the U.S. military. DMR has four independent, full-duplex channels, which provide surface ships, submarines, and shore commands with multiple waveforms and associated internal multi-level information security for voice and data communications. A single DMR is capable of replacing numerous existing Navy and Coast Guard legacy radios in the high frequency, very high frequency, and ultra-high frequency (UHF) line-of-sight and UHF satellite communications (SATCOM) frequency bands. The DMR is software configurable and programmable with an open system architecture using commercial off-the-shelf/non-developmental item hardware. DMR is the Navy's primary solution for providing the UHF SATCOM Integrated Waveform and Mobile User Objective System waveform to the Fleet.

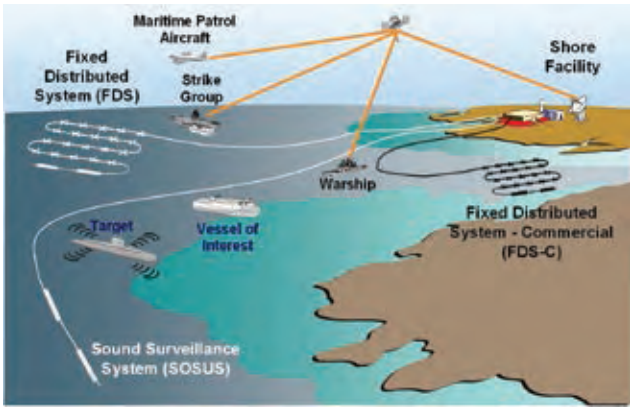
Status

The Navy has procured 556 DMR systems through FY 2013. The DMR is installed on various platforms including the *Nimitz* (CVN 68)-class aircraft carriers, *Arleigh Burke* (DDG 51)-class guided-missile destroyers, the USS Makin Island (LHD 8) and America (LHA 6) amphibious assault ships, *San Antonio* (LPD 17)-class amphibious transport dock ships, *Lewis and Clark* (T-AKE)-class ships, select shore communications stations, and on submarines as part of the Common Submarine Radio Room. Due to the cancellation of the Joint Tactical Radio System Airborne, Maritime-Fixed program, DMR was approved as the Navy and USCG's radio/terminal solution for implementing the IW and MUOS waveforms. For Navy new construction, DMR is also used to provide an HF capability as part of the High Frequency Distribution Amplifier Group (HFDAG). With the introduction of IW, MUOS and HFDAG, DMR is the Navy's complete tactical communication solution for the radio-frequency spectrum from 2 MHz through 2 GHz. IW/MUOS capable DMRs are planned to start fielding in FY 2016.

Developers

General Dynamics	Scottsdale, Arizona, USA

INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR)



Fixed Surveillance Systems (FSS)

Description

The Fixed Surveillance Systems program consists of the Sound Surveillance System (SOSUS); the Fixed Distributed System (FDS), which is a large-area distributed field of acoustic arrays; and the FDS-Commercial (FDS-C), a commercial off-the-shelf version of FDS. FSS provides threat location information to tactical forces and contributes to an accurate operational maritime picture for the joint force commander. FSS comprises a series of arrays deployed on the ocean floor in deep-ocean areas and strategic locations. Due to its long in-situ lifetime, it provides indications and warning of hostile maritime activity before conflicts begin.

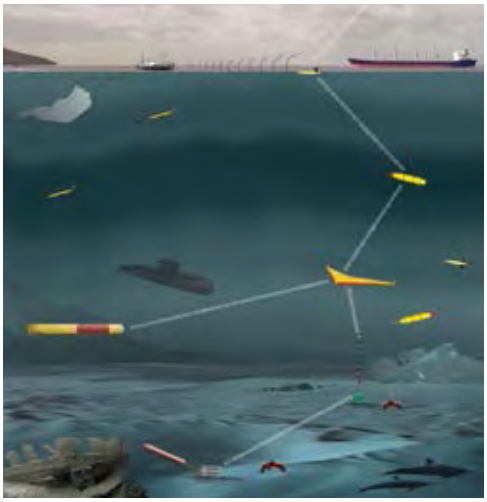
The system consists of two segments: the Integrated Common Processor (ICP), which handles processing, display, and communication functions; and the underwater segment, which consists of SOSUS, a long array of hydrophones, and FDS or FDS-C. FSS leverages advances in the commercial industry to provide a more cost-effective FDS caliber system to meet the Fleet's ongoing needs for long-term undersea surveillance.

Status

ICP technical refreshes and updates are installed as required to provide increased operator proficiency, functionality, and savings in logistics support and software maintenance.

Developers

Multiple sources.



Persistent Littoral Undersea Surveillance (PLUS) System

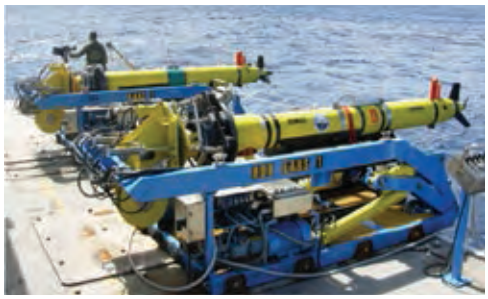
Description

The Persistent Littoral Undersea Surveillance System provides effective, adaptive, and persistent undersea surveillance of multiple quiet targets over large littoral areas. It is a network that consists of mobile unmanned underwater vehicles (UUVs) with sensors, UUV gliders for communications, and a remote-control station. In-water components can be launched and recovered from a variety of vessels.

Status

PLUS has been transferred from the Office of Naval Research Innovative Naval Prototype Program to the Program Executive Office for Littoral Combat Ship Unmanned Maritime Vehicle Systems Program Office (PMS 406). It will be transferred to the Fleet in FY 2015 as a user operational evaluation system (UOES) to develop

tactics, techniques, and procedures for employment and to inform the development of future UUV systems including the Large Displacement UUV. As a UOES effort, PLUS will not be a program of record and will be transferred to the Large Displacement UUV program in FY 2015.



Developers

Office of Naval Research	Ballston, Virginia, USA
Program Executive Office Littoral Combat Ship, PMS 406	Washington, D.C., USA

MQ-4C *Triton* Unmanned Aircraft System (UAS)

Description

Formerly the Broad-Area Maritime Surveillance (BAMS) Unmanned Aircraft System program, the MQ-4C *Triton* UAS is a key element in the recapitalization of Navy's Maritime Patrol and Reconnaissance Force (MPRF) airborne intelligence, surveillance, and reconnaissance (ISR) capability. *Triton* will be a force multiplier for joint force and fleet commanders, enhancing their situational awareness and shortening the sensor-to-shooter kill chain by providing a multiple-sensor, persistent maritime ISR capability. Triton's persistent-sensor dwell and ability to network its data, deliver a capability that will enable the MPRF family of systems to meet the Navy's maritime ISR requirements. A single *Triton* orbit provides continuous surveillance capability at a maximum mission radius of 2,000 nautical miles for a minimum of 24 hours. At full operational capability, the system provides up to five simultaneous orbits worldwide.

Status

The *Triton* UAS Analysis of Alternatives, Operational Requirements Document, Capability Development Document, and initial Concept of Operations are complete. Milestone B was achieved in April 2008. The System Design Document initiated in August 2008, and the Gate 6 review completed on August 6, 2012. *Triton*'s first flight occurred on May 23, 2013, and initial envelope-expansion flights are ongoing. Milestone C is scheduled for 2015, and Initial Operational Capability is expected in FY 2018.

Developers

Exelis	Baltimore, Maryland, USA
L3 Communications	Salt Lake, Utah, USA
Northrop Grumman	Bethpage, New York, USA
Rolls Royce	Indianapolis, Indiana, USA

MQ-8B/C *Fire Scout* Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle (VTUAV) System

Description

The MQ-8B/C *Fire Scout* Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle System is a component of the Navy's airborne intelligence, surveillance, and reconnaissance (ISR) family of systems. The Fire Scout provides day and night real-time ISR, target acquisition, voice communications relay, and battlefield management capabilities to the tactical commander. The VTUAV System comprises one to three air vehicles, a ground control station, unmanned common aircraft recovery system, tactical control data link, and tactical control system software interface for operator control of the UAV. The system is designed to operate—conduct launch, recovery, and mission command-and-control functions—from the Littoral Combat Ship (LCS) and any suitably equipped air-capable ship, as well as land-based sites for expeditionary operations and support to special operations forces (SOF).

Status

The MQ-8 provides SOF ISR support with the Brite Star II turret (electro-optical/infrared payload) and other modular mission payloads. With its 115-nautical mile range and five and one-half hour endurance (depending on payload and environment), Fire Scout also can satisfy surface warfare and mine countermeasures (MCM) mission requirements. Through early FY 2014, the Fire Scout has completed six deployments on board *Oliver Hazard Perry* (FFG 7)-class frigates. Dual-qualified (MH-60R/S helicopter and MQ-8 VTUAV) members of an aviation detachment, fielded from the expeditionary helo HSM (MH-60R)/HSC (MH-60S) communities, maintain the system. The MQ-8B Fire Scout is designed for LCS warfare module support.

The MQ-8B will cease production in the second quarter of FY 2014 in favor of a more capable airframe. In response to a joint emergent operational need, payload, range, and endurance upgrades to the MQ-8B commenced with the introduction of the Bell 407 (MQ-8C) platform to replace the existing Schweizer 333-based model (MQ-8B), with its first flight planned for the first quarter of FY 2014. The quick-reaction assessment (QRA) for the MQ-8C Endurance Upgrade is scheduled for the third quarter of FY 2014, and the first deployment is planned for the fourth quarter of FY 2015. Additionally, in response to another urgent operational need, integration and test efforts are progressing to incorporate the ZPY-4 radar and the Advanced Precision Kill Weapons System into the MQ-8C. The weapons QRA completed June 20, 2013, and the radar QRA is scheduled for the third quarter of FY 2014.

The MQ-8B surpassed 11,500 flight hours in October 2013 on board the USS Samuel B. Roberts (FFG 58) and continues to develop and grow in preparation for its integration into the LCS surface warfare and MCM mission modules. The program will continue to provide critical ISR support to SOF utilizing available frigates as it

prepares for its maiden deployment on board the USS Fort Worth (LCS 3) in the fourth quarter of FY 2014.

Developers

Northrop Grumman	San Diego, California, USA
Schweizer Aircraft Corporation	Big Flats, New York, USA
Bell Helicopter	Ozark, Alabama, USA

Navy Unmanned Combat Aircraft System Demonstration (UCAS-D)

Description

The Navy Unmanned Combat Air System Demonstration (UCAS-D) program evolved from the Joint Navy/Air Force development program called J-UCAS. Program management and associated technologies were transferred to the Navy in August 2006. The UCAS-D program uses a low-observable X-47B platform to demonstrate unmanned carrier operations and will advance the associated technologies in support of potential follow-on unmanned acquisition programs. These efforts include maturing technologies for actual aircraft carrier catapult launches and arrested landings, deck operations, as well as autonomous operations in carrier-controlled airspace. Autonomous air refueling demonstrations are also part of the technology maturation program.

Status

Northrop Grumman Systems Corporation was awarded the UCAS-D contract in August 2007. The Navy conducted surrogate aircraft flights in the vicinity of aircraft carriers in 2009 and 2010 and completed the first six, fully autonomous carrier-arrested landings by an F/A-18 Hornet surrogate aircraft in July 2011.

The program transitioned from Edwards Air Force Base to Naval Air Station (NAS) Patuxent River, Maryland, and conducted the first flight of the X-47B at Patuxent River in July 2012. Shore-based carrier suitability testing was initiated in the fall of 2012 as surrogate aircraft continued to demonstrate successful autonomous operations in the carrier-controlled airspace. The X-47B was hoisted on board the USS Harry S. Truman (CVN 75) in December 2012 and successfully executed a variety of aircraft carrier deck operations. The X-47B completed shore-based catapult and precision landing testing in early 2013.

On May 4, 2013, the X-47B completed the first shore-based arrested landing at NAS Patuxent River. On May 14, an X-47B successfully catapulted from the USS George H. W. Bush (CVN 77) for a flight back to Patuxent River. On May 17, the X-47B flew from Pax River to the ship and executed the first carrier "touch-and-go" by an unmanned air vehicle. Following more shore-based arrestment testing, X-47B made the first carrier-based arrested landing by a fully autonomous unmanned air vehicle on July 10, 2013, marking a key in history for the Navy and carrier aviation. Autonomous air refueling tests will be conducted through 2014.

The UCAS-D air vehicles will not be operational, as they will not include any mission systems, sensors or weapons. UCAS-D serves as an essential risk-reduction effort to achieve the appropriate technology readiness level for transition of technologies to the Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) program.

Developers

Northrop Grumman Systems Corporation	El Segundo, California, USA

RQ-21A *Interrogator* Small Tactical Unmanned Aircraft System (STUAS)

Description

The *Integrator* Small Tactical Unmanned Aircraft System is an asset under the direct control of Navy Special Warfare and Navy Expeditionary Combat Command forces and *Whidbey Island* (LSD 41)-class ships to provide tactical intelligence, surveillance, and reconnaissance capability. STUAS vehicles are equipped with electro-optic/infrared sensors, laser range finders and illuminators, and automatic identification systems, and the land-based version includes a communications relay. A system consists of five vehicles, one (ship) or two (shore ground) control stations, launch and recovery equipment, spare parts, and government-furnished equipment. The RQ-21A *Integrator* is a 75-pound/16-foot wingspan vehicle (135 pounds fully loaded) capable of 12-15 hours endurance and 55 knots at greater than 15,000 feet altitude.

Status

Initial Operational Capability is expected in the second quarter of FY 2014.

Developers

Insitu, Inc.	Bingen, Washington, USA
HoodTech	Hood River, Oregon, USA
NW UAV	Portland, Oregon, USA
Quatro Composites	Poway, California, USA

Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) System

Description

In FY 2009, the Office of the Chief of Naval Operations conducted the Power Projection from the Sea Capabilities-Based Assessment. It identified gaps in persistent sea-based intelligence, surveillance, and reconnaissance (ISR) with precision strike across the entire range of military operations. Concurrently, Combatant Commander Integrated Priority Lists identified a high-priority need for additional ISR. The Navy ISR resource sponsor (OPNAV N2N6) identified funding in FY 2012 to begin development of a carrier-based, unmanned air system (UAS) to provide ISR with precision strike capability to close these gaps—the Unmanned Carrier-Launched Airborne Surveillance and Strike System.

The UCLASS System will operate from all *Nimitz* (CVN 68)- and *Ford* (CVN 78)-class carriers, enhancing ship versatility through integration of four to eight UAVs into a carrier air wing, enabling 24/7 ISR, targeting, strike, and bomb-damage assessment operations. The UCLASS System comprises an air vehicle segment (airframe, ISR payloads, mission systems, and weapons integration), a control and connectivity segment, and a carrier integration segment. Affordability is the focus for the UCLASS System, with incremental growth capability designed in up-front. The UCLASS System will interface with existing shipboard and land-based processing, exploitation, and dissemination systems.

The scope of the UCLASS effort includes design, development, integration, test, and training. The acquisition program will be structured with the goal of delivering an early operational capability in 2020 and a deployed operational capability in 2022.

Status

The Navy endorsed the program baseline in May 2011. Later that year, the Joint Requirements Oversight Council approved the UCLASS Initial Capabilities Document. Subsequently, the Undersecretary of Defense for Acquisition, Technology, and Logistics authorized the UCLASS program for entry into the materiel solutions analysis phase. The UCLASS Analysis of Alternatives (AoA) was completed in May 2012 and approved by the Navy Resources and Requirements Review Board. The AoA was reviewed by the Office of the Secretary of Defense and deemed sufficient. The Navy approved the UCLASS service-level Capabilities Development Document in April 2013, endorsing the UCLASS draft system concept of operations and the technology development strategy. In FY 2014, the Navy plans to release a request for proposals for the air vehicle system.

Developers

To be determined.

UQQ-2 Surveillance Towed Array Sensor System (SURTASS)

Description

The UQQ-2 Surveillance Towed Array Sensor System capability consists of a fleet of five ships that provide passive detection of quiet nuclear and diesel-electric powered submarines and real-time reporting to theater commanders and operational units. SURTASS employs the TL-29A twin-line passive acoustic towed array, which offers significant passive detection capability for undersea surveillance operations in both deep-ocean and shallow-water littoral environments using directional noise rejection and a bearing ambiguity resolution capability.

Status

Five SURTASS vessels are operational in the Pacific fleet in early FY 2014. All have TL-29A twin-line arrays and have been upgraded with the Integrated Common Processor (ICP), which will result in increased operator proficiency, functionality, and savings in logis-

tics support and software maintenance. Technical refreshes to ICP hardware will be installed to meet future requirements.

Developers

Lockheed Martin	Syracuse, New York, USA
Lockheed Martin	Manassas, New Hampshire, USA

WQT-2 Surveillance Towed Array Sensor System (SURTASS)/Low Frequency Active (LFA)

Description

The Low Frequency Active system is the active adjunct to the Surveillance Towed Array Sensor System sonar system. LFA consists of a vertical source array with active transducers, power amplifiers, and an array-handling system. The LFA transmit array is deployed through a center well hatch of T-AGOS oceanographic survey ships. It uses the SURTASS passive array as the receiver and is capable of long-range detections of submarine and surface ship contacts. A mobile system, SURTASS LFA can be employed as a force-protection sensor wherever the force commander directs, including forward operating areas or in support of carrier strike group and amphibious ready group operations.

Status

One LFA array system is installed onboard the USNS Impeccable (T-AGOS 23). The Compact LFA (CLFA) system, employing smaller and lighter sources, has been installed on the USNS Victorious (T-AGOS 19), the USNS Able (T-AGOS 20), and the USNS Effective (T-AGOS 21). Technical refreshes to the Integrated Common Processor are installed to maintain increased operator proficiency and functionality.

Developers

BAE Systems	Manchester, New Hampshire, USA
Lockheed Martin	Manassas, New Hampshire, USA

ELECTRONIC AND CYBER WARFARE

Joint Counter Radio-Controlled Improvised Explosive Device (RCIED) Electronic Warfare (JCREW)

Description

Improvised explosive devices (IEDs) present a significant threat to U.S. and coalition forces throughout the world and across the full range of military operations. The Counter Radio-Controlled IED Electronic Warfare (CREW) program encompasses all of the mobile, man-portable, and fixed-site protection systems employed to counter IEDs that are either armed or initiated by radio-command signals. Fielded first- and second-generation CREW systems were acquired largely by non-developmental urgent operational need initiatives to address immediate warfighter requirements. Joint CREW (JCREW) is a Navy-led program to develop the next generation of joint-service CREW systems. JCREW will correct deficiencies in existing CREW systems and address emerging worldwide RCIED threats. Additionally, JCREW has an open architecture, facilitating the system's evolution as new threats, advances in technology, and new vehicle requirements are introduced.

Status

The Navy will continue as lead through the development of Block One initial capability, integrating joint service requirements. The Army has assumed duties as the executive agent for CREW and will incorporate the JCREW capability into the defensive electronic attack portion of their future Integrated Electronic Warfare System program.

Developers

Northrop Grumman Systems Corporation — San Diego, California, USA

Next-Generation Jammer (NGJ) Airborne Electronic Attack

Description

The Next-Generation Jammer is the replacement for the aging ALQ-99 Tactical Jamming System (TJS). Fielded in 1971, ALQ-99 is the only airborne tactical jamming system in the Department of Defense inventory. ALQ-99 is facing material and technological obsolescence and cannot counter all current, much less future, threats. The NGJ will provide significantly improved jamming capabilities against a wide variety of technically complex systems. It will be a full-spectrum jammer, developed in increments, and will initially be fielded on the EA-18G *Growler*. NGJ will be the prime contributor for the airborne electronic attack mission.

Status

The Navy awarded the 22-month contract in July 2013 with NJG Technology Development scheduled to begin in mid-FY 2014.

Developers

BAE Systems	Nashua, New Hampshire, USA
ITT	Clifton, New Jersey, USA
Northrop Grumman Systems Corporation	Bethpage, New York, USA
Raytheon	Goleta, California, USA

Nulka Radar Decoy System

Description

Nulka is an active, off-board, ship-launched decoy developed in cooperation with Australia to counter a wide spectrum of present and future radar-guided anti-ship cruise missiles (ASCMs). The Nulka decoy employs a broadband radio frequency repeater mounted on a hovering rocket platform. After launch, the Nulka decoy radiates a large, ship-like radar cross-section and flies a trajectory that seduces incoming ASCMs away from their intended targets. Australia developed the hovering rocket, launcher, and launcher interface unit. The Navy developed the electronic payload and fire control system. The in-service Mk 36 Decoy Launching System (DLS) has been modified to support Nulka decoys and is designated the Mk 53 DLS.

Status

Nulka received Milestone C approval for Full-Rate Production in January 1999. Installation began on U.S. and Australian warships in September 1999. The system is installed on U.S. Coast Guard cutters and more than 120 U.S. Navy ships. Installation on aircraft carriers began in the fourth quarter of FY 2013. Additional installations and will continue throughout FY 2014.

Developers

BAE Systems	Edinburgh, Australia
Lockheed Martin Sippican	Marion, Massachusetts, USA
Sechan Electronics, Inc.	Litiz, Pennsylvania, USA

SSQ-130 Ship Signal Exploitation Equipment (SSEE) Increment F

Description

The Shipboard Information Warfare Exploit program provides improved situational awareness and near real-time indications and warnings to warfighters by improving and increasing tactical cryptologic and information warfare exploitation capabilities across Navy combatant platforms. The SSQ-130 SSEE Increment F is a shipboard information operations and electronic warfare system that provides commanders with automatic signal acquisition, direction finding, and target geo-location. SSEE Increment F also will incorporate many developmental counter-ISR (intelligence, surveillance, and reconnaissance) capabilities.

SSEE is a commercial-off-the-shelf/non-developmental item program that is easily reconfigured and therefore able to respond rapidly to emergent tasking in evolving threat environments. The system design permits rapid insertion of new and emerging tech-

nologies that will integrate capabilities from existing systems and advanced technologies into a single, scalable, spirally developed, interoperable system.

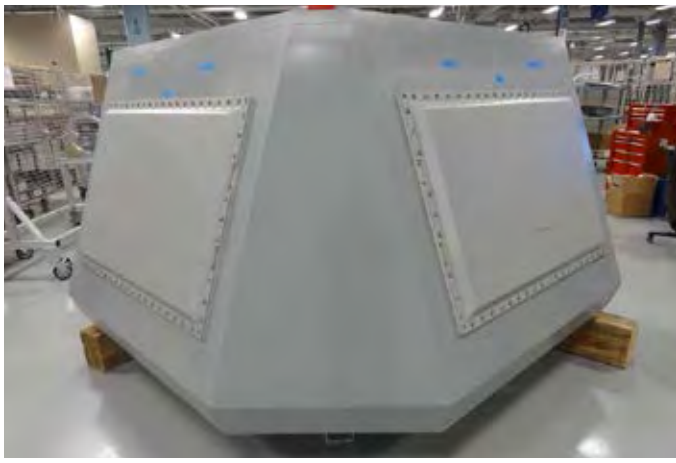
Status

SSEE Increment F entered Full-Rate Production in July 2011, and 56 units will be delivered by FY 2018, with Full Operational Capability estimated for FY 2020. By early FY 2014, 21 units have been delivered, and 15 units have been completely installed.

Developers

Argon-ST	Fairfax, Virginia, USA

Surface Electronic Warfare Improvement Program (SEWIP)



Description

The Surface Electronic Warfare Improvement Program is an evolutionary development block upgrade program for the SLQ-32 electronic warfare system. In early FY 2014, 170 SEWIP systems are installed on Navy aircraft carriers, surface and amphibious warships, and Coast Guard cutters.

SEWIP was established as an Acquisition Category II program in July 2002 after cancellation of the Advanced Integrated Electronic Warfare System. Block 1A replaces the SLQ-32 processor with an electronic surveillance enhancement processor and the UYQ-70 display console. Block 1B also improves the human machine interface of the SLQ-32 and adds specific emitter identification capability that provides platform identification. The high-gain high sensitivity receiver (Block 1B3) provides improved situational awareness through non-cooperative detection and identification of platforms beyond the radar horizon. Block 2 provides improvements to the electronic support receiver.

Upgrades to the antenna, receiver, and combat system interface allow the SLQ-32 system to pace new threats; improve signal detection, measurement accuracies, and classification; and mitigate electromagnetic interference. Block 3 will provide improvements for the electronic attack transmitter by providing integrated countermeasures against radio frequency-guided threats and extending frequency range coverage. SEWIP will also cue Nulka decoy launch.

Status

SEWIP Block 2 development contract was awarded September 30, 2009 and will begin delivery in 2014. Approximately 60 units are to be delivered within the future years defense plan. SEWIP Block 3's advanced, active-EA capabilities are in full development with a Milestone B decision scheduled for early-to-mid FY 2014. Block development completion and first procurement are expected in 2017, followed by first delivery in the 2018 timeframe.

Developers

General Dynamics Advanced Information Systems	Fairfax, Virginia, USA
Lockheed Martin	Eagan, Minnesota, USA
Northrop Grumman PRB Systems	Goleta, California, USA

DECISION SUPERIORITY

Advanced Tactical Data Link Systems (ATDLS)

Description

The ATDLS program provides tactical data link (TDL) command and control (C2) for U.S. forces, allies, and coalition partners in accordance with the Joint Tactical Data Enterprise Services Migration Plan (JTMP), the Department of Defense (DoD) roadmap for TDL implementation. ATDLS sustains and improves existing networks while developing future networks. Joint TDLs (Link-11, Link-16, and Link-22) include terminals, gateways, networks, and support initiatives that improve connectivity, interoperability, training, and support. Link-16 is DoD's primary TDL implemented to most TDL-capable platforms and some munitions for specific applications. Link-22 is a multi-national development effort replacing Link-11 with a more suitable high frequency protocol using a message similar to Link-16. Terminals include the Joint Tactical Information Distribution System (JTIDS) and Multifunctional Information Distribution System (MIDS), which provide a Link-16 capability for C2 of aircraft, ships, and ground sites. MIDS-Low Volume Terminal (MIDS-LVT) is a joint and multinational cooperative program to develop, produce, and sustain a successor terminal to JTIDS and is the most widely employed Link-16 terminal. MIDS is the core for MIDS On Ship (MOS). The United States serves as MIDS-LVT program leader, with France, Germany, Italy, and Spain as full partners. Dynamic Network Management (DNM) increases Link 16 network efficiency and reconfiguration flexibility. MIDS Joint Tactical Radio System (JTRS) is an Engineering Change Proposal of the MIDS-LVT and fully interoperable with JTIDS and MIDS-LVT providing Link-16, TACAN, J Voice and three channels for future scalability.

Gateways include the Command and Control Processor (C2P), the Air Defense System Integrator (ADSI), and the Link Monitoring and Management Tool (LMMT). C2P is a TDL communication processor associated with host combat systems, such as Aegis or the Ship Self-Defense System (SSDS). The current system (often called the Next-Generation C2P) provides extended range capabilities and improved operator interfaces through an incremental approach for capability enhancements and technology refresh. C2P is adding Link 22 capability through its next major upgrade.

The Common Data Link Management System (CDLMS) is the engineering at the heart of the C2P system, and integrates components to monitor multi-TDL networks simultaneously. ADSI is a time-sensitive tactical C2, commercial off-the-shelf system providing for processing and display of multiple TDL interfaces, data forwarding, and TDL information to the Global Command and Control System–Maritime (GCCS-M). LMMT is a network monitoring management and communications system to meet emerging Maritime Operations Center (MOC) C2 multi-mission TDL requirements and address the shortcomings of existing systems such as ADSI.

Status

JTIDS/MOS: JTIDS/MOS terminals will be updated to satisfy NSA cryptographic modernization and DoD/DOT frequency remapping mandates with an initial operational capability (IOC) planned for FY 2017. Program management and acquisition authority for JTIDS/MOS is under the Link 16 Network Program.

DNM: Time Slot Reallocation (TSR) achieved IOC on ships in the C2P and JTIDS programs in FY 2007. TSR was also fielded on E-2C, EA-6B, and H-60 aircraft in FY 2009, and is scheduled to field on other joint platforms such as E-3 and E-8. DNM is scheduled for Milestone C/Full Deployment Decision Review, IOC in FY 2014, and FOC in FY 2015.

MIDS-LVT: The program entered the engineering, management, and development (EMD) phase in December 1993. MIDS was approved for low-rate initial production (LRIP) in FY 2000 and reached IOC on the F/A-18C/D *Hornet* in FY 2003. Within the Navy, MIDS is being procured from 2012 through FY 2017 for F/A-18 C/D/E/F, E/A-18/G, MH-60R/S, and CH-53K aircraft. The Air Force F-15 fighter variant, MIDS-LVT(3), is fully fielded, and the Army variant, LVT(2), is deployed with all designated Army units. MIDS-LVTs will be updated to the Block Upgrade 2 (BU2) configuration commencing in FY 2017. MIDS LVT BU2 will incorporate CM. FR, and enhanced throughput to maintain system viability and address NSA and DoD/DoT mandates. As of FY 2013, more than 9,238 MIDS-LVTs had been delivered or were on contract, and integrated in 76 platforms within the five partners (i.e. US, France, Germany, Italy and Spain) and 36 foreign military sales customer nations.

MIDS JTRS: MIDS JTRS completed operational testing on its lead platform, the F/A-18E/F *Super Hornet*, in the second quarter of FY 2012. F/A-18 IOTE report assessed MIDS JTRS as operationally effective and suitable with minor deficiencies for fleet deployment. Additionally, DT/OT testing of the MIDS JTRS terminal was performed on both USAF E-8C (JSTARS) and RC-135 (Rivet Joint) platforms where MIDS JTRS was found to be operationally effective and suitable with limitations. MIDS JTRS received full production and fielding approval in 2QFY 2012, with IOC for the F/A-18E/F in the fourth quarter of FY 2012. MIDS JTRS is now deployed on five F/A-18 squadrons and on the USAF E-8C (JSTARS) and RC-135 (Rivet Joint). MIDS JTRS Block Cycle 1 (BC1) was awarded in FY 2011. BC1 configuration includes CM upgrades to fully comply with NSA mandates. BC1 retrofits will be available in FY 2014. MIDS JTRS Block Cycle 2 (BC2) was awarded in second quarter of FY 2013. BC2 will incorporate DNM, RelNav, and specific MOS platform requirements into MIDS JTRS. To support From The Air (FTA) Naval Integrated Fire Control-Counter Air (NIFC-CA), the Navy funded MIDS JTRS improvements including four Net-Concurrent Multi-Netting with Concurrent Contention Receive (CMN-4) and Tactical Targeting and Networking Tech-

nology (TTNT). CMN-4 full development and TTNT technology development were both awarded the fourth quarter of FY 2013. CMN-4 increases Link-16 network capacity by allowing better utilization of the Link-16 network. CMN-4 is fully interoperable with non-CMN-4 Link-16 platforms. TTNT complements Link-16 and meets emerging networking requirements that Link-16 cannot fulfill. TTNT will enable IP capability on an airborne environment for tactical aircrafts. MIDS JTRS CMN-4 limited production and fielding and retrofits are planned for FY 2016 with full production starting in FY 2017. MIDS JTRS TTNT limited production is planned for FY 2018 with production in FY 2019.

C2P: C2P Legacy, C2P Rehost, and NGC2P Increment 1 have completed fielding and are in the operations and support phase. NGC2P Increment 2 achieved full rate production in July 2008, and will achieve full operational capability and transition to the O&S phase by FY 2016 as per the current shipboard architecture upgrade plan. NGC2P Increment 3 began development in FY 2013.

NILE: NILE partner countries have fielded Link-22 on limited ship and shore sites. Link-22 capability will be implemented in NGC2P as Increment 3, with development work beginning in FY 2013.

ADSI: ADSI Version 14 is in fielding. ADSI Version 15 testing is complete and limited fielding is planned to commence in FY 2014. The program intends to supplement/replace certain ADSI systems with the Link Monitoring and Management Tool (LMMT) capability.

Developers

Data Link Solutions	Wayne, New Jersey, USA
ViaSat	Carlsbad, California, USA

Automatic Identification System (AIS)

Description

The Automatic Identification System is a maritime digital broadcast system that continually exchanges voyage and vessel data among network participants over very-high-frequency radio in support of regional and global maritime domain awareness (MDA) requirements. The data include vessel identity, position, speed, course, destination, and other information of critical interest for navigation safety and maritime security. Commercial vessels greater than 300 gross tons are required by the International Maritime Organization and the 1974 International Convention for the Safety of Life at Sea to use AIS. Warships are exempt. The Navy AIS program collects open-source AIS data broadcast from AIS transceivers on commercial vessels. These open-source AIS data, combined with other government intelligence and surveillance data, are used by Navy ships and submarines to improve safety of navigation and are integrated into the common operational picture to enhance situational awareness. The AIS data collected by Navy platforms are also aggregated within the MDA/AIS Sensor/Server (MASS) capability at several operational shore sites.

The MASS then provides the data to unclassified and classified users in support of MDA efforts, with particular focus on improving the Nation's maritime security.

Status

Navy AIS began as a rapid deployment capability, transitioned to a program of record on December 24, 2008 and was designated as an Acquisition Category IV program. The Space and Naval Warfare Systems Command Program Executive Office C4I is the milestone decision authority. As of September 2013, Increment I AIS systems were installed on 169 unit-level ships (e.g., cruisers and destroyers) and 23 force-level ships (e.g., aircraft carriers and amphibious assault ships). AIS installations have also been completed on 30 submarines, with an additional eight scheduled through FY 2014. The systems include a laptop computer display on the bridge and connectivity to send unclassified AIS data to shore sites. They also allow for the direct transfer of AIS track information. The Navy is implementing a firmware upgrade to add encrypted capability on submarine AIS systems to improve safety of navigation for submarines operating in close proximity to Coast Guard vessels that routinely encrypt their AIS position reports. Shore sites are operational at Third Fleet, Fifth Fleet, Pacific Fleet, and Fleet Forces Command.

Developers

L3 Communications	Orlando, Florida, USA
SAAB Transponder Tech	Sterling, Virginia, USA

Cooperative Engagement Capability (CEC)

Description

CEC provides improved battle force air-defense capabilities by integrating sensor data of each cooperating ship, aircraft, and ground station into a single, real-time, fire-control-quality, composite track picture. CEC is a critical pillar of the Naval Integrated Fire Control-Counter Air (NIFC-CA) capability and will provide a significant contribution to the Joint Integrated Fire Control (JIFC) operational architecture. CEC interfaces the weapons and sensor capabilities of each CEC-equipped ship and aircraft in the strike group, as well as ground mobile units in support of integrated engagement capability. By simultaneously distributing sensor data on airborne threats to each ship within a strike group, CEC extends the range at which a ship can engage hostile tracks to beyond the radar horizon, significantly improving area, local, and self-defense capabilities. CEC enables a strike group or joint task force to act as a single, geographically distributed combat system. CEC provides the fleet with greater defense in-depth and the mutual support required to confront evolving threats of anti-ship cruise missiles and theater ballistic missiles.

Status

In April 2002, the Defense Acquisition Board approved full rate production for CEC (USG-2) shipboard and low rate initial production for E-2C *Hawkeye* (USG-3) airborne equipment sets. In September 2003, the Defense Department approved FY 2004/2005 follow-on production for the USG-3. There are 120 CEC installations

(62 ships, 30 aircraft, 4 Army aerostats, 10 USMC Composite Tracking Networks and 14 Land-Based Test Sites) as of September 2013. Total future CEC installation is planned for 269 ships, aircraft, and land units.

Navy Integrated Fire Control-Counter Air From the Sea (NIFC-CA FTS) live-fire testing commenced in 2013 with successful tests at the White Sands Missile Range and on board the USS Chancellorsville (CG 62). Live NIFC-CA FTS testing is scheduled to continue with approximately one event every six-to-nine months through FY 2022.

Developers

Johns Hopkins University	
Applied Physics Laboratory	Laurel, Maryland, USA
Raytheon Systems Company	St. Petersburg, Florida, USA
Sechan Electronics, Inc.	Lititz, Pennsylvania, USA

Deployable Joint Command and Control Capability (DJC2)

Description

Deployable Joint Command and Control program is a standardized, rapidly deployable, scalable, and reconfigurable C2 and collaboration combat operations center that can be set up anywhere in the world to support geographic combatant commanders and their joint component commands in the rapid standup of a joint task force (JTF) headquarters. DJC2 can be employed when executing operations ranging in scale from that of a first responder or small early-entry, forward-component operations center to that of a full JTF combat operations center. DJC2 has been used for humanitarian assistance/disaster response operations, including: JTF Unified Response after the earthquake in Haiti; Operation Tomodachi in Japan; JTF Caring Response after Cyclone Nargis in Myanmar; and JTF Katrina after Hurricane Katrina in New Orleans, Louisiana. Additionally, the systems are used extensively for JTF headquarters joint exercises and training. DJC2 extends the joint sea base ashore for rapid, dynamic joint operations.

The DJC2 system has four modular tent/mobile shelter configurations, which iteratively build up C2 capability during the first phases of a joint operation. Configurations include: an autonomous Rapid-Response Kit (RRK, 5 to 15 seats); En Route (6 to 12 seats carried on board C-130 and C-17 aircraft); Early Entry (20 to 40 seats); and Core (60 seats). An Early Entry configuration can be set up and operational with three networks and communications in less than six hours. The fully fielded DJC2 configuration can be set up and operational with five networks in less than 24 hours in a footprint of approximately 40,000 square feet. The number of users supported can be expanded by lashing together two or more Cores, or by adding Core Expansion Kits (three available, adding 60-seats each, 180 total). Fully fielded DJC2 includes self-generated power, environmental control, shelters (tents), infrastructure, limited communications equipment, C2 applications, office automation and collaboration software applications with operator workstations (laptop computers, chairs and tables), displays,

intercommunications, local area networks, and access to wide area networks.

The DJC2 program has delivered to the combatant and joint force commanders an operationally tested C2 system that is: horizontally and vertically integrated across all levels of command; interoperable across joint, coalition, interagency, non-governmental organization/private volunteer organization; robust, scalable, and rapidly deployable, including autonomous en-route and Rapid-Response Kit capabilities; and incorporated into the design through evolving technology insertion and fielding to continuously meet combatant and joint force commanders' emerging requirements.

Status

In September 2008, the DJC2 program attained Full Operational Capability with the delivery of six operational Core systems to U.S. Southern Command, U.S. European Command, U.S. Pacific Command, U.S. Army South, U.S. Army Africa, and III Marine Expeditionary Force. A seventh system was provided to NAVCENT in support of a UONS and their COOP requirements. This system is currently under consideration for inclusion into the DJC2 POR. Programmed funding supports hardware sustainment, information technology refresh, and technology-insertion efforts (based on warfighter input as technologies mature) across the future years defense program.

The first cycles of technology insertion have been successfully delivered and included secure wireless networking and a new variant of the RRK that is more modular and includes a specialized commander's kit. Follow-on cycles of technology insertion are delivering such capabilities as application virtualization; core expansion kits; early entry light configuration; robust storage architecture; and Voice over Secure Internet Protocol (VoSIP).

Future capabilities planned include cloud services, application virtualization, virtual desktop infrastructure, and IPv6. Because of its open architecture and modular design, the DJC2 system can be reconfigured to meet a wide variety of form/fit/functions.

This design advantage, coupled with the system's robust capabilities and proven utility, has resulted in several non-program of record customers procuring DJC2 capabilities as a low-risk, cost-effective (due to savings in development costs) solution to meeting their deployable C2 requirements. U.S. Naval Forces Central Command has leveraged DJC2 technology and architecture for its operations center using a combination of Internal Airlift/Helicopter Slingable Container Unit containers and tents. The Marine Corps has procured three modified DJC2 Core systems (with an expanded 180 seats each) to serve as its Combat Operations Center v(1) system. The Naval Expeditionary Combat Command, four Marine Expeditionary Units, and the Naval Mine and Anti-Submarine Warfare Command have procured rapid-response kits (and plan to procure other DJC2 configurations/subsystems) to meet their expeditionary needs.

Developers

ARINC	Panama City, Florida, USA
George Tech Research Institute	Atlanta, Georgia, USA
ISPA Technology	Panama City, Florida, USA
Naval Surface Warfare Center Panama City Detachment	Panama City, Florida, USA

Distributed Common Ground System – Navy (DCGS-N)

Description

Distributed Common Ground System–Navy Increment One is the Navy component of the Department of Defense (DoD) DCGS family of systems. DCGS-N is the Navy's primary intelligence, surveillance, reconnaissance, and targeting (ISR&T) support system, and provides processing, exploitation, and dissemination services at the operational and tactical levels of war. DCGS-N operates at the secret and sensitive compartmented information (SCI) security levels. DCGS-N makes maximum use of commercial-off-the-shelf (COTS), mature government-off-the-shelf (GOTS), and joint services software, tools, and standards to provide a scalable, modular, extensible multi-source capability that is interoperable with the other Service and Agency DCGS systems.

In 2007, the DCGS-N program realigned to the CANES Common Computing Environment (CCE)/Agile Core Services (ACS) architecture. DCGS-N Increment One replaces all legacy Joint Service Imagery Processing System-Navy and SCI Global Command and Control-Maritime systems.

The Increment One follow-on system, DCGS-N Increment Two, will field initially at an ashore enterprise node in 2017 and will be available to the Fleet via reach-back. In following years, DCGS-N Increment Two will be software hosted within the CANES infrastructure. DCGS-N Increment Two will field Maritime Domain Awareness capabilities and converge afloat and ashore ISR. It will leverage DoD, and Intelligence Community (IC) infrastructures, including emerging cloud architecture, to ensure the Navy's joint command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) interoperability. Increment Two will provide the necessary end-to-end processing, exploitation, and dissemination architecture to address future sensor data from Navy ISR tactical sensor platform investments. It will greatly improve the Navy's ability to: (1) identify maritime threats; (2) fuse national, tactical, and inter-theater data for operational use; and (3) allow better DCGS family-of-systems and Intelligence Community visibility into maritime collection requirements. Increment Two will support evolving fleet needs through frequent delivery of capabilities.

The Intelligence Carry-On Program (ICOP) fulfills fleet requirements and urgent operational needs for a subset of DCGS-N intelligence capabilities on Navy unit-level platforms. The ICOP suite includes an integrated 3-D operational picture displaying intelligence and other data sources to provide a complete picture of the battlespace. The system supports a full-motion video receive, process, exploit, and disseminate capability as well as the ability to process and correlate electronic intelligence and communica-

tions externals. It integrates mature COTS and GOTS applications with shared storage and communication paths to reach back to the DCGS-N Enterprise Node and national ISR systems, making the tactical user a part of the larger ISR enterprise. The ICOP prototype has received positive feedback from fleet users and won both the Department of Navy Acquisition Excellence Award for Technology Transition and the Office for Naval Research Rapid Technology Transition Achievement Award.

Status

The DCGS-N installation plan includes aircraft carriers, large-deck amphibious assault ships, fleet command ships, intelligence training centers and schoolhouse facilities, and shore-based numbered fleet maritime operations centers. Increment One has fielded 23 systems through FY 2013 and will field to a total of 34 locations by the end of FY 2014. Increment Two is scheduled to test and field in FY 2017 as an enterprise node ashore, and it will subsequently replace all Increment One installations. ICOP development will begin in FY 2014 with delivery commencing in FY 2015.

Developers

BAE Systems — Rancho Bernado, California, USA

E-2C/D *Hawkeye* Airborne Early Warning Aircraft

Description

The E-2D Advanced *Hawkeye*, with the APY-9 radar, is a two-generation leap in radar performance, which brings an improved over-the-horizon, overland, and littoral detection and tracking capability to the carrier strike group and joint force commanders. The APY-9, coupled with Cooperative Engagement Capability (CEC), Link-16, and the Advanced Tactical Data Link, fully integrates the E-2D Advanced Hawkeye into the joint integrated air and missile-defense (IAMD) role. The APY-9's advanced detection and tracking capability, in conjunction with AEGIS and the upgraded Standard Missile, as well as the F/A-18 *Hornet* and its upgraded AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM), will allow strike groups to deploy an organic, theater-wide air and cruise missile defense capability to protect high-priority areas and U.S. and coalition forces ashore and afloat.

The E-2 *Hawkeye* is the Navy's airborne surveillance and battle management command and control (BMC2) platform, providing support of decisive power projection at sea and over land for the carrier strike group and joint force commanders. In addition to in-service capabilities, the E-2 has an extensive upgrade and development program to improve the capability of the aircraft as it is a critical element in the joint integrated air and missile defense (IAMD) architecture. The E-2C *Hawkeye 2000*, with the APS-145 radar, features a Mission Computer Upgrade (MCU), CEC, Improved Electronic Support Measures, Link-16, Global Positioning System, and satellite data and voice capability. The MCU greatly improves weapons systems processing power, enabling incorporation of CEC. In turn, CEC-equipped *Hawkeye 2000*s significantly extend the engagement capability of air-defense warships. They

are key to early cueing of the Aegis Weapons System, dramatically extending the lethal range of the Standard Missile. The E-2D is the key enabler to the Naval Integrated Fire Control–Counter Air (NIFC-CA) capability and will continue as the airborne "eyes" of the Fleet.

Status

As of September 2013, there were 61 E-2C aircraft in the Fleet, 26 of which were *Hawkeye 2000*s. Ten E-2Ds were delivered with 15 more on contract with the Navy proposing a multi-year contract for an additional 25-32 aircraft during the next five years. The E-2D Developmental Test Program and Initial Operational Test and Evaluation were completed in October 2012 and reported the E-2D as effective and suitable. The first fleet squadron began transitioning to the E-2D in June of 2013 and is on track for initial operational capability in October 2014 and subsequent deployment in early 2015.

Developers

Lockheed Martin	Syracuse, New York, USA
Northrop Grumman	Bethpage, New York, USA
Northrop Grumman	St. Augustine, New York, USA

E-6B *Mercury*

Description

Derived from the Boeing 707, the E-6B platform provides the Commander, U.S. Strategic Command (USSTRATCOM), with the command, control, and communications capability needed for execution and direction of strategic-nuclear forces. Designed to support a robust and flexible nuclear deterrent posture well into the 21st Century, the E-6B performs very low frequency (VLF) emergency communications, the U. S. Strategic Command Airborne Command Post mission, and Airborne Launch Control of ground-based inter-continental ballistic missiles. It is the Navy's only survivable means of nuclear command and control.

Status

The Block I modification program will sustain and improve E-6B capability and is focused on several aircraft deficiencies identified by USSTRATCOM. The contract for Block I was awarded to Rockwell Collins in March 2004, and Initial Operational Capability (IOC) is planned for 2014.

In 2005, the Navy initiated the Internet Protocol and Bandwidth Expansion (IP/BE) program to modernize the E-6B platform. In 2008, the Navy directed the Multi-Role Tactical Common Data Link (MR-TCDL) and Family of Advanced Beyond Line-of-Sight Terminal/Presidential National Voice Conferencing (FAB-T/PNVC) programs to provide additional enhancements to field a T-3 capability and the replacement of the MILSTAR terminals to connect with the Advanced Extremely High Frequency satellite system. The contract for MR-TCDL integration and installation into one E-6B aircraft and E-6B Systems Integration Lab was awarded to Northrop Grumman in March 2012.

The IP/BE, MR-TCDL, and FAB-T/PNVC programs will support USSTRATCOM's migration of Nuclear Command and Control (C2) to a distributed, network/IP-based global C2 system as an airborne node. Planned IOCs for these programs are as follows: IP/BE in 2014; MR-TCDL in 2016; and FAB-T/PNVC in 2019.

Developers

Boeing	Wichita, Kansas, USA
DRS	Tinker AFB, Oklahoma, USA
Northrop Grumman	Herndon, Virginia, USA
Rockwell, Collins	Richardson, Texas, USA

Global Command and Control System – Maritime (GCCS-M)

Description

Global Command and Control System–Maritime is the maritime implementation of the GCCS family of systems. It supports decision making at all echelons of command with a single, integrated, scalable C4I (command, control, communications, computers, and intelligence) system. The C4I system fuses, correlates, filters, maintains, and displays location and attribute information on friendly, hostile, and neutral land, sea, and air forces, integrated with available intelligence and environmental information. It operates in near real-time and constantly updates unit positions and other situational-awareness data. GCCS–M also records data in databases and maintains a history of changes to those records. System users can then use the data to construct relevant tactical pictures using maps, charts, topography overlays, oceanographic overlays, meteorological overlays, imagery, and all-source intelligence information coordinated into a common operational picture that can be shared locally and with other sites. Navy commanders review and evaluate the general tactical situation, plan actions and operations, direct forces, synchronize tactical movements, and integrate force maneuver with firepower. The system operates in a variety of environments and supports joint, coalition, allied, and multinational forces. GCCS–M is implemented afloat and at select ashore fixed command centers.

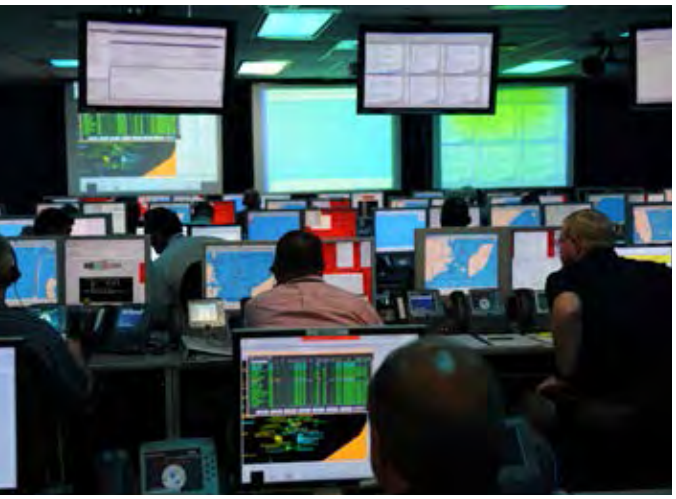
Status

The GCCS-M program is designated an Acquisition Category IAC evolutionary acquisition program with development and implementation progressing in increments. The acquisition strategy calls for each GCCS–M increment (major release) to proceed through acquisition milestone reviews prior to fielding. The program is operating in two simultaneous acquisition increments: Increment 1 (GCCS–M Version 4.0 and prior) is in deployment/sustainment; and Increment 2 (GCCS-M Version 4.1) completed a Fielding Decision Review (FDR) on August 16, 2011, resulting in authorization of full fielding of Increment 2 force-level and unit-level configurations. The Increment 2 group level configuration is in the integration and testing phase, with an operational test planned for the second quarter of FY 2014 and an FDR planned

for the first quarter of FY 2015. GCCS-M includes efforts necessary to ensure synchronization and interoperability with the GCCS family of systems.

Developers

Science Applications International Corporation	San Diego, California, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA



Maritime Operations Center (MOC)

Description

The Navy's maritime operations centers (MOCs) enhance the Navy's command and control capabilities at the operational level through headquarters manned by individuals proficient in joint and naval operational-level staff processes and equipped to provide globally networked, scalable, and flexible capability across the spectrum of conflict. MOCs provide organizational consistency, the scalability and flexibility to transition between various command roles, and enhanced global networking among Navy-maritime organizations. The MOC construct achieves effective, agile, networked, and scalable staffs, employing standardized doctrine, processes, and command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems. Each MOC is able to support their Maritime Commander who is tasked to command and control Navy and joint forces in joint, interagency, and combined roles. The global network and commonality enable both reach-back and load sharing across all MOCs. Education provided via the Maritime Staff Operators Course provides foundational knowledge in joint and naval operational-level processes and prepares personnel to perform Navy operational level MOC functions. Training and assist teams from U.S. Fleet Forces Command and the Naval War College provide MOCs with on-site training and assessment and share best practices in order to maintain proficiency in and ability to execute critical staff processes.

Status

Eight Navy Operational Level headquarters are equipped with the initial MOC material configuration. Key MOC baseline systems hardware and software capabilities have been fielded to U.S. Fleet Forces Command, Pacific Fleet, Third Fleet, NAVSOUTH/Fourth Fleet, NAVCENT/Fifth Fleet, NAVEUR/NAVAF/Sixth Fleet, Seventh Fleet, and FLEETCYBERCOM/Tenth Fleet. Systems fielded to these MOCs include the Combined Enterprise Regional Information Exchange System–Maritime, Air Defense System Integrator, Radiant Mercury, Analyst Notebook, Missile Defense Planning System, Command and Control Battle Management and Communications System, Command and Control Personal Computer (C2PC), Distributed Common Ground System–Navy, Joint Automated Deep Operations Coordination System (JADOCS), and Global Command and Control System–Maritime (GCCS-M).

Support and program wholeness depend on multiple suppliers, joint and Navy Programs of Record across several interconnected requirements and resource seams.

Developers

DRS	Tinker AFB, Oklahoma, USA
Rockwell Collins	Richardson, Texas, USA

Maritime Tactical Command and Control (MTC2)

Description

Maritime Tactical Command and Control is a software program follow-on to the Global Command and Control System–Maritime (GCCS-M) program of record, which will provide tactical command and control (C2) capabilities and maritime unique operational level of war capabilities not supported by the joint C2 effort. Future fielding plan for MTC2 will include all echelons of command within the Navy. MTC2 will retain capability of GCCS-M 4.1 system while ultimately providing a suite of maritime applications as part of an "Application Store" concept that enables enhanced situational awareness, planning, execution, monitoring, and assessment of unit mission tasking and requirements.

Status

MTC2 completed a Materiel Development Decision the first quarter of FY 2013, Command and Control Rapid Prototype Continuum Transition Readiness Assessment in the second quarter of FY 2013, and an Analysis of Alternative in the third quarter of FY 2013. Following the MDD in FY 2013, MTC2 was designated as a "Rapid IT" acquisition program by Program Executive Officer (PEO) Command, Control, Communications, Computers, and Intelligence (C4I). The PEO is preparing to execute an initial build decision for Release 1 in FY 2014 and expects formal approval as a program of record in FY 2014. The MTC2 program will define/develop reference architecture, develop software, complete Independent Technical Assessment (Phase II), and conduct Integrated and Operational Test in late-FY 2014 or early FY 2015.

Developers

Space and Naval Warfare Systems Center Pacific	San Diego, California, USA

Mk XIIA Mode 5 Identification Friend or Foe (IFF)

Description

The Mk XIIA Mode 5 Identification Friend or Foe (IFF) is a secure, real-time, cooperative "blue-force" combat identification system designed to inform commanders' "Shoot/No-Shoot" decisions. Advanced technology, coding, and cryptographic techniques are incorporated into the IFF Mode 5 to provide reliable, secure, and improved equipment performance compared to Mode 4. The Mode 5 waveform is defined in NATO Standardization Agreement (STANAG) 4193 and is compatible with all U.S. and international civil IFF requirements. This Navy Acquisition Category II program is based on the improved Mk XII Cooperative IFF Operational Requirements Document, dated April 27, 2001. Transponders will be installed on more than 3,000 ships and Navy/Marine Corps aircraft. Mode 5 interrogator equipment will be fielded on select ships and aircraft, including MH-60R *Seahawk* helicopters, E-2D *Hawkeye,* F/A-18C/D/E/F *Hornet/Super Hornet*, and E/A-18G *Growler* aircraft.

Status

Navy Initial Operational Capability (IOC) and Full Rate Production were approved in 2012. Integrated and Operational testing on the E-2D, MV-22 *Osprey*, P-3C *Orion*, *Arleigh Burke* (DDG 51) destroyers, and *Ticonderoga* (CG 47) cruisers occurred during Bold Quest 13-01/Joint Operational Test Approach–2 in June 2013. The program is on track for joint IOC and Full Operational Capability in 2014 and 2020, respectively, with the Joint Requirements Oversight Council approved exception of the F/A-18E/F and EA-18G. Operational testing of the combined interrogator/transponder on the F/A-18E/F and EA-18G is planned for 2014.

Developers

BAE Systems	Greenlawn, New York, USA
DRS	Tinker AFB, Oklahoma, USA
General Dynamics Decision Systems	Scottsdale, Arizona, USA

Navy Air Operations Command and Control (NAOC2)

Description

Navy Air Operations Command and Control program provides task force commanders the ability to plan, disseminate, monitor, and execute theater air battles. NAOC2 capability is provided by the Theater Battle Management Core Systems (TBMCS). TBMCS is an Air Force Acquisition Category III program of record with joint interest. TBMCS is integrated and fielded to enable the air planner to produce the joint air tasking order and air space control order, which give afloat battle staffs and maritime operations centers the capability to lead, monitor, and direct the activities of assigned or attached forces during large-scale combined joint service operations with a joint force air and space component commander (JFACC).

Status

TBMCS 1.1.3 is in the operations and sustainment phase. Software and security upgrades are fielded as they become available. The NAOC2 program is integrated and tested within the Navy operational environment for fielding to force-level ships (aircraft carriers, amphibious assault ships, and command ships), maritime operations centers, and selected training sites. The Air Force's Command and Control Air and Space Operations Suite and Command Control and Information Services programs of record will replace TBMCS. The Air Force will develop these programs in a service-oriented architecture environment, and the Navy will migrate into these programs, which will reside in the Consolidated Afloat Networks and Enterprise Services environment.

Developers

Lockheed Martin	Colorado Springs, Colorado, USA
Space and Naval Warfare Systems Center Pacific	San Diego, California, USA

Tactical Messaging / Command and Control Official Information Exchange (C2OIX)

Description

Command and Control Official Information Exchange provides the Navy with organizational messaging services to and from worldwide Department of Defense (DoD) consumers, such as tactical deployed users, designated federal government organizations, and foreign allies. C2OIX Afloat consists of the Navy Modular Automated Communications System (NAVMACS), a shipboard message processing system that guards broadcast channels and provides the only General Service Top Secret level communications path on and off the ship. C2OIX Shore provides the shore-messaging infrastructure via the C2OIX Message Gate system at the Naval Computer and Telecommunications Area Master Stations.

Status

C2OIX has replaced both Tactical Messaging and the Defense Message System as the Navy's single program or record supporting all naval messaging requirements, providing organizational C2 messages to all ashore, afloat and mobile Navy users. Afloat component NAVMACS II is in the operations and sustainment phase and undergoing a Service Life Extension Project to technically refresh all shipboard systems. Shore components are in the operations and sustainment phase and have been upgraded to the C2OIX Message Gate system.

Developers

General Dynamics Scientific Research Corporation	Taunton, Massachusetts, USA Charleston, South Carolina, USA

Tactical Mobile

Description

The Navy Tactical/Mobile (TacMobile) Program provides systems to support maritime commanders with the capability to plan, direct, and control the tactical operations of Maritime Patrol and Reconnaissance Forces (MPRF), joint and naval expeditionary forces, and other assigned units within their respective areas of responsibility. The TacMobile systems that support these missions are tactical operations centers (TOCs), mobile tactical operations centers (MTOCS), and joint mobile ashore support terminals (JMASTS). TOCs and MTOCs provide MPRF operational support ashore at main operating bases, primary deployment sites, and forward operating bases, similar to support provided on board an aircraft carrier to embarked tactical air wings.

Support includes persistent situational operational and tactical awareness, Maritime Patrol and Reconnaissance Aircraft (MPRA) pre-mission coordination and planning, mission and target briefings, tactical in-flight support, post-mission analysis of collected sensor data, data dissemination, and feedback to aircraft sensor operators and supported commanders. Services provided include: analysis and correlation of diverse sensor information; data management support; command decision aids; data communication; mission planning, evaluation, and dissemination of surveillance data; and threat alerts to operational users ashore and afloat. As advances in sensor technology are fielded on MPRA, the TOC and MTOC sensor analysis equipment will evolve to support the new sensor capabilities. JMAST provides a robust and transportable C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) capability to a Navy component commander or other staff. JMAST systems have supported overseas contingency operations, humanitarian assistance and disaster response efforts, and noncombatant evacuation operations, among other critical operations.

Status

TacMobile Increment 2.1 Full-Rate Production and fielding were authorized in November 2012 to field new capabilities incorporating P-8A *Poseidon* Multi-mission Maritime Aircraft mission support, applications and systems interfaces as well as critical communications upgrades needed for TOCs and MTOCs to support P-8A *Poseidon* intelligence surveillance, and reconnaissance (ISR) operations. Increment 2.1 achieved Initial Operational Capability in October 2013 and will reach Full Operational Capability in FY 2016. Development is underway to support P-8A Increment 2 engineering change proposals and MQ-4C *Triton* Unmanned Aircraft System to achieve more efficient information flow across the Navy's sensor grid through implementation of tactical service-oriented architecture enabled by the global information grid.

Developers

Northrop Grumman	Hollywood, Maryland, USA
Science Applications International Corporation	Charleston, South Carolina, USA
Space and Naval Warfare Systems Center Atlantic	Charleston, South Carolina, USA

UYQ-100 Undersea Warfare Decision Support System (USW-DSS)

Description

Undersea Warfare Decision Support System provides a net-centric capability for the anti-submarine warfare (ASW) commander to plan, coordinate, establish, and maintain a common tactical picture and execute tactical control. It does this by implementing net-centric decision-making tools in an open architecture environment that enables sharing of key tactical data between ASW platforms and support nodes within the battlespace in near real-time. By providing this enhanced command and control within the strike group and theater, the detect-to-engage timeline is shortened. The UYQ-100 USW-DSS is the sole Navy program of record providing an undersea warfare common tactical picture. USW-DSS complements and provides an interface with common operational picture systems, such as the Global Command and Control System–Maritime (GCCS-M) and Link-11/16 tactical data links. When deployed on destroyers, the Navy's SQQ-89 surface ship sonar system provides ship, sensor, and track data to USW-DSS. The Aircraft Carrier Tactical Support System (CV-TSC) provides these data when the system is installed on carriers. These data sources enable USW-DSS to generate and share a single, composite track picture capable of fire control. Decision support tools within the system employ a service-oriented architecture with existing computing hardware and communication links comprising sensor data from multiple platforms to provide rapid confidence in the decision processes between sensors and weapons. These capabilities provide the sea combat commander, theater ASW commander, and ASW commander an integrated capability to plan, conduct, and coordinate USW operations across all ASW platforms. USW-DSS provides highly detailed visualization, integrated platform sensor and distributed combat systems, reduced data entry, improved sensor performance predictions, and data fusion while reducing redundancy of USW tactical decision aids.

Status

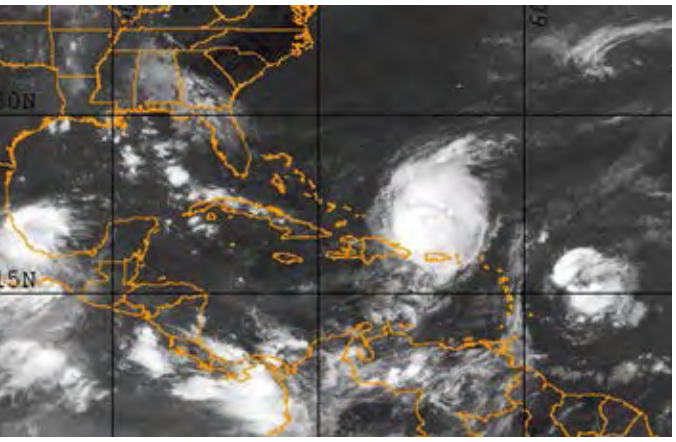
USW-DSS Initial Operational Capability was fielded in the first quarter of FY 2010, and Advanced Capability Build 2 (ACB-2) Release 3 (B2R3) completed Initial Operational Test and Evaluation (IOT&E) in FY 2013. By early FY 2014, USW-DSS had been delivered to 35 surface combatants and aircraft carriers. USW-DSS is also operational at three shore commands and five sites conducting initial and refresher training. These deployed systems provide Navy commands unique USW mission-planning capabilities and mission execution, USW common tactical picture, and tactical execution capabilities. Advanced Capability Build 2 Release 3 fully leverages the Consolidated Afloat Network and Enterprise Services (CANES) hardware and software-computing environment by installing as software only on ships. Design and task analysis for a B2R3 software update will commence following reporting of the completed IOT&E expected in early FY 2014. B2-R3 fielding is planned to continue through FY 2019 on a total of 65 ships

and shore sites. Future plans include ACB-3 with new functions to more fully integrate air platform data exchange, enhanced and expanded on-board and net-centric data interfaces, and weapon-target pairing decision aids.

Developers

Adaptive Methods, Inc.	Centerville, Virginia, USA
Naval Surface Warfare Center Division	Carderock, Virginia, USA
Naval Undersea Warfare Center Division	Keyport, Washington, USA
Progeny Systems Corporation	Manassas, Virginia, USA

OCEANOGRAPHY, SPACE, AND MARITIME DOMAIN AWARENESS



Hazardous Weather Detection and Display Capability (HWDDC)

Description

Hazardous Weather Detection and Display Capability passively extracts data from the tactical scans of the SPS-48(E) and SPS-48(G) 3-D air search radars to generate weather situational awareness products in near-real-time. Within the footprint of the radar, HWDDC provides data on precipitation intensity (when precipitation is present), storm cell movement, and wind speed/direction. This is the first capability of its kind and dramatically reduces risk to safety of flight and other shipboard operations including other ships within the radar footprint.

Status

Designated an Abbreviated Acquisition Program by Space and Naval Warfare Systems Command PEO C4I on May 22, 2013, the SPS-48(E) variant is installed on 12 aircraft carriers and large-deck amphibious warships, while the SPS-48(G) variant is installed on one aircraft carrier. HWDDC is scheduled to enter the Consolidated Afloat Network Enterprise System (CANES) System Integration and Testing event in early FY 2014, and Full Operational Capability will be achieved when all aircraft carrier and amphibious assault platforms have received the SPS-48(G) upgrades, CANES installations, and CANES hosted HWDDC.

Developers

Basic Commerce and Industries, Inc.	Morristown, New Jersey, USA
Space and Naval Warfare Systems Command PEO C4I and PMW-12	San Diego, California, USA

Littoral Battlespace Sensing – Unmanned Undersea Vehicles (LBS-UUV)

Description

The Littoral Battlespace Sensing–Unmanned Undersea Vehicle program provides a low-observable, continuous capability to characterize ocean properties that influence sound and light propagation for acoustic and optical weapon and sensor performance predictions within areas of interest. Critical to realizing undersea dominance, the system has delivered buoyancy-driven undersea gliders (LBS-G) and electrically powered, autonomous undersea vehicles (LBS-AUV) to enable anti-submarine, mine, expeditionary, and naval special warfare planning and execution and persistent intelligence preparation of the environment (IPOE).

Launched and recovered from *Pathfinder* (T-AGS 60)-class oceanographic survey vessels, LBS-G and LBS-AUV will provide persistent battlespace awareness. Additionally, LBS is a force multiplier for the T-AGS ships that further expands collection capabilities in contested areas to ensure access and reduce risk in fleet operations. LBS-UUV is increment 1 of Littoral Battlespace Sensing, Fusion, and Integration (LBSF&I), the Department of the Navy's principal IPOE programmatic construct for meteorological and oceanographic data collection, processing, and data/product dissemination.

LBSF&I is an integrated end-to-end system-of-systems capable of measuring a large variety of environmental parameters from the sea floor to the top of the atmosphere. LBSF&I will be capable of processing, exploiting, and assuring the quality of these data. The relevant information collected from this system is integrated at the Glider Operations Center into naval C4ISR (command, control, communication, computer, intelligence, surveillance, and reconnaissance) systems as part of the Global Information Grid Enterprise Services.

Status

LBS-G reached Full Operational Capability in July 2012, and by early 2014 the program has delivered more than 50 gliders to the Naval Oceanographic Office. A total of 150 gliders will be delivered by FY 2015. LBS-AUV reached a favorable Milestone C and full-rate production decision in June 2012, and the program has delivered two engineering design models to the Naval Oceanographic office; a total of eight vehicles will be delivered by FY 2017. Both LBS-G and LBS-AUV are conducting real-world ocean-sensing missions in overseas locations in support of anti-submarine and mine warfare and IPOE.

Developers

Hydroid, Inc.	Pocasset, Massachusetts, USA
Teledyne Brown Engineering	Huntsville, Alabama, USA
Teledyne Webb Research	East Falmouth, Massachusetts, USA

Maritime Domain Awareness (MDA)

Description

Maritime Domain Awareness facilitates timely decision-making that enables early actions to neutralize threats to U.S. national security interests. MDA results from the discovery, collection, sharing, fusion, analysis, and dissemination of mission-relevant data, information, and intelligence in the context of maritime political, social, economic, and environmental trends within geographic regions. MDA requires a collaborative and comprehensive information and intelligence-sharing environment, working across international and agency borders.

The Navy MDA Concept signed in July 2011 emphasizes Navy maritime operations centers as the focal point for efforts to improve Navy MDA, leveraging reach-back intelligence hubs for analytical support. The Navy's MDA concept complements the 2012 Presidential Policy Directive (PPD)-18 on Maritime Security, which directs integration of all-source intelligence, law-enforcement information, and open-source data. Navy funding also supports MDA-focused analytical capabilities at the Naval Criminal Investigative Service, Office of Naval Intelligence, and numerous other Navy activities to close validated capability gaps.

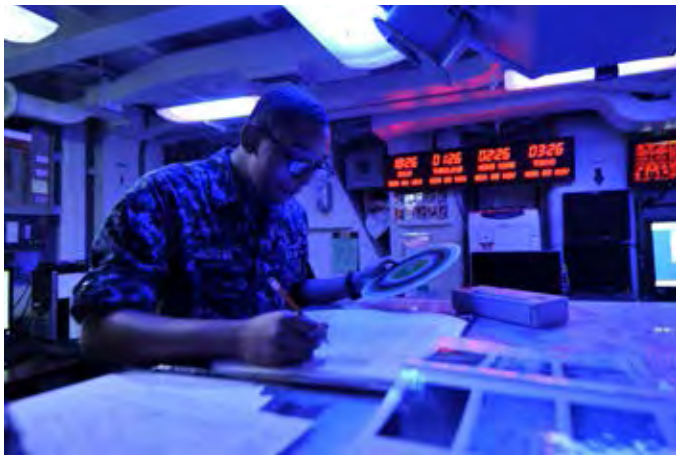
Status

In 2010, the Joint Requirements Oversight Council approved the MDA Initial Capabilities Document, which identified 20 prioritized MDA capability gaps aimed at improving information access, analysis, and sharing to a wide range of interagency and international partners. Dynamic Enterprise Integration Platform is a Secret-level, web-based software deployed in 2011 that fuses and aggregates data from multiple levels and sources to address gaps. Future tools will reside within Increment 2 of the Distributed Common Ground System-Navy program.

Developers

Space and Naval Warfare Systems Command	
PMW-12	San Diego, California, USA
Space and Naval Warfare Systems	
Center, Pacific	San Diego, California, USA

Naval Integrated Tactical Environmental System – Next Generation (NITES – Next)



Description

Naval Integrated Tactical Environmental System–Next Generation is a software-centric solution that leverages CANES infrastructure and services on force level ships. It is being developed to replace legacy meteorology and oceanography (METOC) capabilities in support of the Commander of the Naval Meteorology and Oceanography Command's (CNMOC) Battlespace on Demand concept, fleet safety, and fleet command and control.

NITES-Next represents the core processing, exploitation and dissemination (PED) tool of the METOC professional and provides a one-stop shop of "tools" and tactical decision aids required to generate decision products in support of the spectrum of naval operations. It will be capable of consuming Open Geospatial Consortium (OGC)-compliant information and products, processed remotely sensed environmental information, and ocean and atmospheric model fields that can then be analyzed to produce forecast environmental conditions and impacts on fleet safety, weapons performance, sensor performance, and overall mission. It will also be capable of producing OGC-compliant products that can be shared/viewed on in-service and future Navy command and control systems, including Command and Control Rapid Prototype Continuum, Maritime Tactical Command and Control, and Distributed Common Ground System–Navy systems that will increase fleet-wide situational awareness.

Status

NITES-Next was designated an IT Streamlining Pilot Program in March 2012 and received a Fleet Capability Release (FCR)-1 build decision in May 2012. NITES-Next is expected to be fully developed in five FCRs. Initial Operational Capability will be achieved after successful Operational Test and Evaluation of FCR-1; Full Operational Capability will be achieved after FCR-5. FCR-1 will enter the Consolidated Afloat Network Enterprise System (CANES) System Integration and Testing event in early FY 2014, and a FCR-2 build decision is also scheduled for the same time period. A limited fielding decision for FCR-1 is then expected in the second quarter of FY1 2014, allowing for installation on the first available force level CANES ships. IOC is scheduled for the second quarter of FY 2015.

Developers

Forward Slope, Inc.	San Diego, California, USA
Space and Naval Warfare Systems Command	
PEO C4I and PMW-120	San Diego, California, USA
Space and Naval Warfare Systems	
Center, Pacific	San Diego, California, USA

NAVSTAR Global Positioning System (GPS)

Description

The NAVSTAR GPS program is a space-based, satellite radio navigation system that provides authorized users with 24/7, worldwide, all-weather, three-dimensional positioning, velocity, and precise time data. Navy responsibilities include the integration of GPS in 285 surface ships and submarines and more than 3,700 aircraft, integration of shipboard combat systems with the Navigation Sensor System Interface (NAVSSI) and the deployment of follow-on GPS-based Positioning, Navigation, and Timing Services (GPNTS) and anti-jam (A/J) protection for high-priority combat platforms through the navigation warfare (NAVWAR) program. NAVWAR provides anti-jam antennas to protect air and sea naval platforms against GPS interference to ensure a continued high level of mission effectiveness in a GPS jamming environment.

GPS plays a critical role not only in precise navigation, but also in providing precise time synchronization to precision-strike weapons, naval surface fire support systems, and ship C4I (command, control, communications, computers, and intelligence) systems. NAVSSI is the in-service shipboard system that collects, processes, and disseminates position, velocity, and timing data to weapons systems, C4I, and combat-support systems on board surface warships. GPNTS will incorporate the next-generation of GPS receivers, initially the Selective Availability Anti-Spoofing Module, to be followed by M-Code receivers, to ensure that U.S. Navy ships can use the new GPS signals being broadcast from the latest GPS satellites. GPNTS also features A/J antennas and multiple atomic clocks to support assured position, navigation, d and timing services. GPNTS Initial Operational Capability is expected in 2016.

Status

All Navy platform GPS installations are complete. The Air NAVWAR program continues tests on suitable A/J antennas for Navy unmanned aerial vehicles such as Fire Scout. Installation of A/J antennas in F/A-18 E/F/G *Super Hornet/Growler* and AV-8B *Harrier II* aircraft is ongoing. The Sea NAVWAR program is installing GPS A/J antennas on major surface combatants and the Navy's submarine force. The Navy is completing installation of NAVSSIs on select Navy surface combatants with an expected Full Operational Capability in FY 2015. The GPNTS program completed a successful Critical Design Review in February 2013. The program's next major event is Milestone C, scheduled for early 2015.

Developers

Boeing Military Aircraft	St. Louis, Missouri, USA
Litton Data Systems	San Diego, California, USA
Raytheon Systems	Los Angeles, California, USA
Rockwell-Collins	Cedar Rapids, Iowa, USA

T-AGS 66 Oceanographic Survey Ship

Description

The *Pathfinder* (T-AGS 60)-class oceanographic survey vessels comprise six 329-foot long, 5,000-ton vessels that provide multi-purpose oceanographic capabilities in coastal and deep-ocean areas. Under the Military Survey restrictions of the United Nations Convention on the Law of the Sea, the T-AGS 60 represents an internationally recognized environmental information-collection capability that can operate within the Exclusive Economic Zones of sovereign nations in support of DoD requirements without host-nation approval. Non-military ships conducting these collections may only do so with host-nation approval. T-AGS ships perform acoustic, biological, physical, and geophysical surveys, and gather data that provide much of DoD's information on the ocean environment as well as mapping the ocean floor to update nautical charts and promote safety of navigation. These data points help to improve undersea warfare technology and enemy ship and submarine detection. T-AGS 60-class ships are designed with a common bus diesel-electric propulsion system consisting of twin-screw propellers driven through Z-drives. The Z-drives, with 360-degree direction control, provide for precise and accurate position-keeping and track-line following.

The T-AGS ships are manned and operated for the Oceanographer of the Navy by civilian crews provided by the Military Sealift Command (MSC), and the Naval Oceanographic Office provides mission scientists and technicians.

The Navy will deliver the newest vessel to the T-AGS fleet, the USNS Maury (T-AGS 66), in FY 2014. A modified version of the *Pathfinder*-class vessels, the ship is named after Matthew Fontaine Maury, the father of modern oceanography and naval meteorology. T-AGS 66 will be 24 feet longer than the in-service *Pathfinder* T-AGS vessels to accommodate the addition of an 18- by 18-foot inboard moon pool. The moon pool will allow access to the water through the ship's hull for the deployment and retrieval of unmanned undersea vehicles. The increased ship length will also provide 12 additional permanent berthing accommodations. As on previous vessels, a hull-mounted mission system gondola will house the multi-beam sonar system.

Status

The construction of the USNS Maury (T-AGS 66) is under contract with VT Halter Marine of Pascagoula, Mississippi. The keel was laid on February 1, 2011 and the ship was christened and launched on March 27, 2013. The ship is scheduled for delivery to the Navy in FY 2014.

Developers

Naval Meteorology and Oceanography Command	Stennis Space Center, Mississippi, USA
Oceanography of the Navy	Washington, D.C., USA
VT Halter Marine	Pascagoula, Mississippi, USA

Task Force Climate Change (TFCC)

Description

The Chief of Naval Operations (CNO) established Task Force Climate Change (TFCC) in 2009 to address the impacts of climate change on naval readiness. TFCC engages with representatives from many Navy offices and staffs, the National Atmospheric and Oceanic Administration, and the U.S. Coast Guard. The objective of TFCC is to develop policy, strategy, and investment recommendations regarding climate change and the Navy, with a near-term focus on the Arctic, a maritime region that is changing more rapidly than any other area of the world. TFCC is informed by national security and Defense and Navy strategic guidance in executing this objective.

Status

Task Force Climate Change has developed two roadmaps signed by the Vice Chief of Naval Operations, which provide plans of action with timelines to drive Navy policy, engagement, and investment decisions regarding the Arctic and global climate change. Actions specified in the roadmaps are underway, and TFCC provides quarterly updates to the CNO. Following the guidance in the 2010 Quadrennial Defense Review, the Navy's initial investment strategy for the Arctic involves science and technology efforts to improve observation and prediction in high-latitude maritime regions.

Developers

Oceanographer of the Navy	Washington, D.C., USA
Naval Meteorology and Oceanography Command	Stennis Space Center, Mississippi, USA
Office of Naval Research	Arlington, VA, USA

SUPPLY AND LOGISTICS

Naval logistics is essential to our combat power, bridging our nation's industrial base to forward deployed naval forces. Readiness and the ability to sustain forward operations hinge upon logistics support. Naval logistics is the process of getting material from the manufacturer's shipping terminal to our forces worldwide. In addition to material, naval logistics encompasses planning, acquisition, maintenance, engineering support, training, transportation, facilities operations, and personnel support backing up our naval forces around the globe, day and night, in peace and war.

JHSV 1 *Spearhead*-Class Joint High-Speed Vessel

Description

The Joint High-Speed Vessel (JHSV) is a high-speed, shallow-draft surface vessel with an expansive open mission bay and ample reserve power and ship services capacity. Manned by civilian mariners under the control of the Military Sealift Command, it will provide a persistent deployed presence in operational theaters around the world. Capable of speeds in excess of 35 knots and ranges of 1,200 nautical miles fully loaded, the shallow-draft characteristics of the JHSV allow it to operate effectively in littoral areas and access small, austere ports. FY 2014 will see the initial deployments of the USNS Spearhead (JHSV 1) and the USNS Choctaw County (JHSV 2), providing excellent opportunities to integrate these new, highly adaptable platforms into the Fleet and evaluate the many ways the Navy can employ their unique combination of persistent forward presence, flexible payload capacity, and speed.

Status

The USNS Spearhead delivered in October 2012 and was ready for fleet tasking in November 2013. The USNS Choctaw County was delivered in June 2013 and will be ready for fleet tasking in May 2014. The USNS Millinocket (JHSV 3) is to be delivered to the Navy in early 2014. The other ships in the class are: Fall River (JHSV 4); Trenton (JHSV 5); Brunswick (JHSV 6); Carson City (JHSV 7); Yuma (JHSV 8); Bismarck (JHSV 9); and Burlington (JHSV 10).

Developers

Austal USA	Mobile, Alabama, USA
General Dynamics Advanced Information Systems	Fairfax, Virginia, USA

Naval Tactical Command Support System (NTCSS)

Description

The Naval Tactical Command Support System is the combat logistics support information system used by Navy and Marine Corps commanders to manage and assess unit and group material and personnel readiness. NTCSS provides intermediate and organizational maintenance, supply, and personnel administration management capabilities to surface, sub-surface, and aviation operational commanders. NTCSS also supports network-centric warfare by integrating logistics information to complement the tactical readiness picture for operational commanders.

Through an evolutionary acquisition strategy, NTCSS replaced, merged, and optimized legacy Shipboard Non-tactical ADP Program, Naval Aviation Logistics Command Management Information System, Maintenance Resource Management System, and several smaller logistics applications into an integrated and modernized capability. The first stage of the strategy included hardware modernization and network installations using open system architectures and operating environments common with ship-

board tactical programs. The second stage optimized the functional applications using modern software development tools, relational databases, and data replication.

Going forward, business-process improvements are being developed and implemented under sponsorship of functional and fleet managers. Initiatives include migration to an open service oriented architecture, data center hosting, implementation of web services, and the transfer of shipboard logistics data ashore as part of a broader "Move Workload Ashore" initiative to reduce shipboard manpower. Other initiatives include making NTCSS data accessible via the common operational picture to enable operational decisions based on near-real-time readiness data and merging systems such as NTCSS, Global Command Support System-Marine Corps, and Global Command Support System-Maritime into a common/shared capability that exchanges data with Naval Enterprise Resource Planning. As a result, the Navy and Marine Corps will realize greater operational efficiency and lower total ownership costs.

Status

NTCSS is a mature program in Full Rate Production and continues to be the warfighter's production system to maintain fleet readiness. Full Operational Capability (FOC) at naval air stations, Marine air logistics squadrons, and ship and submarines was achieved in FY 2010. An optimized NTCSS capability, targeted for aircraft squadrons, began Full Rate Production in FY 2007 and achieved FOC in the first quarter FY 2012. The technology "refresh" to replace antiquated NTCSS hardware/software and maintain compliance with DoD/DoN Information Assurance and Baseline Reduction mandates commenced in FY 2010, with the completion of deployment cycle planned in FY 2017.

Developers

Advanced Enterprise Systems	Norfolk, Virginia, USA
CACI	Norfolk, Virginia, USA

Navy Energy Program

Description

The 2013 Navy Energy Strategy addresses energy as a strategic resource. The Navy understands how energy security is fundamental to executing its mission afloat and ashore, and the Service must be resilient to a future in which conventional sources of energy could be less available. Our goal is to invest in energy efficiency and consumption-reduction initiatives that reduce the Navy's overall requirement for petroleum, while increasing the use of alternative fuels both in our operations and in our facilities. The Navy Energy Strategy guides a strong portfolio of investments in people, technology, and programs across the Navy's Aviation, Expeditionary, Maritime, and Shore enterprises. In the near-term, the Navy will make significant gains by adjusting policies to enable more energy efficient operations, encouraging awareness and energy-conscious behavior by personnel, optimizing existing technologies to reduce

energy consumption, and speeding the implementation of new technologies, all with the intent of enhancing or enabling greater combat readiness and mission success.

The Navy is grooming a new generation of "energy warriors" through incentives and education. The incentivized Energy Conservation (iENCON) program encourages ships to apply energy-efficient procedures and operations during all suitable ship missions, whether the ship is underway or in port. The iENCON Program rewards those ships that are most successful with conducting fuel-efficient operations and practices. In FY 2012, the iENCON program helped achieve a savings of 981,600 barrels of fuel, which resulted in a cost avoidance of more than 10 percent, equal to an additional 47,400 underway steaming hours. This program was so successful that the Navy launched its Aircraft Energy Conservation Program (Air-ENCON) to optimize fuel consumption by the Navy's 3,700 aircraft.

Maritime-efficiency initiatives seek to reduce energy output in all shipboard evolutions. Passive technologies include the hybrid electric drive (HED). The HED, which continues development and tests, will yield energy storage, power conversion, and control approaches that will enable single-generator ship operations for reduced fuel consumption operations. Active technologies include stern flaps that modify the flow field under the hull to reduce drag, turbulence, and overall hull resistance. Actionable technologies include the Shipboard Energy Dashboard, which provides real-time situational awareness of energy demand associated with equipment. The installation of the Energy Dashboard on board the USS Kidd (DDG 100) has demonstrated a potential energy savings of more than 92,000 KwH. Another actionable technology, the Smart Voyage Planning Decision Aid, sends messages to ships with optimized routing plans for both ship safety and fuel savings. Solid-state lighting upgrades on destroyers in FY 2012 and FY 2013 saved more than 400 barrels of fuel per ship per year and thousands of hours of maintenance hours compared to traditional lighting.

Aircraft engine research is focused on new turbine engine configurations with program goals to decrease fuel consumption and acquisition and maintenance costs while increasing aircraft operational availability and performance. Engine improvements will be accomplished through innovative materials and processes to produce better components. This includes developing new high-temperature metal alloys and inter-metallic materials for lighter and more heat-resistant turbine blades and disks, and thermal/environmental barrier coating systems to improve component heat resistance to obtain greater fuel efficiency. Significant improvement in F-35 Joint Strike Fighter Block 5+ engine fuel economy will increase efficiency and performance. Energy maintenance refinement to the T-56 trainer aircraft is also increasing energy performance. Increased use of aviation simulators in continental U.S. flight training is helping pilots to reduce fuel use while increasing readiness.

The Department of the Navy (DoN) is investing in alternative fuel research to diversify its energy supply. Ongoing test and qualification of renewable fuel blends, such as Hydro-treated Esters and Fatty Acids (HEFA), will enable widespread use by naval aircraft and ships. HRJ-5, a hydro-treated renewable drop-in equivalent to conventional JP-5 fuel, has been certified for use throughout the Fleet. Ultimately, hydro-processed renewable and other synthetic fuel blends produced through the Fischer Tropsch process (a collection of chemical reactions that converts a mixture of carbon monoxide and hydrogen into liquid hydrocarbons) will be purchased in operational quantities once they become cost competitive with conventional fuels. DoN has mandated that alternative fuels must be able to mix or alternate with petroleum and not require a change in aircraft or ship configuration.

In July 2012, the Navy completed the world's largest practical demonstration of non-petroleum fuel use during the "Rim of the Pacific" (RIMPAC) exercise. During the exercise, a complete carrier strike group of U.S. ships and aircraft were powered entirely by a 50/50 blend of biofuel/petroleum-based fuels or nuclear power for an intense two-day test. Navy ships also employed innovative fuel efficiency/conservation technologies such as shipboard energy dashboards, hydrodynamic stern flaps, and solidstate lighting to reduce energy consumption. In 2016, DoN will sail the "Great Green Fleet," which will encompass globally deployed aircraft and ships using the alternative fuels and energy efficiency technologies that were demonstrated at RIMPAC.

Ashore, the Navy continues to focus on increased efficiency through infrastructure and utility systems upgrades. The Service has installed advanced meters to track energy consumption, deployed alternative fuel vehicles to decrease the fuel consumption of the non-tactical vehicle fleet, and established energy-management systems to drive changes in culture and behavior. Renewable energy technology is being implemented where viable. The Navy has a geothermal power plant at China Lake, California; wind power in the Bahamas and California; Landfill Gas-to-Energy and wave buoys in Hawaii; and solar-powered lighting and hot water heaters at installations around the world. Energy Security Audits ensure critical assets have reliable and redundant power and pilots are underway to test and develop SmartGrid technology. Shore energy research and development, such as marine hydro-kinetic generation, continue as Navy explores additional energy sources and technologies.

FY 2013 saw the debut of the Secretary of the Navy's Executive Energy series, which is expanding the repertoire of DoN Energy leaders by providing energy training to Flag officers, Senior Executives, and Senior Enlisted Leaders. Additionally, the Naval Postgraduate School (NPS) offers four masters degree programs with an energy focus for Navy and Marine Corps personnel.

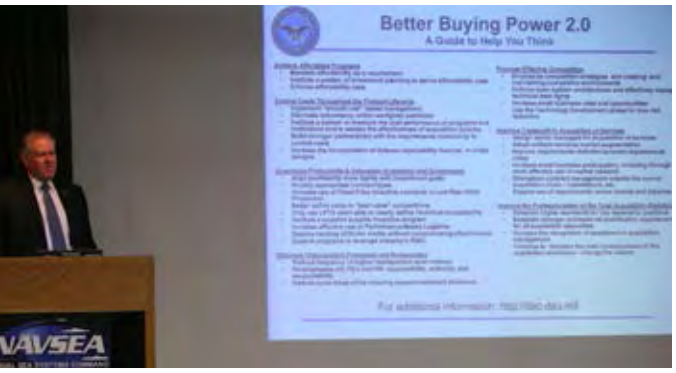
Status

In early FY 2014, hybrid electric drive is being installed on the USS Makin Island (LHD 8). Stern flaps are installed on all guided missile cruisers, destroyers, and frigates, and certain amphibious ships

(LHD, LPD, and LSD). Energy Dashboards have been installed on six guided-missile destroyers and will be installed on an additional seven destroyers in FY 2014. Combustion Trim Loops are installed on seven amphibious ships (LHD 1-6 and LHA 5). The NPS Energy Masters Program is funded for FY 2014. The first two courses of the Secretary of the Navy's Executive Energy Series were held in FY 2013. The Navy's FY 2014 investment maintains the enhancements made in FY 2013 and provides additional funds to address shore energy legislative requirements and tactical energy initiatives that target energy efficiency, reduce energy consumption, and complete alternative fuel test and certification to lay the foundation for increased alternative fuel use.

Developers

Cebrowski Institute	Monterey, California, USA
Naval Air Systems Command	Patuxent River, Maryland, USA
Naval Facilities Command	Washington, D.C., USA
Naval Sea Systems Command	Washington, D.C., USA



Navy Enterprise Resource Planning (Navy ERP)

Description

Enterprise Resource Planning is a generic name for comprehensive management systems used to power an organization's crucial business functions. The Navy ERP solution allows the Navy to unify, standardize, and streamline all its business activities into one system to deliver information transparency that is secure, reliable, accessible, and current. The solution enables sustained Navy compliance with the Chief Financial Officers Act of 1990 and the Department of Defense Information Assurance Certification and Accreditation Process.

Navy ERP is being delivered in two releases. Finance/Acquisition Solution (Release 1.0) provides the Navy with unprecedented financial transparency that can be leveraged across the Navy as a common cost-management framework. This release provides the Navy with an enterprise solution supporting budgeting, billing, external procurement, period close, business warehousing, and cost planning. The Single Supply Solution (Release 1.1) delivers enterprise visibility and process standardization of the Navy Supply Chain. The Single Supply Solution provides an integrated capability from global planning to local inventory handling, thus enabling the Navy to optimize positioning of stock to improve fleet readiness and maximize use of supply funds and assets. More specifically, the Single Supply Solution supports such functions as order fulfillment, inventory management, consignment, warehouse management, provisioning, carcass tracking, supply outfitting, and supply and demand planning. Navy ERP combines business process reengineering and industry best practices, supported by commercial off-the-shelf software, and integrates all facets of Navy business operations, using a single database to manage shared common data.

Status

Navy ERP financial solution has been deployed to the following commands: Naval Air Systems Command (2007); Naval Supply Systems Command (2008); Space and Naval Warfare Systems Command (2009); Naval Sea Systems Command General Fund (2010) and Working Capital Fund (2011); and the Office of Naval Research and Strategic Systems Programs (2012). The Navy ERP Single Supply Solution deployment started in February 2010 and has been successfully deployed to the Naval Inventory Control Points at Philadelphia and Mechanicsburg, Pennsylvania. The first regional implementation of the Single Supply Solution was completed in August 2012, and Initial Operational Capability achieved in May 2008. In October 2008, the Assistant Secretary of the Navy (Financial Management and Comptroller) designated Navy ERP the Navy's Financial System of Record. In early 2014, Navy ERP is deployed to approximately 71,000 users and manages approximately 51 percent of the Navy's Total Obligation Authority.

Developers

Deloitte Consulting	Alexandria, Virginia, USA
IBM	Armonk, New York, USA
SAP America, Inc.	Newtown Square, Pennsylvania, USA

T-AH 19 *Mercy*-Class Hospital Ship

Description

The Navy's two *Mercy*-class hospital ships—the USNS Mercy (T-AH 19) and USNS Comfort (T-AH 20)—are national strategic assets and are employed to support combatant commander (COCOM) requirements. Hospital ships provide highly capable medical facilities and are configured and equipped to meet their primary mission as large-scale trauma centers for combat operations. Each ship has 12 operating rooms and up to 1,000 beds (100 acute care, 400 intermediate, and 500 minor). Additionally, the hospital ships serve as cornerstones for peacetime shaping and stability operations, acting as powerful enablers of stability, security, and reconstruction efforts around the globe. The Nation's hospital ships provide a highly visible, engaged, and reassuring presence when deployed for Theater Security Cooperation (TSC) missions or to respond to humanitarian-assistance or disaster-relief needs. As part of the Naval Fleet Auxiliary Force managed by the Military Sealift Command, these ships are maintained in either a reduced operating status (ROS) or full operating status depending on mission tasking and COCOM requests. Generally, one hospital ship is scheduled for a 120-150 day TSC deployment per year. Periodic maintenance is performed to ensure both ships are able to meet full operational capability within a matter of days when activated from ROS. Civilian mariner crews man these ships, with medical staff augmentation when activated.

Status

The USNS Mercy and USNS Comfort have expected service lives to 2020 and 2021, respectively.

Developers

General Dynamics	San Diego, California, USA
National Steel and Shipbuilding Company	

T-AKE 1 *Lewis and Clark*-Class Dry Cargo and Ammunition Ship

Description

The ability to sustain indefinitely ships on station at sea is a key enabler of the Navy's unmatched ability to project and sustain power forward. The *Lewis and Clark* (T-AKE 1)-class dry cargo and ammunition ships are one of the cornerstones of the critical capability. T-AKE ships provide at-sea delivery of dry cargo and ordnance directly to customer ships and other station ships providing continuous support to combat forces and other naval vessels. With their large, easily reconfigurable cargo holds, T-AKEs replaced three previous classes of fleet auxiliaries with a single hull form. As a secondary mission, T-AKEs can act in concert with a fleet replenishment oiler (T-AO) to fill the station-ship role. T-AKE ships are built to commercial standards and are manned by civilian mariners managed by the Military Sealift Command. A Navy aviation detachment or contracted commercial equivalent embarked on board provides vertical replenishment capability.

Status

The fixed-price incentive contract with General Dynamics National Steel and Shipbuilding Company included option pricing for up to 14 T-AKE hulls to support Combat Logistics Force (CLF) and Maritime Prepositioning Force (MPF) program requirements. The Navy and the Marine Corps have agreed that hulls 12-14 originally designated for the MPF will instead serve as CLF ships, with the MPF to receive the first two hulls in the class. The final hull in this class (T-AKE 14) was delivered in October 2012.

Developers

General Dynamics — San Diego, California, USA
National Steel and Shipbuilding Company

T-AO 187 *Kaiser*-Class and T-AO(X) Replenishment Oiler

Description

The Navy has 15 in-service *Kaiser* (T-AO 187)-class replenishment oilers in the Combat Logistics Force. The ships are part of the Naval Fleet Auxiliary Force under the control of MSC and are manned by MSC civilian mariners. Along with the T-AKE they form the foundation of the Navy's ability to project power forward indefinitely through replenishment at sea and the "shuttling" of dry cargo and fuel from resupply bases to Navy combatants and task forces or station ships in forward areas of operation. The T-AO provides bulk marine diesel fuel and JP5 jet fuel to forces afloat, and they also have a limited capacity to provide stores, packaged cargo, refrigerated cargo, and mail.

The T-AO(X) is the Navy's next-generation replenishment oiler, featuring increased dry and refrigerated cargo capacity, and double-hulled construction. They are to replace the *Kaiser*-class oilers as they reach the ends of their 35-year expected service lives beginning in 2021.

Status
The T-AO(X) Analysis of Alternatives was completed in October 2011. The Navy approved the Capability Development Document in November 2012. Industry studies are in progress and are scheduled to brief out in December 2013. The lead ship is funded for production in FY 2016.

Developers
To be determined.

T-AOE 6 *Supply*-Class Fast Combat Support Ship

Description
The Navy has four *Supply* (T-AOE 6)-class fast combat support ships in the Combat Logistics Force. These ships are part of the Naval Fleet Auxiliary Force under the control of the Military Sealift Command and are manned by civilian mariners. Capable of maintaining higher sustained speeds than other Navy replenishment ships and meeting the full spectrum of afloat replenishment requirements, these ships provide fuel, ordnance, and dry cargo to deployed aircraft carrier and amphibious ready groups from a single point of supply. Working in concert with *Lewis and Clark* (T-AKE 1)-class dry cargo and ammunition ships and *Kaiser* (T-AO 187)-class replenishment oilers, the T-AOEs are key enablers of the Navy's ability to project and sustain power forward indefinitely through replenishment at sea.

Status
Two of the four fast combat support ships, the USNS Bridge (T-AOE 10) and the USNS Rainier (T-AOE 7), are scheduled for inactivation in late FY 2014 and early FY 2015, respectively. The two remaining fast combat support ships in service, the USNS Supply (T-AOE 6) and the USNS Arctic (T-AOE 8), have expected service lives ending in 2034 and 2035, respectively.

Developers
General Dynamics — San Diego, California, USA
National Steel and Shipbuilding Company

T-ATF(X) Fleet Ocean Tugs

Description
In early FY 2014 the Navy has four in-service fleet ocean tugs (T-ATFs) to support towing, salvage, diving, and rescue operations. The primary missions of the T-ATF include emergency towing of battle-damaged ships, providing firefighting assistance to other ships, and supporting submarine-rescue and portable self-sustaining deep-diving operations. T-ATF(X) is the next-generation towing and salvage ship under development to replace the four fleet ocean tugs. With an enhanced capability to support modern self-contained diving and salvage systems, it has the potential to

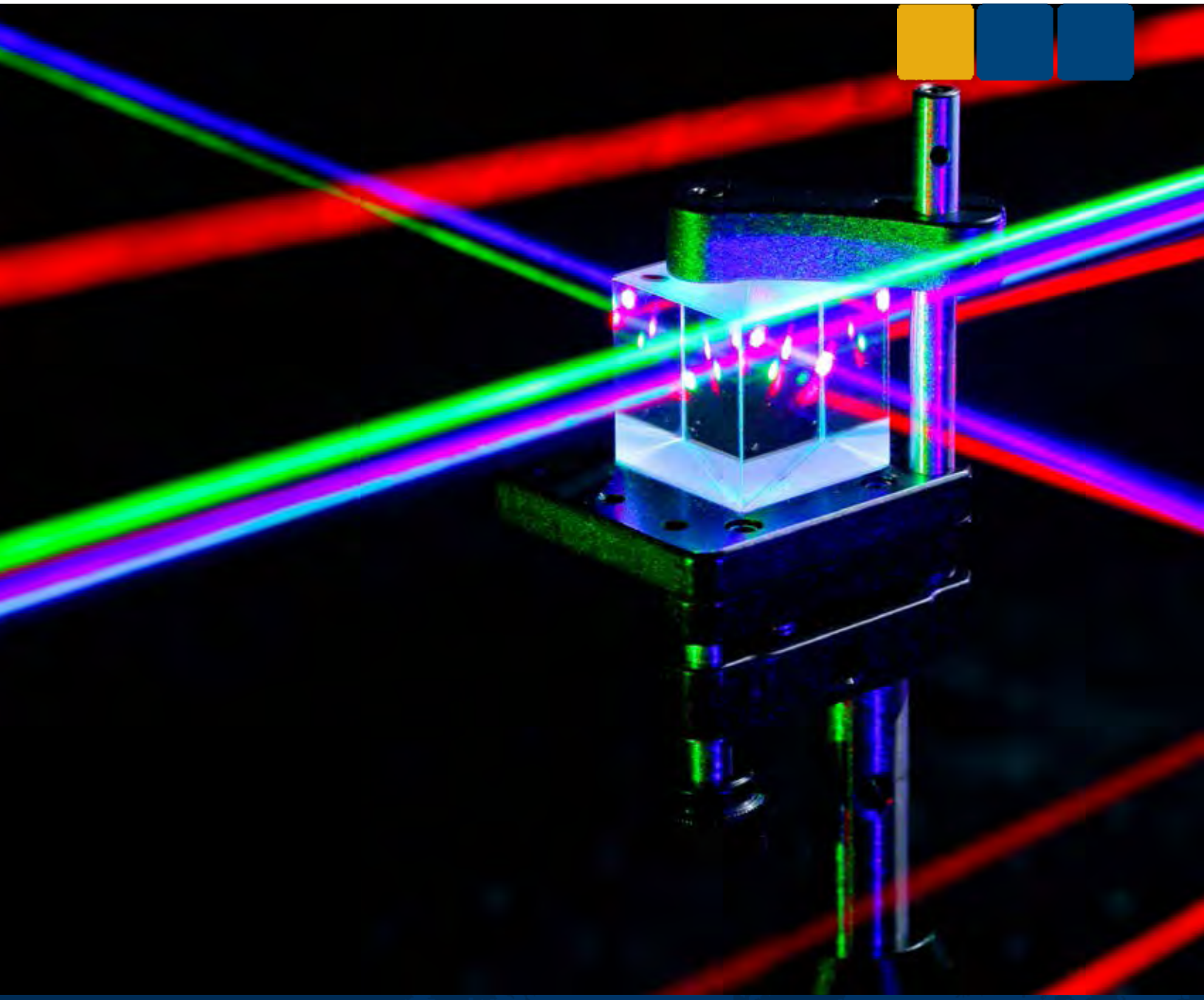
provide a common hull form to replace the four in-service T-ARS rescue and salvage ships, in addition to the ATFs. These new ships are expected to enter service in the early 2020s as the existing T-ATF and T-ARS platforms begin to reach the end of their expected service lives.

Status

The T-ATF(X) Analysis of Alternatives was completed in September 2012. Due to the high degree of commonality between expected T-ATF(X) capabilities and ships already in widespread commercial use, the Navy is investigating the benefits of direct commercial procurement of an existing design to satisfy requirements. The Capability Development Document is under development in FY 2014.

Developers

To be determined.



SCIENCE AND TECHNOLOGY

Naval science and technology (S&T) delivers new capabilities to the Navy and Marine Corps that ensure continued superiority of U.S. naval forces today and warfighters in the future. In keeping with its mandate, the Office of Naval Research (ONR) plans, fosters, and encourages scientific research in recognition of its paramount importance to future naval power and national security. The Naval S&T objective is to support a Navy and Marine Corps that is capable of prevailing in any environment by focusing on S&T areas with big payoffs, encouraging innovative thinking and business processes, and striving to improve the transition of S&T into acquisition programs in the most cost-effective means possible—striking the right balance between responsive near-term technology insertion and long-term basic research.

SCIENCE AND TECHNOLOGY

Autonomous Aerial Cargo/Utility System (AACUS)

Description

The Autonomous Aerial Cargo/Utility System Innovative Naval Prototype explores advanced autonomous capabilities for reliable resupply/retrograde and, in the long term, casualty evacuation by an unmanned air vehicle under adverse conditions. Key features of the AACUS include a vehicle autonomously avoiding obstacles while finding and landing at an unprepared landing site in dynamic conditions, with goal-directed supervisory control by a field operator possessing no special training.

The AACUS represents a substantial leap compared to present-day operations as well as other more near-term Cargo Unmanned Aerial Systems (CUASs) development programs. AACUS focuses on autonomous obstacle avoidance and unprepared landing site selection, with precision-landing capabilities that include contingency management until the point of landing. AACUS includes a goal-based supervisory control component such that any field personnel can request and negotiate a desired landing site. Moreover, AACUS will communicate with ground personnel for seamless and safe loading and unloading.

The program embraces an open-architecture approach for global management of mission planning data, making AACUS technologies platform-agnostic and transferable to new as well as legacy CUASs. AACUS-enabled CUASs will rapidly respond to requests for support in degraded weather conditions, launch from sea and land, fly in high and/or hot environments, and autonomously detect and negotiate precision landing sites in potentially hostile settings. These missions could require significant obstacle and threat avoidance, with aggressive maneuvering in the descent-to-land phase.

Status

The Autonomous Aerial Cargo/Utility System is an ONR Innovative Naval Prototype program with a FY 2012 start, sponsored through the ONR's Office of Innovation.

Developers

Office of Naval Research — Arlington, Virginia, USA

Discovery & Invention (D&I) Research

Description

Research provides the foundation for future breakthroughs in advanced technology. The Discovery and Invention research portfolio represents more than 40 percent of the Navy's science and technology (S&T) budget. It consists of Basic Research and early Applied Research that fund a wide variety of scientific and engineering fields with a goal of discovering or exploiting new knowledge to enhance and transform future naval technological capabilities. With a broad focus, the D&I portfolio aims for development of high risk and high impact projects with a long time span of maturity, from 5-20 years for transition.

D&I investments are the essential foundation required for advanced technology, and leverage other service, governmental, department, industry, international, and general research community investments. In many cases, the Office of Naval Research (ONR) investments were the first to seed new research performed by many of the world's leading scientists and engineers at universities, federal laboratories, and private industry. Thousands of scientists, including more than 60 Nobel Prize winners, have been supported by ONR. Together, their research has literally changed the world with advances in cell phones, the Global Positioning System, life-saving vaccines, lasers, fiber optics, radars, blood-clotting agents, semiconductors, nanotechnologies, and more.

For example, early D&I investments in Gallium Nitride devices led to Wide Bandgap Semiconductor program and ONR's Sea Shield, Future Naval Capabilities programs. These efforts have resulted in high-performing radar systems in the next-generation E-2D *Hawkeye* aircraft and for ship radar via the InTop Innovative Naval Prototype program. The D&I research in autonomous sciences has yielded autonomous systems in use today that cost-effectively extend aircraft, ship, and submarine capabilities. A bio-inspired science effort has produced a microbial fuel cell capable of powering small undersea sensors. Recognizing the need to network advancements in all warfighting capabilities, the D&I portfolio contains a substantial investment in information technology sciences. The breakthroughs in this arena include Composable FORCEnet, space-based microwave imagery and enhanced weather forecasting and storm prediction. Rounding out the D&I portfolio is the multi-discipline exploration of materials. This effort encompasses acoustic meta-materials projects, which have produced advances in sensors, noise reduction, and stealth coatings. Integrated computational material sciences produced breakthroughs in precision time and timekeeping and generated Nobel Prizes for ONR-funded researchers in 1997, 2001, 2005, and 2012.

Status

Investments in basic and applied research across multiple disciplines help to mitigate risk and provide the foundation for discovering and maturing new technology. ONR works with researchers across the country, from the Naval Research Laboratory to numerous universities, labs and businesses helping to keep our naval forces technologically dominant and affordable.

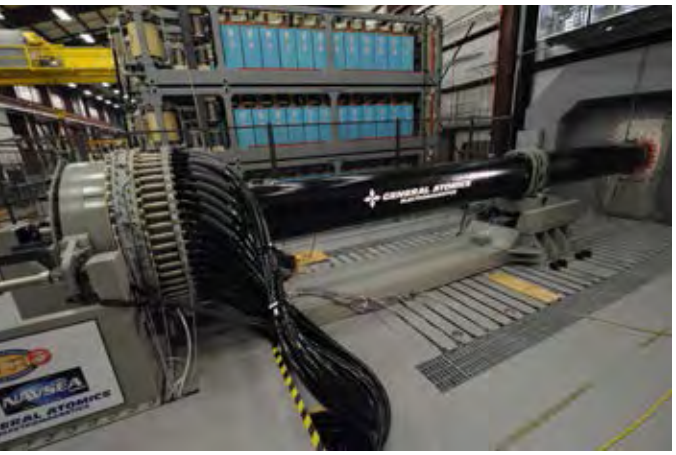
Developers

Office of Naval Research — Arlington, Virginia, USA

Electromagnetic Railgun (EMRG)

Description

The Electromagnetic Railgun Innovative Naval Prototype is a long-range weapon that fires projectiles using electricity instead of chemical propellants. Magnetic fields created by high electrical currents accelerate a sliding metal conductor, or armature, between two rails to launch projectiles at 4,500 mph to 5,600 mph. Electricity generated by the ship is stored in the pulsed power system over several seconds. The stored electric pulse is released



into the railgun, creating an electromagnetic force that accelerates the projectile to speeds of up to Mach 7.5. The kinetic-energy warhead eliminates the hazards of high explosives in the ship and unexploded ordnance on the battlefield. When fielded, EMRG will be a flexible weapon system capable of addressing many critical missions with its long-range, persistent precision-fires and deep magazines. Low cost per engagement shifts the cost curve to Navy's advantage. This multi-mission weapon system fulfills a range of needed capabilities including naval surface fire support, anti-surface warfare, and self-defense.

Status

The EMRG effort began in FY 2005. During the initial phase, launch energy advanced in muzzle energy from 6 to 32 mega-joules. 32 mega-joules is the launch energy needed to fire a hypervelocity projectile approximately 110 nautical miles. Modeling tools assess and predict barrel life, which has increased from the tens to hundreds of shots with goal of 1,000 shots or more. The Navy has tested full-scale industry advanced composite launchers for structure strength and manufacturability. Finally, pulsed-power system design has advanced from single-shot operations to actively cooled "rep-rate" operation. Building on the success of the first phase, the second phase started in 2012 with a focus on developing equipment and techniques to fire ten rounds per minute. Thermal management techniques required for sustained firing rates are in development for both the launcher system and the pulsed-power system. The Office of Naval Research will develop a tactical prototype EMRG launcher and pulsed-power architecture suitable for advanced testing both afloat and ashore. Railgun demonstration has been funded in FY 2015 and FY 2016.

Developers

Naval Surface Warfare Center, Dahlgren	Dahlgren, Virginia, USA
Office of Naval Research	Arlington, Virginia, USA

Future Naval Capabilities (FNC)

Description

The Office of Naval Research (ONR) Future Naval Capabilities program is a requirements-driven science & technology (S&T) program focused on developing and transitioning advanced component technologies to programs of record and/or directly to the warfighter more quickly (three-to-five years) than a traditional acquisition program. FNCs are near-term projects and represent the requirements-driven, technologically mature, delivery-oriented portion of the naval S&T portfolio. The FNC program aims to deliver mature products for integration into platforms, weapons, sensors, or specifications that improve Navy and Marine Corps warfighting and support capabilities. FNCs are governed by a formal set of business rules that ensure all stakeholders are involved in program oversight, management, and execution. By design, FNCs strengthen S&T coordination between the Fleet/Fleet Marine Force, S&T, acquisition, and resource-requirements communities.

FNC products are selected annually to address specific gaps, with final prioritization approved by a three-star Technology Oversight Group. FNC products are often based on previous early research investments and are intended to transition to the Fleet/Fleet Marine Force within a five-year time frame. FNC project selection takes into account related work in other naval centers of excellence the, Department of Defense, other government agencies, industry, and academia. The FNC has already registered several successes, for example:

The Advanced Power Generation FNC transitioned two important technologies to the Alternative Power Sources for Communications Equipment program at the Marine Corps Systems Command. The Ground Renewable Expeditionary Energy System is a series of solar panels and rechargeable batteries that provide an average continuous output of 300 watts of power, filling the energy gap between what a large power generator and a battery provide. The other deliverable was a man-portable, JP-8-fueled, 500-1000 watt generator. It has an auto-start capability to support its use in conjunction with renewable energy and storage systems. These technologies are enabling Marine Corps expeditionary forces to keep pace with increasing energy demands, while reducing the logistical footprint associated with fuel and battery usage.

The Compact Rapid Attack Weapon FNC transitioned an advanced fuze sensor system and safety and arming system for the Program Executive Office (PEO) Submarine Anti-Torpedo Torpedo (ATT) program. Improved guidance and control algorithms will also transition to the operating forces. Together, these technologies will improve the Navy's ability to defend against salvos of torpedoes by increasing the ATT's effectiveness in shallow water and in the presence of countermeasures.

The Tracking and Locating FNC transitioned a Common Information Space Viewer to the Net-Centric Sensor Analysis for Mine Warfare program under the PEO Littoral Combat Ship. This software provides a video map and track-visualization environment that enables context-based analysis of Wide Area Airborne Surveillance data by overlaying imagery, tracks, and alerts in a time-synchronized viewer.

The Large Vessel Interface Lift-on/Lift-off Crane FNC underwent final testing on the SS Flickertail State, demonstrating its ability to raise and lower containers into cell guides under Sea State 3 conditions. This crane system senses and compensates for the relative motion between two ships and stabilizes containers during transfer, enabling the rapid and safe at-sea transfer of heavy loads during adverse weather conditions.

Status

The FNC program began in FY 2002 to improve the delivery of new technological capabilities to the warfighter. Approved projects are required to have technology-transition agreements that document the commitment of ONR, the resource sponsor, and the acquisition program to develop, deliver, and integrate prod-

ucts into new or upgraded systems to be delivered to the operating forces. Every FNC product's technical and financial milestones are reviewed annually and must meet required transition commitment levels for S&T development to continue. Products that no longer have viable transition paths are terminated, and residual funding is used to address issues with existing products, or start new products in compliance with Navy priorities, charters, business rules, and development guidelines.

Developers

Office of Naval Research — Arlington, Virginia, USA

Integrated Topside (InTop)

Description

The Integrated Topside Innovative Naval Prototype program is developing a revolutionary way to provide radio frequency (RF) services on board naval platforms. InTop is doing this through an integrated, multifunction, multibeam topside aperture construct that has a modular, open RF architecture, software-defined functionality, and the capability to synchronize and optimize RF functions for electromagnetic interference (EMI) and electromagnetic compatibility mitigation. The InTop program is designing and building a scalable family of electronic warfare (EW), radar, information operations (IO), and communication capabilities to support multiple ship classes. InTop's design facilitates best-of-breed technology and cost-effective upgrades. The InTop vision is to dominate the RF spectrum, enable innovation through RF open architecture (hardware and software), and create affordable systems that are scalable across platforms. In the past, each new RF system was designed, developed and procured independently. This led to a significant increase in the number of topside antennas. This increase caused EMI/EMC issues, radar cross-section vulnerabilities, and negatively impacted the overall performance of critical ship EW, IO and communication functions. InTop is addressing these issues problems through a holistic approach to designing RF systems. In addition, InTop is providing a flexible and agile RF infrastructure that will enable the Navy to maneuver within the EM spectrum, operate in an anti-access/area-denial environment, and achieve its vision for information dominance and EM maneuver warfare.

Status

The InTop INP program began in FY 2010 and as of early FY 2014 has awarded 13 contracts. It has designed and is building a Wideband Submarine Satellite Communications Antenna that will be tested at the Naval Undersea Warfare Center in the summer of 2014. This antenna is the Technology Development phase for the Submarine Advanced High Data Rate program. InTop has also designed and is currently building an EW/IO/Communication Advanced Development Model that will be delivered to the Naval Research Laboratory's Chesapeake Bay Detachment for testing in the summer of 2014. This prototype is the Technical Development

phase for the Surface Electronic Warfare Improvement Program Block 3 and provides the capability to support communication and IO functions through that system. InTop is also designing a fully digital Flexible Distributed Array Radar prototype and will begin building this prototype in FY 2015. Finally, the InTop program has developed a Resource Allocation Manager that enables the various functions to use RF resources needed to complete their missions. The flexibility that is enabled by the RAM provides the capability to reallocate resources "on the fly" to provide more capability to the commander than would have been available with the individual legacy systems. Additional contracts in other RF functional areas are forthcoming.

Developers
Office of Naval Research Arlington, Virginia, USA

Large Displacement Unmanned Underwater Vehicle (LDUUV)

Description
The Large Displacement Unmanned Underwater Vehicle Innovative Naval Prototype is a fully autonomous, long-endurance UUV capable of operating near shore, extending and multiplying Navy platform capabilities. LDUUV will extend the Navy's reach into previously denied areas. LDUUV is an open-architecture, modular underwater vehicle that will be much larger than traditional UUVs. The increase in size will be used to expand mission sets, incorporate mission module flexibility, and increase the duration of missions. The open-architecture design will enable a multi-mission vehicle and quick integration of new payloads.

The LDUUV is a pier-launched and -recovered UUV (without the need for ship-launch or -recovery) with the capability to transit in the open ocean and conduct over-the-horizon missions in littoral waters. LDUUV develops critical technologies needed to enable UUVs to operate in the littorals for more than 70 days and enables the extension of Navy platform-sensing capabilities over the horizon while extending its influence. The creation of this UUV is intended to act as a significant force-multiplier for the Navy and will help close warfighter gaps in a cost-effective manner.

Status
The LDUUV program began in FY 2011. Through early FY 2014, several LDUUV prototypes have been completed and are in testing, and the program is preparing for development of a next-generation vehicle. The program is also developing advanced capabilities for the propulsion and energy needs of future generations of LDUUVs. Efforts are underway to establish a program of record for a multi-mission LDUUV, with plans to achieve Initial Operational Capability in FY 2022.

Developers
Office of Naval Research Arlington, Virginia, USA

Naval Research Laboratory (NRL)

Description

The Naval Research Laboratory is the Department of the Navy's (DoN) corporate laboratory. The NRL base program carries out research to meet needs identified in the Naval S&T Strategic Plan and sustains world-class skills and innovation in the DoN's in-house lab. The broad-based core scientific research at NRL serves as a foundation that can be focused on any particular area of interest to develop technology rapidly from concept to operation when high-priority, short-term needs arise. NRL has served the Navy, Marine Corps, and the Nation for more than 90 years with a breadth of research that facilitates quick assimilation of critical ideas and technologies being developed overseas for exploitation or countermeasures. In addition, NRL is the lead Navy laboratory for research in space systems, firefighting, tactical electronic warfare, microelectronic devices, and artificial intelligence. NRL lines of business include battlespace environments, electronics and electronic warfare, information systems technology, materials, sensors, space platforms, technology transfer and undersea warfare. For example, NRL research explores naval environments with wide-ranging investigations that measure parameters of deep oceans, analyze marine atmospheric conditions, monitor solar behavior, and assess survivability of critical naval space assets. Detection and communication capabilities benefit by research that exploits new portions of the electromagnetic spectrum, extends ranges to outer space, and enables reliable and secure transfer of information. Research in the fields of autonomous systems, biomolecular science, engineering, firefighting, fuels, lubricants, nanotechnology, shipbuilding materials, sound in the sea, submarine habitability, superconductivity and virtual reality remain steadfast concerns at NRL.

Status

Research and projects continue in a broad spectrum of fields.

Developers

Naval Research Laboratory	Washington, D.C., USA
Office of Naval Research	Arlington, Virginia, USA

ONR Global

Description

The Office of Naval Research, Global maintains a forward presence in offices at key locations around the world, as well as science advisors in more than 20 Navy and Marine Corps commands. Its two-pronged mission is to connect the international science and technology (S&T) community to the Navy and Marine Corps, and to connect the naval S&T community to the operating forces. ONR Global's team of scientists and engineers fosters international S&T cooperation and facilitates the induction of cutting-edge technology to Sailors and Marines. ONR Global executes its mission through a small staff of associate directors and science advisors. Associate directors search the globe for emerging scientific research and advanced technologies. They engage foreign governments and collaborate with the State Department, academic in-

stitutions, and industry to develop opportunities for cooperative research that add value to naval S&T programs. ONR Global has 23 associate directors dispersed among its five regional engagement offices (London, United Kingdom; Prague, Czech Republic; Santiago, Chile; Singapore; and Tokyo, Japan). ONR Global anticipates opening an additional regional engagement office in Sao Paulo, Brazil, during FY 2014. Science advisors are embedded in Navy and Marine Corps commands and directly link with the naval warfighter delivering S&T solutions that solve operational problems. ONR Global has science advisors assigned to 23 Joint, Navy and Marine Corps commands.

Status

ONR Global's efforts include leveraging research by Korean, Japanese, Indian and U.S. scientists to develop millimeter wave tubes important for radar; coordination of geographically separated expertise in radio frequency circuits, fabrication, cathode materials, and high-fidelity simulation; and collaboration with researchers in Brazil and Holland in developing a two- and three-dimensional software model of the Amazon Delta to provide improved modeling capabilities for riverine and delta environments. Support provided to the Marine Corps helped develop the Infantry Immersive Training facility that provides cost effective, mixed-reality training scenarios to better prepare Marines for deployment. An operational assessment of a prototype Expeditionary Water Craft likewise provided key data on effectiveness, efficiency, and total ownership cost decision factors.

Developers

Office of Naval Research	Arlington, Virginia, USA
Office of Naval Research, Global	Singapore

Science, Technology, Engineering and Mathematics (STEM)

Description

Recognizing that a healthy science, technology, engineering, and mathematics workforce is critical to meeting the greatest Navy and Marine Corps challenges, the Secretary of the Navy is committed to doubling the Department of the Navy's (DoN) investment in STEM. This commitment answers the President's national call to improve U.S. STEM education during the next decade. The Navy Department's STEM Roadmap focuses on five priorities that combine best-in-class experiences for students alongside the needs of the Navy for a STEM workforce pipeline. The five priorities are: (1) Inspire the next generation of scientists and engineers; (2) Engage students and build their STEM confidence and skills through hands-on learning activities that incorporate naval-relevant content; (3) Educate students to be well prepared for employment in STEM careers that support the Navy and Marine Corps; (4) Employ, retain and develop naval STEM professionals; and (5) Collaborate on STEM efforts across the Department of the Navy, the federal government, and best-practice organizations. Initiatives include exciting new programs that will increase participa-

tion by students and teachers, allow for hands-on and meaningful learning experiences, and meet the underserved where they live. As part of the plan, the Office of Naval Research will manage the coordination of the DoN's STEM efforts, a portfolio of more than 80 localized outreach and education efforts across the country.

Status

The Navy and Marine Corps STEM portfolio is allocated across hundreds of programs and projects nationwide. The program also invests funding to support graduate students and research assistants under research grants to academic institutions.

Developers

Office of Naval Research Arlington, Virginia, USA

Solid State Laser

Description

The Solid State Laser Quick-Reaction (SSL-QRC) and Technology Maturation (SSL-TM) are leap-ahead programs that provide naval platforms with a highly effective and affordable point-defense capability against surface and air threats, including swarms of small boats and asymmetric threats such as armed unmanned aerial vehicles (UAVs). The SSL provides discrimination, sensing, deterrence, and destructive capabilities that complement gun and missile kinetic-energy weapons. SSL enables a deep non-explosive magazine capability and a speed-of light delivery against multiple maneuvering targets. The SSL generates high-intensity laser light from ship's power through a beam director against inbound threats. The SSL program is an investment to transition the directed-energy weapons technology from science laboratories and commercial applications to a ship self-defense weapon system. This revolutionary technology provides multiple payoffs to the warfighter. The ability to control and point the laser beam with pinpoint, sniper-like accuracy at long ranges allows for operation in any maritime environment-. This concept has been proven through live-fire, at-sea demonstrations with the Maritime Laser Demonstration and Laser Weapon System (LaWS) on naval test ranges. The variability and adaptability of the beam director provides a graduated lethality capability with the potential to minimize collateral damage with the lowest cost-per-engagement coupled with a very low lifecycle cost when compared to a traditional kinetic projectile. Logistics support costs compared to that of conventional explosive munitions are virtually eliminated. The SSL is already proven to be an effective alternative to expensive missile systems against low-value targets.

Status

The SSL program began in FY 2012 to design, develop, fabricate, integrate, and test a 100-150 kilowatt SSL advanced development prototype intended for Aegis destroyers and the Littoral Combat Ship classes. In 2013, the SSL program expanded to include a deployment for the USS Ponce (LPD/AFSB-I 15) of the SEQ-3(XN-1) laser weapon system. Efforts are underway to develop this technology into a program of record for ship self defense.

Developers

Naval Sea Systems Command	Washington, D.C., USA
Office of Naval Research	Arlington, Virginia, USA
Space and Naval Warfare Systems Command	San Diego, California, USA

SwampWorks

Description

The Office of Naval Research (ONR) SwampWorks program explores innovative, high-risk, and disruptive technologies and concepts. Due to the portfolio's high-risk nature, SwampWorks leverages short exploratory studies to examine the maturation of a proposed technology before making substantial investments. Efforts are smaller in scope than Innovative Naval Prototypes (INPs) and are intended to produce results in less than three years. SwampWorks projects are not limited to any set of technology areas. Available throughout the year, the program invests in innovative technology development and experimentation that will ultimately provide a dramatic improvement for the warfighter. Successful SwampWorks efforts include:

The eXperimental Fuel Cell Unmanned Aerial System (XFC UAS). The XFC UAS is a fully autonomous, all-electric fuel cell-powered, folding-wing UAS with an endurance of greater than six hours. The non-hybridized power plant supports the propulsion system and payload for a flight endurance that enables relatively low-cost, low-altitude intelligence, surveillance, and reconnaissance missions. The XFC UAS uses an electrically assisted take-off system that lifts the plane vertically out of its very small-footprint container, which enables launch from a variety of platforms, such as a pickup truck or small surface vessel.

High-Temperature Superconducting (HTS) Minesweeping Testing on unmanned surface vehicles (USVs). This project designed, built and tested a HTS Magnetic/Acoustic minesweeping system for a 40-foot Unmanned Surface Vehicle. ONR conducted two successful on-the-water demonstrations of the HTS minesweeping system to demonstrate the system performance and robustness of this technology. The system was tested at a Fleet Experimentation in September 2013 in California for a total of 46 hours (557 miles) of simulated on-water minesweeping with no significant issues. The extended underway operations of the HTS minesweeping system have proven the technology is reliable during long periods of operation including night operations. The collected Versatile Exercise Mine Systems data show that the HTS minesweeping system is capable of producing a magnetic dipole moment to activate magnetic-influence mines at appropriate standoff distances. This activation method coupled with the performance of the USV craft will produce assured access with minimal risk.

The Advanced Port Security Barrier (APSB). Waterside security for ships is a top priority for naval force protection. The in-service port security barrier is a net-capture barrier that has been de-

ployed since 2001, but is proving to be cost-prohibitive in operations, maintenance, and sustainment. The goal of the APSB project is to test and experiment with passive water barrier replacement systems that will include a completely remote gate opening and closing capability (with a mechanical backup), reducing or eliminating the cost for manpower to execute that function. HALO Maritime Defense Systems has produced a truly innovative water-barrier system based on a catamaran, double-wall barrier configuration to stop an attacking boat on impact. It does this by transferring the kinetic energy of the force into the water mass that is trapped between the barrier walls. The anchoring system, unlike with the in-service PSB, is used for station keeping only and not for stopping power. As a result, the HALO barrier is designed for uniform strength and stopping power across the length of the barrier.

Status

SwampWorks has substantial flexibility in planning and execution. Its streamlined approval process allows for the shortest possible technology development timeframe.

Developers

Office of Naval Research	Arlington, Virginia, USA
HALO Maritime Defense Systems	Newton, New Hampshire, USA

TechSolutions

Description

TechSolutions is a transformational business process created by the Office of Naval Research to provide Sailors and Marines with a web-based tool for bringing technology needs to the attention of the naval science and technology (S&T) community for rapid response and delivery. Available on the Internet, TechSolutions accepts recommendations and suggestions from Navy and Marine Corps personnel working at the ground level on ways to improve mission effectiveness through the application of technology. It is focused solely on delivering needed technology to the Navy and Marine Corps and moving the sea services toward more effective and efficient use of personnel. TechSolutions uses rapid prototyping of technologies to meet specific requirements with definable metrics and includes appropriate systems command elements in an integrated product team concept. While neither a substitute for the acquisition process nor a replacement for the systems commands, TechSolutions aims to provide the Fleet and Marine Force with a prototype demonstration that is a 60- to 80-percent solution addressing immediate needs and can be easily transitioned by the acquisition community. Examples include:

Improved Flight Deck Clothing. This project provides an upgrade to the in-service cotton flight deck jersey and trousers. The new jerseys are made of moisture-wicking fabric and the new trousers have secure pockets with stitching to prevent objects from falling out and posing a hazard to flight operations. The redesigned trousers fit better, are less expensive to manufacture, and will be stan-

dardized throughout the Fleet. The new high-tech fabric is durable, provides better fire protection, and resists the absorption of petroleum products. The improved flight deck clothing increases the warfighter's safety and comfort and is intended to maintain its integrity for up to 12 months.

Multiple Weapon Control Sight (MWCS). The sight provides Marines with an improved day/night fire-control capability for several infantry weapon systems, such as mortars and automatic grenade launchers. This allows Marines to effectively engage targets during day and night operations. This multi-weapon capability decreases the number of different sighting systems that warfighters are required to learn and lessens the burden on the supply and maintenance infrastructure. To employ the MWCS, the Marine points his or her weapon at the target and dials in the distance using the range knob. The unit adjusts the firing angle and cant of the weapon to the correct position, increasing probability of a first-round hit. MWCS can be mounted on the side of weapons and requires zero modifications to the weapon or its ammunition. The Marines have tested and evaluated the upgraded sight in the field and their response has been positive.

The Catapult Capacity Selector Valve (CSV) Calculator. The calculator is a handheld electronic personal digital assistant (PDA) device with custom software that allows catapult officers to accurately and quickly compute the proper CSV setting for an aircraft carrier steam catapult. The legacy CSV procedure required catapult officers to calculate the proper CSV setting by performing a series of manual lookups in paper reference tables. Now, these reference tables are stored on the PDA calculator, minimizing catapult officers' stress, reducing workload, and improving their safety. The PDA has a touch screen that is operable with gloved hands, a tethered stylus, and a large navigation button. It is readable in the sunlight, is weather tolerant and has a battery life of approximately 14 hours. Catapult officers have tested and evaluated the CSV Calculator on board a carrier and are pleased with the new capability.

Status

To succeed in its S&T mission, TechSolutions needs active involvement and participation by the operating forces. Every query will be answered, and if a demonstration is performed or prototype developed, the submitter will be invited to participate in the process from the start through final delivery of the technology. TechSolutions aims to deliver a demonstration or prototype within 12 months.

Developers

Office of Naval Research Arlington, Virginia, USA

APPENDIX A

RECENT NAVY-MARINE CORPS COMBAT ACTIONS, CRISIS RESPONSES, AND EXERCISES

Dates	Location/Operation/Mission	U.S. Naval Forces
Apr - Oct 2012	Op SOUTHERN SEAS w/ UNITAS	USS Underwood (FFG 36)
Sep - Oct 2012	Dual CVN Operations	USS George Washington (CVN 73) USS John C Stennis (CVN 74) USS Mobile Bay (CG 53) USS Cowpens (CG 63)
Sep - Oct 2012	Op JUKEBOX LOTUS	USS Fort McHenry (LSD 43) USS McFaul (DDG 74)
Sept-Oct 2012	Pacific Island Nations (PINS) Oceania	USS Peleliu (LHA 5)
Sep - Nov 2012	Ex JOINT WARRIOR 12-2	USS Gettysburg (CG 64) USNS Leroy Grumman (T-AO 195) USS Mitscher (DDG 57)
Oct - Nov 2012	Ex AUSTERE CHALLENGE	USS Mount Whitney (LCC 20) USS Laboon (DDG 58)
Oct 2012	Ex CARAT CAMBODIA	USS Vandegrift (FFG 48) USNS Safeguard (T-ARS 50) USNS Salvor (T-ARS 52)
Oct 2012	Ex RADIANT SCOUT	USS Greeneville (SSN 614) USS Mustin (DDG 89)
Oct 2012	San Francisco Fleet Week	USS Makin Island (LHD 8) USS Spruance (DDG 111) USS Preble (DDG 88)
Oct 2012	Ex CLEAR HORIZON	USS Patriot (MCM 7) USS Guardian (MCM 5)
Oct 2012	PHIBLEX 13	USS Bonhomme Richard (LHD 6) USS Tortuga (LSD 46) USS Denver (LPD 9)
Oct 2012	Ex CARAT CAMBODIA	USS Vandegrift (FFG 48) USNS Safeguard (T-ARS 50) USNS Salvor (T-ARS 52) Mobile Diving and Salvage Unit 1 Riverine Squadron 1
Oct-Nov 2012	Ex Keen SWORD/ANNUALEX	USS George Washington (CVN 73) USS Cowpens (CG 63) USS John S McCain (DDG 56) USS Fitzgerald (DDG 62) USS McCampbell (DDG 85) USS Mustin (DDG 89) USNS Tippecanoe (T-AOE 199) USNS Amelia Earhart (T-AKE 6) USS Denver (LPD 9)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Tortuga (LSD 46) USS Defender (MCM 2)
Nov 2012	NIMITZ COMPTUEX	USS Nimitz (CVN 68) USS Antietam (CG 54) USS Preble (DDG 88) USS Sampson (DDG 102) USS Sterett (DDG 104) USS Ford (FFG 54) USS San Francisco (SSN 711) USS Hampton (SSN 767)
Nov 2012	ROKN SUBEX	USS Jacksonville (SSN 699)
Nov 2012	NIMITZ JTFEX	USS Nimitz (CVN 68) USS Momsen (DDG 92) USS Sampson (DDG 102) USS Sterett (DDG 104) USS Ford (FFG 54) USS San Francisco (SSN 711) USS Hampton (SSN 767)
Nov 2012	Ex CARAT BRUNEI	USS Reuben James (FFG 57) EODMU 5
Nov 2012	Hurricane SANDY DSCA Response	Naval Mobile Construction Battalion 5 USS Wasp (LHD 1) USS San Antonio (LPD 17) USS Carter Hall (LSD 50)
Nov 2012	Ex AUSTERE CHALLENGE 12	USS Mount Whitney (LCC 20)
Nov 2012	MINEX/EODEX	USS Avenger (MCM 7) USS Defender (MCM 2) EODMU 5
Nov - Dec 2012	MCSOFEX	USS John S McCain (DDG 56) USS McCampbell (DDG 85)
Nov 2012 - Ongoing	Op ENDURING FREEDOM	USS Harry S Truman (CVN 75) Strike Group USS Nimitz (CVN 68) Strike Group USS John C Stennis (CVN 74) Strike Group
Nov 2012 - Ongoing	Counter-Piracy Operations in the GOA (Gulf of Aden) / HOA (Horn of Africa) / Somali Basin / Arabian Sea	USS Georgia (SSGN 729) USS Robert G Bradley (FFG 49) USS Gonzalez (DDG 66)
Nov 2012 - Ongoing	OP RAINMAKER	USS Florida (SSGN 728) USS Oscar Austin (DDG 79) USS Thach (FFG 43) USS Georgia (SSGN 729) USS Bainbridge (DDG 96)
Nov 2012 - Ongoing	Counter Illicit Trafficking OPS SOUTHCOM	USS Rentz (FFG 46) USS Gary (FFG 51) USS Thach (FFG 43) USS Carr (FFG 52) USNS Curtis (T-AVB 4)

Dates	Location/Operation/Mission	U.S. Naval Forces
Nov 2012	MAVI BALINA	USS Forrest Sherman (DDG 98)
Nov 2012	Ex CUTLASS EXPRESS	Seabeas
Nov 2012	BHR POTUS Support	USS Bonhomme Richard (LHD 6)
Nov 2012	SHAMAL 13-1	USS Dwight D Eisenhower (CVN 69) USS John C Stennis (CVN 74) USS Ponce (LPD 15) 15th MEU USS Dextrous (MCM 13) USS Scout (MCM 8)
Nov 2012	OLYMPIC TITAN	USNS Observation Island (T-AGM 23)
Nov 2012 - Mar 2013	Op SOUTHERN PARTNERSHIP STATION	HSV Swift (HSV 2) USNS Pathfinder (T-AGS 60)
Nov - Dec 2012	AMDEX 13-1	USS John C Stennis (CVN 74) USS Mobile Bay (CG 53) USS Farragut (DDG 99) USS Paul Hamilton (DDG 60) USS Decatur (DDG 73)
Dec 2012	ROKN FLEETEX	USS Gridley (DDG 101) USS Reuben James (FFG 57)
Dec 2012	ROKN CMPOP	CTF 72
Dec 2012	Ex Habu NAG 12	CTF 76 COMPHIBRON ELEVEN 31st MEU
Dec 2012	PHIBRON - MEU INTEGRATION TRAINING	USS Kearsarge (LHD 3) USS San Antonio (LPD 17) USS Carter Hall (LSD 50) USS Bataan (LHD 5) USS Carter Hall (LSD 50) USNS Big Horn (T-AO 198)
Dec 2012	Ex IRON MAGIC	USS Peleliu (LHA 5) USS Green Bay (LPD 20) USS Rushmore (LSD 47) 15th MEU
Dec 2012	CARL VINSON USWEX	USS Carl Vinson (CVN 70) USS Bunker Hill (CG 52) USS Halsey (DDG 97) USS Santa Fe (SSN 763) USS Hawaii (SSN 776)
Jan 2013	YELLOW SEA OPS	USS Reuben James (FFG 57)
Jan 2013	Ex Red Reef	USS Peleliu (LHA 5) USS Green Bay (LPD 20) USS Rushmore (LSD 47) 15 MEU

Dates	Location/Operation/Mission	U.S. Naval Forces
		CTF 50 / 51 / 57 ESG 5 PHIBRON 3
Jan 2013	SUBEX	USS Oklahoma City (SSN-723)
Jan 2013	TAMEX 13-1	CTF 72 P-3
Jan 2013	USWEX 13-1	CTF32 CTF 34 DESRON TWO THREE USS Higgins (DDG-76) USS Shoup (DDG-86) USS Chafee (DDG-90) USS Chung Hoon (DDG 93) USS Stockdale (DDG-106) USS William P Lawrence (DDG-110) USNS Rainer (T-AOE-7) USS Columbia (SSN-771) USS Greenville (SSN-772)
Jan 2013	DAWN BLITZ 13-1	USS Boxer (LHD-4) USS Lake Champlain (CG 57) USS Wayne E Meyer (DDG-108)
Jan-Feb 2013	HST COMPUTEX`	USS Harry S Truman (CVN-75) USS Gettysburg (CG 64) USS Monterey (CG-61) USS Gravely (DDG 107) USS Barry (DDG 52) USS Simpson (FFG-56) USS Kauffman (FG-59) USS Scranton (SSN 756) USS Annapolis (SSN-760) USNS Kanawha (T-AO-196) USNS Robert E Perry (T-AKE-5)
Jan-Feb 2013	KSG ARG COMPTUEX	USS Kearsarge (LHD-3) USS San Antonio (LPD-17) USS Carter Hall (LSD-50)
Jan-Feb 2013	CARAT TIMOR - LESTE	CTF 73 USS Guardian (MCM 5) USMC FASTPAC
Jan-Feb 2013	Ex IRON FIST	PHIBRON 1 13th MEU
Feb 2013	COBRA GOLD 13	USS Bonhomme Richard (LHD 6) USS Tortuga (LSD 46) USS Reuben James (FFG 57) USS Germantown (LSD 42) HSC 85 HSC 25
Feb 2013	JMSDF SUBCOMP	USS Albuquerque (SSN 706) CTF 74

Dates	Location/Operation/Mission	U.S. Naval Forces
Feb 2013	Ex PROUD MANTA	USS Barry (DDG 52) P-3C
Feb 2013	INDONESIA MINEX	USN DIVERS MCMRON 7
Feb 2013	ROKN SUBEX	USS San Francisco (SSN 711) CTF 72 CTF 74
Feb - May 2013	Op SOUTHERN PARTNERSHIP STATION	HSV SWIFT
Mar 2013	Ex FOAL EAGLE	USS John McCain (DDG 56) USS McCampbell (DDG 85) USS Fitzgerals (DDG 62) USS Lassen (DDG 82) USS Reuben James (FFG 57) USS Cheyenne (SSN 773) USS Safeguard (T ARS 50) USS Avenger (MCM 1) USS Patriot (MCM 7)
Mar 2013	Ex SNAPDRAGON	USS Key West (SSN 722) USS Chicago (SSN 721) P-3C
Mar 2013	USN/JMSDF GUAMEX	CTF 74 VP 1 VP16
Mar 2013	Ex KEY RESOLVE	USS Blue Ridge (LCC 19)
Mar 2013	Ex NOBLE DINA	USS Gravely (DDG 107) USNS Kanawha (T-AO 196) P-3
Mar 2013	ROYAL THAI NAVY ASWEX	USS Albuquerque (SSN 706)
Mar 2013	CTF 76/31ST MEU CERTEX	USS Bonhomme Richard (LHD 6) USS Tortuga (LSD 46) USS Germantown (LSD 42) 31ST MEU
Apr 2013	Ex EAGLE RESOLVE 13	USS San Antonio (LPD 17) USS Stockdale (DDG)
Apr 2013	SEA SOLDIER 13	USS Kearsarge (LHD 3) USS Carter Hall (LSD 50)
Apr 2013	SSANGYONG 13	USS Germantown (LSD 42) 31ST MEU
Apr 2013	Ex SAHARAN EXPRESS 13	USS Bradley (FFG 49)
Apr 2013	Ex BALIKATAN 13	USS Tortuga (LSD 46) CPR 11

Dates	Location/Operation/Mission	U.S. Naval Forces
Apr 2013	Ex BOLD ALLIGATOR	USS Gunston Hall (LSD 44) USS Bataan (LHD 5) USS Carter Hall (LSD 50) USNS Big Horn (T-AO 198) USS Anzio (CG 68) USS Leyte Gulf (CG 55) USS Vicksburg (CG 69) USS Forrest Sherman (DDG 98)
Apr 2013	NIMITZ CSG SUSTEX	USS Nimitz (CVN 68) USS Spruance (DDG 111) USS Dewey (DDG 105) USS Fort Worth (LCS) USS Ingraham (FFG 61)
Apr 2013	FLEET SYNTHETIC TRAINING	USS Fitzgerald (DDG 62) USS Lassen (DDG 82) USS Antietam (CG 54) USS Port Royal (CG 73) USS Chosin (CG 65)
Apr 2012	Vietnam Naval Engagement Activity	USS Blue Ridge (LCC 19) USS Chung Hoon (DDG 93) USNS Safeguard (T-ARS 50)
May 2013	SHAREM 173	USS Chung Hoon (DDG 93) USS Bremerton (SSN 698)
May 2013	TRIDENT FURY	USS Lake Champlain (CG 57) USS Spruance (DDG 111) USS Ford (FFG 54) USNS Amelia Earhart (T-AKE 6)
May 2013	TERMINAL FURY 13	USS Lake Champlain (CG 57) USS Spruance (DDG 111) USS Ford (FFG 54) USNS Amelia Earhart (T-AKE 6)
May - Jun 2013	Ex OPTIC ALLIANCE 13	USS Lake Erie (CG 70) THAAD
May 2013	CARAT INDONESIA	USS Momsen (DDG 92) USS Tortuga (LSD 46) USNS Safeguard (T-ARS 50)
Jun 2013	Ex CARAT THAILAND	USS Momsen (DDG 92) USS Tortuga (LSD 46) USNS Safeguard (T-ARS 50) USS Chosin (CG 65) USNS Amelia Earhart (T-AKE 6) USS Patriot (MCM 7)
Jun 2013	GEMA BHAKTI	None
Jun 2013	SILENT SHARK	USS Chung Hoon (DDG 93) USS Key West (SSN 722)

Dates	Location/Operation/Mission	U.S. Naval Forces
Jun 2013	CARAT INDONESIA	USS Momsen (DDG 92) USS Tortuga (LSD 46) USS Patriot (MCM 7)
Jun 2013	EAGER LION 13	USS Kearsarge (LHD 3) USS William P. Lawrence (DDG 110)
Jun 2013	EAGER LION	USS Kearsarge (LHD 3) USS San Antonio (LPD 17) USS Carter Hall (LSD 50) USS Shoup (DDG 86)
Jun 2013	BALTOPS 13	USS Mount Whitney (LCC 20)
Jun 2013	HST CSG SUSTEX	USS Harry S Truman (CVN-75) USS San Jacinto (CG 56) USS Gettysburg (CG 64) USS Bulkeley (DDG 84) USS Mason (DDG 87)
Jun 2013	Ex CABLE CAR	USS Scranton (SSN 756)
Jun 2013	NAUTICAL UNION	USS William P. Lawrence (DDG 110) USS Ardent (MCM 12)
Jun 2013	DAWN BLITZ 13.2	USS Boxer (LHD-4) USS Cowpens (CG 63) USS Harpers Ferry (LSD 49) USS Makin Island (LHD 8) USS Spruance (DDG 111) USS New Orleans (LPD 18) USNS LUMMUS (T-AK)
Jun 2013	Ex CARAT MALAYSIA	USS Momsen (DDG 92) USS Tortuga (LSD 46) USS Patriot (MCM 7)
Jun 2013	ADMM PLUS HADR/ MILITARY MEDICINE EX	USNS Matthew Perry (T-AKE 9)
Jun 2013	Ex FRUKUS 13	USS Nicholas (FFG 47)
Jun 2013	Ex PACIFIC PARTNERSHIP	USS George Washington (CVN 73) USS Cowpens (CG 63) USS Shiloh (CG 67) USS Lassen (DDG 82) USS Charlotte (SSN 766)
Jun 2013	BOXARG COMPTUEX	USS Boxer (LHD-4) USS Harpers Ferry (LSD 49) USS New Orleans (LPD 18) P-3
Jun - Jul 2013	Ex CARAT PHILIPPINES	USS Fitzgerald (DDG 62) USNS Salvor (T-ARS 52) USNS Safeguard (T-ARS 50)

Dates	Location/Operation/Mission	U.S. Naval Forces
Jul 2013	Ex CARAT SINGAPORE	USS Fitzgerald (DDG 62) USS Freedom (LCS 1) USNS Walter S Diehl (T-AKE 3) USS Asheville (SSN 758)
Jul 2013	2JA-13 MINEX	USS Patriot (MCM 7)
Jul 2013	Ex TRIDENT WARRIOR	USS Wasp (LHD 1) USS Jason Dunham (DDG 109) USNS Grasp (T-ARS)
Jul-Aug 2013	Ex TALISMAN SABER 13	USS George Washington (CVN 73) USS Antietam (CG 54) USS Preble (DDG 88) USS Momsen (DDG 92) USS Denver (LPD 9) USS Blue Ridge (LCC 19) USS Chung Hoon (DDG 93) USS Bonhomme Richard (LHD 6) USS Ohio (SSGN 726) USS Lassen (DDG 82) USNS Rappahannock (T-AO 204) USNS Yukon (T AO 202) USNS WALLY SHIRRA (T-AKE)
Jul-Aug 2013	USS GEORGE HW BUSH CSG GROUP SAIL	USS George Washington (CVN 73) USS Philippine Sea (CG 58) USS Truxtin (DDG 103) USS Roosevelt (DDG 80) USNS Big Horn (T-AO 198)
Jul-Aug 2013	BMD FLIGHT TEST OPERATIONAL (FTO-01)	USS Decatur (DDG 73)
Aug 2013 - Ongoing	OP Juniper Micron	EP-3 P-3C AIP
Aug 2013	Ex ULCHI FREEDOM GUARDIAN	USS Blue Ridge (LCC 19)
Aug 2013	HUMAN SPACE SUPPORT TEST	USS Arlington (LPD 24)
Aug 2013	Ex KOOLENDONG 13	USS Bonhomme Richard (LHD 6) USS Denver (LPD 9)
Aug 2013	F-35B DEVELOPMENT TEST 2	USS Wasp (LHD 1)
Aug - Sep 2013	CARAT BANGLADESH	USNS Safeguard (T-ARS 50)
Aug - Sep 2013	Ex TEMPEST WIND 13	USS Tortuga (LSD 46)
Sep 2013	ADMM+MARITIME SECURITY EX 13	USS Chosin (CG 65)
Sep 2013	MCSOFEX	Carrier Air Wing 5 USS George Washington (CVN 73) USS Antietam (CG 54)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Cowpens (CG 63) USS Curtis Wilbur (DDG 54) USS Preble (DDG 88) USS Mustin (DDG 89) USS John McCain (DDG 56)
Sep 2013	TRILAT SUBEX	USS Hampton (SSN 767)
Sep 2013	Ex SAFE HANDLING 13	USN EOD Team
Sep 2013	SAR & COMMUNICATION Ex	USS Lake Erie (CG 70)
Sep 2013	Ex LUNGFISH 13	USS Chicago (SSN 721)
Sep 2013	FLIGHT TEST MARITIME 21	USS Lake Erie (CG 70)
Sep 2013	ROKN SUBEX	USS Houston (SSN 713)
Sep - Oct 2013	PHIBLEX 14	USS Boxer (LHD 4) USS New Orleans (LPD 18)
Sep 2013	TRITON CENTENARY 13	USS Chosin (CG 65)
Oct 2013	FLIGHT TEST MARITIME 22	USS Lake Erie (CG 70)
Oct 2013	RCN COALITION TASK GROUP EX	USS Mobile Bay (CG 53) USS Dewey (DDG 105) USS Ingraham (FFG 61) USS Gary (FFG 51) USS San Francisco (SSN 711)
Oct 2013	SHAREM 175	USS Curtis Wilbur (DDG 54) USS Lassen (DDG 82) USS Houston (SSN 713)
Oct 2013	CARAT CAMBODIA	USS Freedom (LCS 1)
Oct 2013	FLEET SYNTHETIC TRAINING	USS Ronald Reagan (CVN 76) USS Lake Champlain (CG 57) USS Cape St. George (CG 71) USS Howard (DDG 83) USS Pinckney (DDG 91) USS Kidd (DDG 100) USS Wayne E Meyer (DDG 108)
Oct 2013	GW SG TRILATERAL EX	USS George Washington (CVN 73) USS Antietam (CG 54) USS Cowpens (CG 63) USS Mustin (DDG 89) USS Preble (DDG 88)
Oct - Nov 2013	BAT ARG MEUEX	USS Bataan (LHD 5) USS Mesa Verde (LPD 19) USS Gunston Hall (LSD 44) USS Donald Cook (DDG 75) USS Nitze (DDG 94) USS Taylor (FFG 50)

Dates	Location/Operation/Mission	U.S. Naval Forces
		USS Mahan (DDG 72) USS Robert G Bradley (FFG 49) USS Halyburton (FFG 40)
Nov 2013	SHIN KAME	USS Santa Fe (SSN 763)
Nov 2013	MALABAR	USS McCampbell (DDG 85)
Nov 2013	RRN CSG ID CERTEX	USS McClusky (FFG 41) USS Kidd (DDG 100) USS Lake Champlain (CG 57) USS Howard (DDG 83) USS Wayne E Meyer (DDG 108)
Nov 2013	ROKN SUBEX	USS Tucson (SSN 770)
Nov 2013	DOGU AKDENIZ	USS Stout (DDG 55)
Nov 2013	THAILAND SEASURVEX 14-1	P-3C
Nov 2013	CARAT BRUNEI	USS Freedom (LCS 1)
Nov 2013	ANNUALEX 25G	USS George Washington (CVN 73) USS Antietam (CG 54) USS McCampbell (DDG 85) USS Curtis Wilbur (DDG 54) USS Lassen (DDG 82) USS Cowpens (CG 63) USS Mustin (DDG 89) USS Spruance (DDG 111) USS Santa Fe (SSN 763) USS Key West (SSN 722)
Nov - Dec 2013	GHWB COMPTUEX & JTFEX	USS George H W Bush (CVN 77) USS Philippine Sea (CG 58) USS Leyte Gulf (CG 55) USS Roosevelt (DDG 80) USS Truxtun (DDG 103) USS Boise (SSN 764) USS New Mexico (SSN 779)
Dec 2013	BAT ARG COMPTUEX	USS Bataan (LHD 5) USS Mesa Verde (LPD 19) USS Gunston Hall (LSD 44) USS Elrod (FFG 55) USS Halyburton (FFG 40) USS Springfield (SSN 761) USS New Mexico (SSN 779)
Dec 2013	USN RN ROKN TRILATERAL EX	USS Spruance (DDG 111)
Dec 2013	FORAGER FURY	USS Shiloh (CG 67)
Dec 2013	ROKN SUBEX 14-1	USS Key West (SSN 722)
Dec 2013	IRON MAGIC	USS Boxer (LHD 4)

Dates	Location/Operation/Mission	U.S. Naval Forces
Dec 2013	US-UK MCMEX	USS Ponce (AFSB(I) 15) USS Hopper (DDG 70) USS Gladiator (MCM 11) USS Sentry (MCM 3)
Dec 2013	JMSDF BILATERAL EX	USS Cowpens (CG 63) USS Key West (SSN 722)
Dec 2013	MAPLE FURY	P-3C
Dec 2013	KOA KAI 14	USS Halsey (DDG97) USS O'Kane (DDG 77) USS Chung Hoon (DDG 93) USS Michael Murphy (DDG 112) USS Cape St. George (CG 71) USS Chosin (CG 65) USS Lake Champlain (CG 57) USS Lake Erie (CG 70) USS Port Royal (CG 73) USS Olympia (SSN 717) USS Greeneville (SSN 772)
Jan 2014	SHIN KAME 14-1	USS Columbia (SSN 771)
Jan 2014	IRON FIST 14	USS Lake Champlain (CG 57)
Jan 2014	SHAMAL 14-1	USS Harry S Truman (CVN 75) USS Gettysburg (CG 64) USS San Jacinto (CG 56) USS Boxer (LHD 4) USS New Orleans (LPD 18) USS Harpers Ferry (LSD 49) USS San Juan (SSN 751) USS Ponce (AFSB(I) 15)
Jan 2014	COBRA GOLD 2014	USS Denver (LPD 9) P-3C HSC - 85

APPENDIX B
GLOSSARY

A2/AD	Anti-Access/Area-Denial
AACUS	Autonomous Aerial Cargo/Utility System
AADC	Area Air Defense Commander
AADS	Amphibious Assault Direction System
AAG	Advanced Arresting Gear
AAI	Airborne ASW Intelligence
AAMDTC	Aegis Ashore Missile Defense Test Complex
AARGM	Advanced Anti-Radiation Guided Missile
AAW	Anti-Air Warfare
ABMD	Aegis Ballistic Missile Defense
ABNCP	Airborne Command Post
ABS	Assault Breaching System
ACAT	Acquisition Category
ACB	Amphibious Construction Battalion, or, Advanced Capability Build
ACCES	Advanced Cryptologic Carry-on Exploitation System
ACDS	Advanced Combat Direction System
ACINT	Acoustic Intelligence
ACS	Aerial Common Sensor, or, Aegis Combat System
ACTD	Advanced Concept Technology Demonstration
ACU	Assault Craft Units
AD	Air Defense
ADCAP	Advanced Capability
ADM	Acquisition Decision Memorandum
ADNS	Automated Digital Network System
ADP	Automated Data Processing
ADS	Advanced Deployable System
AE	Assault Echelon
AEA	Airborne Electronic Attack
AEHF	Advanced Extremely High Frequency
AEL	Authorized Equipage List
AEM/S	Advanced Enclosed Mast/Sensor
AESA	Active Electronically Scanned Array
AESOP	Afloat Electromagnetic Spectrum Operations
AFATDS	Advanced Field Artillery Tactical Data System
AFB	Air Force Base
AFG	Airfoil Group
AFFF	Aqueous Film Forming Foam
AFOE	Assault Follow-On Echelon
AFQT	Armed Forces Qualification Test
AFSB	Afloat Forward Staging Base
AG	Aerographer's Mate [enlisted classification]
AGF/LCC	Amphibious Command Ship
AGS	Advanced Gun System
AHE	Advanced Hawkeye
AIEWS	Advanced Integrated Electronic Warfare System
AIP	Anti-Submarine Warfare Improvement Program
AIS	Automatic Identification System
AISR&T	Airborne Intelligence, Surveillance, Reconnaissance, and Targeting
ALCS	Airborne Launch Control System
ALFS	Airborne Low-Frequency Active Sonar
ALMDS	Airborne Laser Mine Detection System
AMCM	Airborne Mine Countermeasures
AMDR	Air and Missile Defense Radar
AMF	Airborne Maritime Fixed
AMNS	Airborne Mine Neutralization System
AMPIR	Airborne Polarmetric Microwave Imaging Radiometer
AMRAAM	Advanced Medium-Range Air-to-Air Missile
ANDVT	Advanced Narrow-Band Digital Voice Terminal
AOA	Amphibious Objective Area, or, Analysis of Alternatives
AOE	Fast Combat Support Ship
AOR	Area of Responsibility
APB	Advanced Processor Build, or, Acquisition Program Baseline
APS	Air Force Prepositioning Ships
APSB	Advanced Port Security Barrier
APTS	Afloat Personal Telephone Service
ARCI	Acoustic Rapid COTS Insertion
ARG	Amphibious Ready Group
ARI	Active Reserve Integration
ARM	Anti-Radiation Missile
AS	Submarine Tender, or, Acquisition Strategy
ASDS	Advanced Seal Delivery System
ASCM	Anti-Ship Cruise Missile
ASO	Automated Shipboard Weather Observation System
ASROC	Anti-Submarine ROCket
ASUW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
ASWC	Anti-Submarine Warfare Commander, or, ASW Commander
AT	Advanced Targeting
ATA	Automatic Target Acquisition
ATC	Air Traffic Control
ATD	Advanced Technology Demonstration, or, Aircrew Training Device
ATDLS	Advanced Tactical Data Link System
ATF	Fleet Ocean Tug
ATFLIR	Advanced Targeting Forward Looking Infrared
ATFP	Anti-Terrorism and Force Protection
ATM	Asynchronous Transfer Mode
ATSM	Active Target Strength Measurement
ATT	Anti-Torpedo Torpedo
ATW	Advanced Threat Warning
ATWCS	Advanced Tomahawk Weapon Control
AURE	All-Up Round Equipment
AUWS	Automated Underwater Work System
AWACS	Airborne Warning and Control System
AWS	Aegis Weapon System
BAH	Basic Allowance for Housing
BAMS	Broad Area Maritime Surveillance
BCA	Broadcast Control Authority
BCO	Base Communications Office
BDI	Battle Damage Indication
BDII	Battle Damage Indication Imagery
BEWL	Biometrics Enabled Watchlist
BFCAPP	Battle Force Capability Assessment and Programming Process
BFEM	Battle Force Email
BFTN	Battle Force Tactical Network
BFTT	Battle Force Tactical Trainer
BLAST	Blast Load Assessment Sense and Test
BLII	Base-Level Information Infrastructure
BLOS	Basic Line of Sight
BMC4I	Battle Management Command, Control, Communications, Computers, and Intelligence
BMD	Ballistic Missile Defense
BMDS	Ballistic-Missile Defense System
BMU	Beach Master Unit
BMUP	Block Modification Upgrade Program
BPI	Business Process Improvement
BPR	Business Process Re-Engineering
BRAC	Base Realignment and Closure
BSAR	Broadband Sonar Analog Receiver

BWA	Biological Warfare Agent
C2BMC	Command, Control, Battle Management, and Communications
C2OIX	Command and Control Information Exchange
C2P	Command and Control Processor
C4I	Command, Control, Communications, Computers, and Intelligence
C4ISR	Command, Control, Communication, Computers, Intelligence, Surveillance, and Reconnaissance
C4N	Command, Control, Communications, Computers, and Navigation
C5F	Commander, Fifth Fleet
CAC	Common-Access Cards
CAD	Component Advanced Development
CADRT	Computer-Aided Dead-Reckoning Table
CAL/VAL	Calibration and Validation
CANES	Consolidated Afloat Network Enterprise Services
CAS	Close Air Support
CATM	Captive Air Training Missiles
CB	Chemical, Biological
CBASS	Common Broadband Advanced Sonar System
CBMU	Construction Battalion Maintenance Units
CBR	Chemical, Biological, and Radiological
CBRND	Chemical, Biological, Radiological, Nuclear Defense
CBSP	Commercial Broadband Satellite Program
CCD	Center for Career Development
CCE	Common Computing Environment
CCG	Computer Control Group
CCP	Common Configuration Program
CCS	Combat Control System
CDA	Commercially Derived Aircraft
CDD	Capability Development Document
CDHQ	Central Command Deployable Headquarters
CDLMS	Common Data Link Management System
CDL-N	Common Data Link, Navy
CDLS	Common Data Link System
CDR	Critical Design Review
CDS	Combat Direction System, or, Common Display System
CEB	CNO Executive Board
CEC	Cooperative Engagement Capability
CENTRIXS	Combined Enterprise Regional Information Exchange System
CFFC	Commander, Fleet Forces Command
CG	Guided-Missile Cruiser
CIB	Common Interactive Broadband
CIE	Collaborative Information Environment
CIO	Chief Information Officer
CIU	Control Indicator Unit
CIWS	Close-In Weapon System
CJF	Commander, Joint Forces
CLF	Combat Logistics Force
CLFA	Compact LFA
CLIP	Common Link Integration Processing
CM	Cryptographic Modernization
CMC	Common Missile Compartment
CMCO	Counter Mine Counter Obstacle
CMF	Common Message Format
CNATRA	Commander, Air Naval Air Training Command
CND	Computer Network Defense
CNIC	Commander, Naval Installations Command
CNO	Chief of Naval Operations
CNRC	Commander, Naval Recruiting Command
CNRRR	Commander, Naval Reserve Recruiting Region
CNS	Communication/Navigation System
CNVA	Computer Network Vulnerability Assessment
COBRA	Coastal Battlefield Reconnaissance and Analysis
COE	Common Operating Environment
COLDS	Cargo Offload and Discharge System
COMINT	Communications Intelligence
COMSATCOM	Commercial Satellite Communications
COMSEC	Communications Security
COMSUBGRU	Commander, Submarine Group
CONOPS	Concept of Operations
CONUS	Continental United States
COP	Common Operational Picture
CORIVRON	Coastal Riverine Squadron
COS	Class of Service
COTS	Commercial-Off-The-Shelf, or, Cargo Offload and Transfer System
CPD	Capability Production Document
CPS	Common Processor System
C-RAM	Counter-Rocket, Artillery, and Mortar
CRF	Coastal Riverine Force
CSAR	Combat Search and Rescue
CSDTS	Common Shipboard Data Terminal Set
CSF	Consolidated Storage Facility
CSG	Carrier Strike Group
CSIT	Combat System Integration and Test
CSL	Common Source Library
CSRB	Critical Skills Retention Bonus
CSRR	Common Submarine Radio Room
CSV	Catapult Capacity Selector Valve calculator
CSWP	Commercial Satellite Wideband Program
CTAPS	Contingency Tactical Automated Planning System [for TACS]
CTE	Continuous Training Environment
CTF	Component Task Force, or, Commander Task Force
CTOL	Conventional Takeoff and Landing
CTP	Common Tactical Picture
CUAS	Cargo Unmanned Aerial Systems
CUP	Common Undersea Program
CV	Conventionally Powered Aircraft Carrier, or, Carrier Variant aircraft
CVBG	Aircraft Carrier Battle Group
CVIC	Carrier Intelligence Center
CVN	Nuclear-Powered Aircraft Carrier
CWSP	Commercial Wideband Satellite Program
D5E	Destruction, degradation, denial, disruption, deceit, and Exploitation
DAB	Defense Acquisition Board
DAMA	Demand Assigned Multiple Access
DAMTC	Direct-Attack Moving Target Capability
DAPS	Dorsal Auxiliary Protective Systems
DARPA	Defense Advanced Research Projects Agency
DBR	Dual Band Radar
DCA	Defensive Counter-Air
DCC	Data Center Consolidation
DCGS–N	Distributed Common Ground System–Navy
DCGS	Distributed Common Ground System
DCID	Director, Central Intelligence Directive
DCL	Detection, Classification, and Localization
DCMS	Director, Communications Security Material Systems
DCNO	Deputy Chief of Naval Operations
DDG	Guided-Missile Destroyer
DECC	Defense Enterprise Computing System
DEIP	Dynamic Enterprise Integration Platform
DEM/VAL	Demonstration/Validation
DF	Direction Finding
DFU	Dry Filter Unit
DIB	DCGS Integration Backbone
DiD	Defense-in-Depth
DIF	Database Integration Framework

DII COE	Defense Information Infrastructure Common Operating Environment
DIMHRS	Defense Integrated Military Human Resource System
DIMUS	Digital Multi-beam Steering
DIO	Defensive Information Operations
DIRCM	Directed Infrared Countermeasures
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DJC2	Deployable Joint Command and Control
DMLGB	Dual-Mode Laser-Guided Bomb
DLS	Decoy Launching System
DMR	Digital Modular Radar
DMR	Digital Modular Radio
DMS	Defense Message System
DMSP	Defense Meteorology Satellite Program
DNM	Dynamic Network Management
DNS	Director, Navy Staff
DoD	Department of Defense
DoN	Department of the Navy
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, and Facilities
DPRIS/EMPRS	Defense Personnel Record Imaging System/ Electronic Military Personnel Record System
DRPM	Direct-Reporting Program Manager
DRSN	Defense Red Switch Network
DSCS	Defense Satellite Communications System
DSMAC	Digital Scene-Matching Area Correlation
DSN	Defense Switch Network
DSRV	Deep-Submergence Rescue Vehicle
DT	Developmental Testing
DTH	DMS Transitional Hubs
EA	Electronic Attack
EAM	Emergency Action Message
EB	Electric Boat
EBEM	Enhanced Bandwidth Efficient Modem
ECCM	Electronic Counter-Countermeasures
ECIDS-N	Electronic Chart Display and Information System–Navy
ECM	Electronic Countermeasures
ECP	Engineering Change Proposal
ECS	Exterior Communication System
EDM	Engineering Development Model
EDS	Electronic Data Systems
EHF	Extremely High Frequency
EIS	Environmental Impact Statement
EKMS	Electronic Key Management System
ELC	Enhanced Lethality Cartridge
ELINT	Electronic Intelligence
EMALS	Electromagnetic Aircraft Launch System
EMCON	Emissions Control
EMD	Engineering and Manufacturing Development
EMI	Electro-Magnetic Interference
EMIO	Expanded Maritime Interception Operations
EMPRS	Electronic Military Personnel Record System
EMRG	Electro-Magnetic Rail Gun
EMW	Expeditionary Maneuver Warfare
EO/IR	Electro-Optical/Infrared
EOC	Early Operational Capability
EOD	Explosive Ordnance Disposal
EOID	Electro-Optic Identification
ER	Extended Range
ERAAW	Extended-Range Anti-Air Warfare
ERAM	Extended-Range Active [homing] Missile
ERM	Extended Range Munition
ERNT	CNO Executive Review of Navy Training
ERP	Enterprise Resource Planning
ESAPI	Enhanced Small Arms Protective Inserts
ESE	Electronic Surveillance Enhancement
ESG	Expeditionary Strike Group
ESL	Enterprise Software Licensing, or, Expected Service Life
ESM	Electronic Support Measures
ESSI	Enhanced Special Structural Inspection
ESSM	Evolved SeaSparrow Missile
ESU	Expeditionary Support Unit
ETC	Echo Tracker Classifier
EUCOM	U.S. European Command
EURCENT	European Central [NCTAMS]
EW	Electronic Warfare
EXCEL	Excellence through Commitment to Education and Learning
FARP	Forward Arming and Refueling Point
FBE	Fleet Battle Experiment
FBM	Fleet Ballistic Missile
FDS	Fixed Distributed System
FDS-C	FDS - COTS
FEL	Free Electron Laser
FFG	Guided-Missile Frigate
FFSP	Fleet and Family Support Program
FHLT	Fleet High-Level Terminal
FIE	Fly-In Echelon
FITC	Fleet Intelligence Training Center
FLEX	Fatigue Life Extension
FLIR	Forward-Looking Infrared
FLMP	Fatigue Life Management Program
FLO/FLO	Float-On/Float-Off
FLTSAT	Fleet Satellite
FNC	Future Naval Capabilities
FOB	Forward Operating Base
FOC	Full Operational Capability
FORCEnet	Navy web of secure communications and information links
FOT	Follow-On Terminal
FOT&E	Full Operational Test and Evaluation
FP	Full Production
FRP	Full-Rate Production, or, Fleet Response Plan
FTS	Federal Telephone System, or, Full-Time Support
FUE	First Unit Equipped
FY	Fiscal Year
FYDP	Future Years Defense Plan
GBS	Global Broadcast Service
GBTS	Ground-Based Training System
GCCS	Global Command and Control System
GCS	Ground Control Station
GCSS	Global Command Support System
GDAIS	General Dynamics Advanced Information Systems
GDIS	General Dynamics Information Systems
GENDET	General Detail (personnel)
GENSER	General Service
GFE	Government-Furnished Equipment
GHMD	Global Hawk Maritime Demonstration system
GIG	Global Information Grid
GIG-BE	Global Information Grid - Bandwidth Expansion
GIG-ES	Global Information Grid Enterprise Services
GLTA	Guardian Laser Tracker Assemblies
GMF	Ground Mobile Force (Air Force)
GMM	Gun Mission Module
GMS	Griffin Missile System
GOTS	Government-Off-The-Shelf
GPNTS	GPS-based Positioning, Navigation, and Timing
GPS	Global Positioning System
GT	Gas Turbine
GWOT	Global War on Terror

HA/DR	Humanitarian Assistance/Disaster Relief
HARM	High-Speed Anti-Radiation Missile
HCI	Human Computer Interface
HD/LD	High-Demand/Low-Density
HDR	High Data-Rate
HED	Hybrid Electric Drive
HEFA	Hydro-treated Esters and Fatty Acids
HF	High Frequency
HFI	Hostile Fire Indication
HFIP	High-Frequency Internet Protocol
HGHS	High-Gain High Sensitivity
HM&E	Hull, Mechanical, and Electrical (systems)
HMI	Human-Machine Interface
HMMWV	High-Mobility Multi-purpose Wheeled Vehicle
HOLC	High Order Language Computer
HPC	Human Performance Center
HSDG	High School Diploma Graduate
HSI	Human Systems Integration
HTS	High-Temperature Superconducting
HUD	Heads Up Display
HWDDC	Hazardous Weather Detection and Display Capability
I&W	Indications and Warning
IA	Information Assurance
IAMD	Integrated Air and Missile Defense
IATF	IA Technical Framework
IBA	Interceptor Body Armor
IBS	Integrated Broadcast Service
IBS/JTT	Integrated Broadcast Service/Joint Tactical Terminal
ICAO	International Civil Aviation Organization
ICAP	Improved Capability
ICD	Initial Capabilities Document
ICOP	Intelligence Carry-On Program
ICP	Integrated Common Processor
ICSTF	Integrated Combat Systems Test Facility
ICWI	Interrupted Continuous-Wave Illumination
IDECMS	Integrated Defensive Electronic Countermeasures System
IDIQ	Indefinite Delivery/Indefinite Quantity
IDS	Identity Dominance System
IDSN	Integrated Digital Switching Network
IDTC	Inter-Deployment Training Cycle
IED	Improvised Explosive Device
i-ENCON	Incentivized Energy Conservation
IET	Intelligence Exploitation Team
IETM	Interactive Electronic Technical Manual
IFF	Identification, Friend or Foe
ILS	Instrument Landing System
IMINT	Imagery Intelligence
INLS	Improved Navy Lighterage
INP	Innovative Naval Prototype
INS	Inertial Navigation System
IO	Information Operations
IOC	Initial Operational Capability
IP	Internet Protocol
IPARTS	Improved Performance Assessment and Readiness Training System
IPDS	Improved Point Detector System
IPPD	Integrated Product and Process Development
IPOE	Intelligence Preparation of Environment
IPR	Interim Program Review
IPS	Integrated Power System
IPT	Integrated Process Team
IR	Infrared
IRCCM	Infrared Counter-Countermeasures
IRST	Infrared Search and Track
IS	Information Systems
ISC	Integrated Ship's Control
ISDN	Integrated Services Digital Network
ISNS	Integrated Shipboard Network System
ISO	Investment Strategy Options
ISPP	Integrated Sponsor's Program Proposal
ISR	Intelligence, Surveillance, Reconnaissance
ISRT	Intelligence, Surveillance, Reconnaissance, and Targeting
ISS	Installation Subsystem
ISS	Information Superiority/Sensors
ISSP	Information Systems Security Program
IT	Information Technology
IT-21	Information Technology for the 21st Century
ITAB	Information Technology Acquisition Board
IU	Interface Unit
IUSS	Integrated Undersea Surveillance System
IW	Indications and Warning
IWS	Integrated Warfare Systems
J&A	Justification and Approval
JASA	Joint Airborne SIGINT Architecture
JASSM	Joint Air-to-Surface Standoff Missile
JATAS	Joint and Allied Threat Awareness System
JBAIDS	Joint Biological Agent Identification and Diagnostic System
JBTDS	Joint Biological Tactical Detection System
JC2-MA	Joint Command and Control - Maritime Applications
JCC	Joint Airborne SIGINT Architecture Modification Common Configuration
JCIDS	Joint Capabilities Integration and Development System
JCM	Joint Common Missile
JCREW	Joint Counter RCIED Electronic Warfare
JCS	Joint Chiefs of Staff
JDAM	Joint Direct-Attack Munition
JDISS	Joint Deployable Intelligence Support Service
JDN	Joint Data Network
JFC	Joint Force Commander
JFCOM	Joint Forces Command
JFCOM JPO	Joint Forces Command Joint Program Office
JFMCC	Joint Forces Maritime Component Commander
JFN	Joint Fires Network
JFNU	Joint Fires Network Unit
JHDA	Joint Host Demand Algorithm
JHMCS	Joint Helmet Mounted Cueing System
JHSV	Joint High-Speed Vessel
JIC	Joint Intelligence Center
JICO/JSS	Joint Interface Control Officer Support System
JIE	Joint Information Environment
JIFC	Joint Integrated Fire Control
JLENS	Joint Land-Attack Cruise Missile Defense Elevated Netted Sensor
JMAST	Joint Mobile Ashore Support Terminal
JMCIS	Joint Maritime Command Information System
JMCOMS	Joint Maritime Communications Strategy
JMLS	Joint Modular Lighterage System
JMOD	Joint Airborne SIGINT Architecture Modification
JMPS	Joint Mission Planning System
JMPS-M	Joint Mission Planning System-Maritime
JNIC	Joint National Integration Center
JNMS	Joint Network Management System
JOA	Joint Operations Area
JOTBS	Joint Operational Test Bed System
JPACE	Joint Protective Aircrew Ensemble
JPALS	Joint Precision Approach and Landing System
JPATS	Joint Primary Aircraft Training System
JPEO	Joint Program Executive Office
JROC	Joint Requirements Oversight Council

JSF	Joint Strike Fighter
JSIPS	Joint Service Imagery Processing System
JSMO	Joint Systems Management Office
JSOW	Joint Standoff Weapon
JSPO	Joint System Program Office
JTA	Joint Tactical Architecture
JTAMDO	Joint Theater Air and Missile Defense Organization
JTDLMP	Joint Tactical Data Link Management Plan
JTIDS	Joint Tactical Information Distribution System
JTRS	Joint Tactical Radio System
JTT	Joint Tactical Terminal
JUWL	Joint Universal Weapon Link
JWICS	Joint Worldwide Intelligence Communications System
KDP	Key Decision Point
KPP	Key Performance Parameter
KSA	Key Systems Attribute
LAIRCM	Large Aircraft Infrared Countermeasures
LAMPS	Light Airborne Multipurpose System
LAN	Local Area Network
LANT	Atlantic
LANTIRN	Low-Altitude Navigation and Targeting Infrared At Night
LBSF&I	Littoral Battlespace Sensing, Fusion and Integration
LBS-UUV	Littoral Battlespace Sensing-Unmanned Undersea Vehicles
LCAC	Landing Craft, Air Cushion
LCB	Lateral Conversion Bonus
LCC	Amphibious Command Ship
LCCA	Low-Cost Conformal Display
LCGR	Launch Control Group Replacement
LCS	Littoral Combat Ship
LCT	Landing Craft Tank
LCU	Landing Craft Utility
LD/HD	Low-Density/High Demand
LDR	Low Data Rate
LDUUV	Large-Diameter Unmanned Undersea Vehicle
LEAD	Launched Expendable Acoustic Decoy
LEAP	Lightweight Exo-Atmospheric Projectile
LEASAT	Leased Satellite
LFA	Low Frequency Active
LGB	Laser-Guided Bomb
LHA	Amphibious Assault Ship
LHA(R)	Amphibious Assault Ship-Replacement
LHD	Amphibious Assault Ship
LHT	Lightweight Hybrid Torpedo
LIDAR	Light Detection and Ranging System, or, Light Detection and Ranging
LiOH	Lithium Hydroxide
LJDAM	Laser Joint Direct-Attack Munition
LMRS	Long-Term Mine Reconnaissance System
LMS	Local Monitor Station
LMSR	Large Medium-Speed Roll-On/Roll-Off
LOS	Line of Sight, or, Length of Service
LOTS	Logistics-Over-The-Shore
LPD	Amphibious Transport Dock [Ship]
LPI	Low-Probability-of-Intercept
LPMP	Launch Platform Mission Planning
LPWS	Land-Based [Phalanx] Weapons System
LRIP	Low Rate Initial Production
LRLAP	Long-Range Land-Attack Projectile
LRS&T	Long-Range Surveillance and Tracking
LSD	Dock Landing Ship
LSO	Landing Signal Officer
LSS	Littoral Surveillance System
LVT	Low-Volume Terminal
LX(R)	Dock Landing Ship Replacement
LWH	Lightweight Helmets
M/BVR	Medium/Beyond Visual Range missile
MA	Maritime Applications
MAGTF	Marine Air-Ground Task Force
MAMDJF	Maritime Air and Missile Defense of Joint Forces
MARCEMP	Manual Relay Center Modernization Program
MASINT	Measurement and Signature Intelligence
MAST	Mobile Ashore Support Terminal
MATT	Multi-mission Airborne Tactical Terminal
MAWS	Missile Approach Warning System
MCAS	Marine Corps Air Station
MCAST	Maritime Civil Affairs and Security Training
MCAT	Maritime Civil Affairs Teams
MCEN	Marine Corps Enterprise Network
MCM	Mine Countermeasures
MCP	Mission Capability Package
MCPON	Master Chief Petty Officer of the Navy
MCS	Mine Countermeasures Command, Control, and Support Ship, or, Mission Computer System
MCS-21	Maritime Cryptologic System for the 21st Century
MCU	Mission Computer Upgrade
MDA	Maritime Domain Awareness, or, Missile Defense Agency
MDR	Medium Data Rate
MDS	Multi-function Display System, or, Mobile Diving and Salvage
MDSU	Mobile Diving and Salvage Unit
MEB	Marine Expeditionary Brigade
MEDAL	Mine Warfare and Environmental Decision Aids Library
MEF	Marine Expeditionary Force
MESF	Maritime Expeditionary Security Force
METMF(R)	Meteorological Mobile Facility Replacement
NEXGEN	Next Generation
METOC	Meteorological and Oceanographic Sensors
MEU	Marine Expeditionary Unit
MEU(SOC)	Marine Expeditionary Unit (Special Operations Capable)
MF	Medium Frequency
MFL	Multi-Frequency Link
MFOQA	Military Flight Operations Quality Assurance
MFR	Multi-Function Radar
MFTA	Multi-Function Towed Array
MGS	Machine Gun System
MHIP	Missile Homing Improvement Program
MICFAC	Mobile Integrated Command Facility
MID	Management Initiative Decision
MIDS	Multi-Function Information Distribution System
MIDS-LVT	Multi-Function Information Distribution System-Low -Volume Terminal
MILDET	Military Detachment
MILSTAR	Military Strategic and Tactical Relay Satellite
MIO	Maritime Interception Operations
MIPS	Maritime Integrated Air and Missile Defense Planning System
MIR	Multi-Sensor Image Reconnaissance
MIRV	Multiple Independently Targeted Reentry Vehicle
MIUW	Mobile Inshore Undersea Warfare
MIW	Mine Warfare
MIWC	Mine Warfare Commander
Mk	Mark
MLLP	Mobile Landing Platform
MLS	Multi-Level Security
MM	[LCS] Mission Module
MMA	Multi-mission Maritime Aircraft

MMRT	Modified Miniature Receiver Terminal
MMSP	Multi-Mission Signal Processor
MNS	Mission Need Statement, or, Mine Neutralization System
MOA	Memorandum of Agreement
MOC	Maritime Operations Center
MOCC	Mobile Operational Command Control Center
MOD	Modification
MOPP	Mission Oriented Protective Posture
MOU	Memorandum of Understanding
MP	[LCS] Mission Package
MPA	Maritime Patrol Aircraft
MPF(F)	Maritime Prepositioning Force (Future)
MPG	Maritime Prepositioning Group
MPRF	Maritime Patrol and Reconnaissance Force
MPS	Maritime Prepositioning Ship, or, Mission Planning System
MRMS	Maintenance Resource Management System
MRMUAS	Medium-Range Maritime Unmanned Aerial System
MR-TCDL	Multi-Role Tactical Common Data Link
MRUUV	Mission-Reconfigurable Unmanned Undersea Vehicle
MSC	Military Sealift Command
MSD	Material Support Dates
MSO	Maritime Security Operations
MTI	Moving Target Indicator
MTOC	Mobile Tactical Operations Center
MUOS	Mobile User Objective System
MWCS	Multiple Weapon Control Sight
MWR	Morale, Welfare, and Recreation
N/JCA	Navy/Joint Concentrator Architecture
NADEP	Naval Aviation Depot
NAF	Naval Air Facility
NALCOMIS	Naval Aviation Logistics Command Management Information System
NAOC2	Naval Air Operations Command and Control
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NATOPS	Naval Aviation and Training Operating Procedures Standardization
NAVAIRSYSCOM	Naval Air Systems Command
NAVCENT	U.S. Naval Forces, Central Commmand
NAVFLIR	Navigation, Forward-Looking Infrared
NAVMAC	Navy Modular Automated Communications
NavMPS	Naval Mission Planning Systems
NAVSEA	Naval Sea Systems Command
NAVSECGRU	Naval Security Group
NAVSSI	Navigation Sensor System Interface
NAVSUP	Naval Supply Systems Command
NAVWAR	Navigation Warfare
NCDP	Naval Capabilities Development Process
NCES	Net-Centric Enterprise Services
NCFS	Naval Fires Control System
NCHB	Navy Cargo Handling Battalion
NCIS	Naval Criminal Investigative Service
NCO	Network-Centric Operations
NCP	Naval Capability Pillar, or, Naval Capability Plan
NCR	Naval Construction Regiment
NCTAMS	Naval Computer and Telecommunications Area Master Stations
NCTF	Naval Component Task Force
NCTS	Naval Computer and Telecommunications Station
NCUSW	Net Centric Undersea Warfare
NCW	Network-Centric Warfare, or, Navy Coastal Warfare
NCWES	Network-Centric Warfare Electronic Support
NDI	Non-Developmental Item
NEC	Naval Enlistment Classification
NECC	Naval Expeditionary Combat Command
NEIC	Navy Expeditionary Intelligence Command
NELR	Navy Expeditionary Logistics Regiment
NEO	Non-Combatant Evacuation Operations
NEP	Navy Enterprise Portal
NEPLO	National Emergency Preparedness Liaison Officer
NESP	Navy Extremely High Frequency (EHF) Satellite Program
NETC	Naval Education and Training Command
NETWARCOM	Network Warfare Command
NFCS	Naval Fires Control System
NFN	Naval Fires Network, and/or Joint Fires Network
NFO	Naval Flight Officer
NFS	Naval Fire Support
NGCD	Next-Generation Chemical Detection
NGC2P	Next Generation Command and Control Processor
NGDS	Next-Generation Diagnostics System
NGEN	Next-Generation Enterprise Network
NGJ	Next-Generation Jammer
NGO	Non-Governmental Organization
NGSS	Northrup Grumman Ship Systems
NIFC-CA	Navy Integrated Fire Control–Counter Air
NII	Network Information Integration
NILE	NATO Improved Link Eleven
NIMA	National Imagery and Mapping Agency
NIPRNET	Unclassified-but-Sensitive Internet Protocol Router Network
NITF	National Imagery Transportation Format
NMCB	Naval Mobile Construction Battalion [Seabee]
NMCI	Navy Marine Corps Intranet
NMCP	Navy Marine Corps Portal
NMITC	Navy Maritime Intelligence Training Center
NMT	Navy Advanced Extremely High Frequency Multiband Terminal
NNOR	Non-Nuclear Ordnance Requirement
NNSOC	Naval Network and Space Command
NOAA	National Oceanographic and Atmospheric Administration
NOC	Network Operation Center
NPDC	Naval Personnel Development Command
N-PFPS	Navy Portable Flight Planning Software
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
NPS	Naval Post-graduate School
NREMS	Navy Regional Enterprise Messaging System
NRF	Naval Reserve Force
NRL	Naval Research Laboratory
NRTD	Near Real-Time Dissemination
NSA	National Security Agency
NSAWC	Naval Strike Air Warfare Center
NSC	National Security Cutter
NSCT	Naval Special Clearance Team
NSFS	Naval Surface Fire Support
NSFV	Naval Security Forces Vest
NSIPS	Navy Standard Integrated Personnel System
NSPG	Navy Strategic Planning Guidance
NSSMS	NATO SeaSparrow Surface Missile System
NSSN	New Attack Submarine [Virginia SSN 774 Class]
NSTC	Naval Service Training Command
NSW	Naval Special Warfare
NSWC/DD	Naval Surface Warfare Center/Dahlgren Division
NSWC/PH	Naval Surface Warfare Center/Port Hueneme Division
NSWG	Naval Special Warfare Group

NSWRON	Naval Special Warfare Squadron
NTCDL	Network Tactical Common Data Link
NTCS-A	Naval Tactical Command System - Afloat
NTCSS	Naval Tactical Command Support System
NTDS	Naval Tactical Data System
NTNO	Navy-Type Navy-Owned
NUFEA	Navy Unique Fleet Essential Airlift
NUFEA-RA	Navy Unique Fleet Essential Airlift-Replacement Aircraft
NUWC	Naval Underwater Warfare Center
NWDC	Navy Warfare Development Command
OA	Operational Assessment
OAG	Operational Advisory Group
OAS	Offensive Air Support
OASD	Office of the Assistant Secretary of Defense
OASIS	Organic Airborne and Surface Influence Sweep
OBT	On-Board Trainer
OCA	Offensive Counter-Air
OCONUS	Outside Continental United States
OED	OSIS Evolutionary Development
OEF	Operation Enduring Freedom
OEO	Other Expeditionary Operations
OGB	Optimized Gun Barrel
OGC	Open Geospatial Consortium
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product Team
OMFTS	Operational Maneuver From The Sea
ONI	Office of Naval Intelligence
ONR	Office of Naval Research
OPAREA	Operational Exercise Area
OPEVAL	Operational Evaluation
OPNAV	Office of the Chief of Naval Operations
OPTASC COMM	Operational Tasking Communications
OPTASC EW	Operational Tasking Electronic Warfare
OPTEMPO	Operating Tempo
OPTEVFOR	Operational Test and Evaluation Force
OR	Operational Requirement
ORD	Operational Requirements Document
OSA	Open System Architecture
OSCAR	Open Systems-Core Avionics Requirements
OSD	Office of the Secretary of Defense
OSD-CAPE	Office of the Secretary of Defense, Cost Assessment and Program Evaluation
OSIS	Ocean Surveillance Information System
OSS	Operational Support System
OT	Operational Testing
OT&E	Operational Testing and Evaluation
OTH	Over the Horizon
P3I	Pre-Planned Product Improvement
PAA	Phased Adaptive Approach
PAC	Pacific
PACE	Program for Afloat College Education
PAS	Processing and Analysis Segment
PC	Patrol Coastal craft
PCU	Pre-Commissioning Unit
PDA	Personal Digital Assistant
PDM	Program Decision Memorandum
PDR	Preliminary Design Review
PEO	Program Executive Office (and Officer)
PEO IWS	Program Executive Office for Integrated Warfare Systems
PERSTEMPO	Personnel Tempo
PFPS	Portable Flight-Planning Software
PGM	Precision-Guided Munition
PHIBGRU	Amphibious Group
PIP	Product Improvement Program, or, Pioneer [UAV] Improvement Program
PKI	Public Key Infrastructure
PLUS	Persistent Littoral Undersea Surveillance
PMA	Post-Mission Analysis
PMK	Power Management Kit
POM	Program Objective Memorandum
POR	Program of Record
PPBE	Planning, Programming, Budgeting, and Execution process
PRMS	Pressurized Rescue Module System
PSE	Physical Security Equipment
PSTN	Public Switched Telephone Network
PTAN	Precision Terrain Aided Navigation
PTW	Precision Targeting Workstation
PUMA	Precision Underwater Mapping
PVO	Private Volunteer Organization
QDR	Quadrennial Defense Review
QOL	Quality of Life
QOS	Quality of Service
R&D	Research and Development
RAM	Rolling Airframe Missile
RAMICS	Rapid Airborne Mine Clearance System
RC	Reserve Component
RCC	Regional Combatant Commander
RCIED	Radio Controlled Improvised Explosive Device
RCOH	Nuclear Refueling/Complex Overhaul
RD&A	Research, Development, and Acquisition
RDC	Rapid Deployment Capability
RDT&E	Research, Development, Test, and Evaluation
REPLO	Regional Emergency Preparedness Liaison Officer
RF	Radio Frequency
RFP	Request for Proposals
RIMPAC	Rim of the Pacific [exercise]
RL	Restricted Line
RM	Radiant Mercury [classified information sanitization program]
RMAST	Reserve Mobile Ashore Support Terminal
RMIG	Radiant Mercury Imagery Guard
RMMV	Remote Multi-Mission Vehicle
RMS	Remote Minehunting System
RO	Reverse Osmosis
ROMO	Range of Military Operations
RORO	Roll-On/Roll-Off
ROS	Reduced Operating Status
RRDD	Risk Reduction and Design Development
RSC	Radar Suite Controller
RSOC	Regional SIGINT Operations Center
RTC	Remote Terminal Component, or, Recruit Training Command
RWR	Radar Warning Receiver
S&T	Science and Technology
SA	Situational Awareness
SAASM	Selective Availability Anti-Spoofing Module
SAG	Surface Action Group
SAHRV	Semiautonomous Hydrographic Reconnaissance Vehicle
SAIC	Science Applications International Corporation
SALTS	Streamlined Alternative Logistic Transmission System
SAM	Surface-to-Air Missile
SAML	Security Assertion Markup Language
SAST	Surface ASW Synthetic Trainer
SATCOM	Satellite Communications
SBIR	Small Business Innovative Research
SBT	Special Boat Team
SCA	Software Communications Architecture
SCC	Sea Combat Commander
SCI	Sensitive Compartmented Information
SCN	Shipbuilding and Conversion (Navy)

SC(X)R	Surface Connector Replacement
SDAP	Special Duty Assignment Pay
SDD	System Design Document, or, System Development and Demonstration [phase]
SDS	Surface Decompression System
SDTA	System Demonstration Test Article
SDTS	Self-Defense Test Ship
SDV	Swimmer [or SEAL] Delivery Vehicle
SDVT	Swimmer [or SEAL] Delivery Vehicle Team
Seabee	Naval Construction Battalion
SEAD	Suppression of Enemy Air Defense
SEAL	Sea-Air-Land Naval Special Warfare Forces
SEAPRINT	Systems Engineering, Acquisition, and Personnel Integration
SEI	Specific Emitter Identification
SEIE	Submarine Escape Immersion Equipment
SELRES	Selected Reserve
SEPLO	State Emergency Preparedness Liaison Officer
SEWIP	Surface Electronic Warfare Improvement Program
SFA MTTs	Security Force Assistance Mobile Training Teams
SHARP	Shared Reconnaissance Pod
SHF	Super High Frequency
SHUMA	Stochastic Unified Multiple Access
SI	Special Intelligence
SIAP	Single Integrated Air Picture
SIGINT	Signals Intelligence
SIMAS	Sonar In-situ Mode Assessment System
SINCGARS	Single Channel Ground and Air Radio System
SIPRNET	Secret Internet Protocol Router Network
SLAD	Slewing-Arm Davit
SLAM	Standoff Land-Attack Missile
SLAM-ER	Standoff Land-Attack Missile-Expanded Response
SLAP	Service Life Assessment Program
SLBM	Submarine-Launched Ballistic Missile
SLEP	Service Life Extension Program
SLR	Side-Looking Radar
SM	Standard Missile
SMCM	Surface Mine Countermeasure
SNAP	Shipboard Non-tactical ADP Program
SNR	Subnet Relay
SOA	Service Oriented Architecture, or, Sustained Operations Ashore
SOAD	Standoff Outside Area Defense
SOAP	Simple Object Access Protocol
SOC	Special Operations Cable, or, Special Operations Craft
SOF	Special Operations Forces
SOPD	Standoff Outside Point Defense
SOSUS	Sound Surveillance System
SPAWAR	Space and Naval Warfare Systems Command
SPECAT	Special Category
SPM	Soldier Power Manager
SPRITE	Spectral and Reconnaissance Imagery for Tactical Exploitation
SRAAM	Short-Range Air-to-Air Missile
SRB	Selective Reenlistment Bonus
SRC	Submarine Rescue Chamber
SRDRS	Submarine Rescue Diving Recompression System
SS	Sensor Subsystem
SSBN	Nuclear-Powered Ballistic-Missile Submarine
SSC	Ship-to-Shore Connector
SSCA	Service Secretary Controlled Aircraft
SSDG	Ship Service Diesel Generators
SSDS	Ship Self-Defense System
SSEE	Ship's Signals Exploitation Equipment
SSG	Strategic Studies Group
SSGN	Guided-Missile Submarine
SSI	Special Structural Inspection
SSI-K	Special Structural Inspection-Kit
SSIPS	Shore Signal and Information Processing Segment
SSK	Diesel-electric/Advanced Air Independent Submarine
SSL	Solid State Laser
SSMIS	Special Sensor Microwave Imager/Sounder [Air Force]
SSMM	Surface-to-Surface Missile Module
SSN	Nuclear-Powered Submarine
SSO	Special Security Office
SS-SPY	Solid State-SPY [radar]
SSST	Supersonic Sea-Skimming Target
STANAG	[NATO] Standardization Agreement
START	Strategic Arms Reduction Treaty
STEM	Science, Technology, Engineering, and Mathematics
STEP	Standardized Tactical Entry Point
STOM	Ship-To-Objective Maneuver
STOVL	Short Take-Off and Vertical Landing
STT	Submarine Tactical Terminal
STUAS	Small Tactical Unmanned Aircraft System
STU-III/R	Secure Telephone Unit, Third Generation, Remote Control Interface
SURTASS	Surveillance Towed Array Sensor System
SUW	Surface Warfare
S-VSR	S-Band Volume Search Radar
SWAN	Shipboard Wide-Area Network
SWATH	Small Waterplane Area, Twin Hull [ship]
SYSCEN	Systems Center
TACAIR	Tactical Aircraft
TACAMO	Take-Charge-and-Move-Out
TACC	Tactical Air Command Centers
TacLAN	Tactical Local Area Network
TACS	Tactical Air Control System
TACTAS	Tactical Towed Array System
TACTOM	Tactical Tomahawk
TADIL-J	Tactical Digital Information Link–Joint Service
TADIRCM	Tactical Aircraft Directed Infra-Red Countermeasure
TADIXS	Tactical Data Information Exchange Systems
T-AGOS	Ocean Surveillance Ship [MSC-operated]
T-AGS	Oceanographic Survey Ships [MSC-operated]
T-AH	Hospital Ship [MSC-operated]
T-AKE	Stores/Ammunition Ship [MSC-operated]
TAMD	Theater Air and Missile Defense
TAMPS	Tactical Automated Mission Planning System
T-AO	Oiler [MSC-operated]
TAOC	Tactical Air Operations Center [Marine Corps]
TAP	Tactical Training Theater Assessment Planning
TARPS	Tactical Airborne Reconnaissance Pod System
TASWC	Theater ASW Commander
TAWS	Terrain Awareness Warning Systems
TBI	Traumatic Brain Injury
TBMCS	Theater Battle Management Core Systems
TC2S	Tomahawk Command and Control System
TCAS	Traffic Alert and Collision Avoidance System
TCDL	Tactical Common Data Link
TCGR	Track Control Group Replacement
TCP	Transmission Control Protocol
TCPED	Tasking Collection Processing Exploitation Dissemination
TCS	Tactical Control System, or, Time-Critical Strike
TCT	Time-Critical Targeting
TDA	Tactical Decision Aid
TDCL	Torpedo Detection, Classification, and Localization
TDD	Target Detection Device

TDLS	Tactical Data Link System
TDM	Time Division Multiplex
TDMA	Time Division Multiple Access
TDP	Tactical Data Processor
TDSS	Tactical Display Support System
TECHEVAL	Technical [Developmental] Evaluation
TEMPALT	Temporary Alteration
TERCOM	Terrain Contour Mapping
TES-N	Tactical Exploitation System-Navy
TESS/NITES	Tactical Environmental Support System/Navy Integrated Tactical Environmental Subsystem
TEU	Training and Evaluation Unit
TFCC	Task Force Climate Change
TFW	Task Force Web
TI	Technology Insertion
TIBS	Tactical Information Broadcast Service
TIC	Toxic Industrial Chemical Agent
TIDS	Tactical Integrated Digital System
TIM	Toxic Industrial Material
TIMS	Training Integrated Management System
TIS	Trusted Information System
TIS	Tactical Interface Subsystem
TJS	Tactical Jamming System
TLAM	Tomahawk Land-Attack Cruise Missile
TLR	Top Level Requirements
TNT	Targeting and Navigation Toolset
TOA	Total Obligational Authority, or, Table of Allowance
TOC	Total Ownership Costs, or, Tactical Operations Center
TOG	Technology Oversight Group
TOW	Tube-launched, Optically-tracked, Wire-guided [missile]
TPPU	Task, Post, Process, Use
TRAFS	Torpedo Recognition and Alertment Functional Segment
T-RDF	Transportable - Radio Direction Finding
TRE	Tactical Receive Equipment
TRIXS	Tactical Reconnaissance Intelligence Exchange System
TS	Top Secret
TSC	Tactical Support Center
TSR	Time Slot Reallocation
TSTC	Total Ship Training Capability
TTNT	Tactical Targeting Network Technology
TTWCS	Tactical Tomahawk Weapon Control System
TUSWC	Theater Undersea Warfare Commander
TWS	Torpedo Warning System
TXS	Transport Services
UAV	Unmanned Aerial Vehicle
UCAS-D	Unmanned Combat Aircraft System Demonstration
UCLASS	Unmanned Carrier-Launched Airborne Surveillance and Strike
UCT	Underwater Construction Teams
UCWI/JUWL	Interrupted Continuous Wave Illumination/ Joint Universal Weapon Link
UDDI	Universal Description, Discovery, and Integration
UFO	Ultra High Frequency Follow-On
UHF	Ultra High Frequency
UISS	Unmanned Influence Sweep System
UMFO	Undergraduate Military Flight Officer
UNITAS	Annual US-South American Allied Exercise
UNREP	Underway Replenishment
UOES	User Operational Evaluation System
UOES	User Operational Evaluation System
UON	Urgent Operational Need
URC	Undersea Rescue Command
URL	Unrestricted Line
USD/AT&L	Under Secretary of Defense for Acquisition, Technology, and Logistics
USMC	United States Marine Corps
USPACOM	United States. Pacific Command
USS	Undersea Surveillance System, and, United States Ship
USSOCOM	U.S. Special Operations Command
USSSTRATCOM	U.S. Strategic Command
USW	Undersea Warfare
USW-DSS	Undersea Warfare-Decision Support System
UUV	Unmanned Undersea Vehicle
UWS	Underwater Segment
UXO	Unexploded Ordnance
VBSS	Visit, Board, Search, and Seize
VCNO	Vice Chief of Naval Operations
VDS	Variable-Depth Sonar
VERTREP	Vertical [underway] Replenishment
VHA	Variable Housing Allowance
VHF	Very High Frequency
VIXS	Video Information Exchange System
VLA	Vertical Launch ASROC
VLF/LF	Very Low Frequency/Low Frequency
VLS	Vertical Launching System
VME	Versa Module Eurocard
VMTS	Virtual Mission Training System
VOD	Vertical Onboard Delivery
VPM	Virginia Payload Module
VPN	Virtual Private Network
VSR	Volume Search Radar
V/STOL	Vertical/Short Take-Off and Landing
VSW	Very Shallow Water
VTC	Video Teleconferencing
VTM	Video Tele-Medicine
VTOL	Vertical Take-Off and Landing
VTT	Video Tele-Training
VTUAV	Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle
VVD	Voice-Video-Data
VXX	Presidential Replacement Helicopter
WAA	Wide Aperture Array
WAN	Wide Area Network
WDL	Weapons Data Link
WEN	Web-Enabled Navy
WGS	Wideband Gapfiller Satellite
WMD	Weapons of Mass Destruction [nuclear, biological, chemical]
WMP	Wideband Modernization Plan
WPN	Weapons Procurement Navy [appropriation]
WSC	Wideband Satellite Communications
XFC UAS	eXperimental Fuel Cell Unmanned Aerial System
XML	Extensible Markup Language
ZBR	Zero-Based Review

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http://www.navy.mil/navydata/policy/seapower/npg14/top-npg14.pdf