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To Deter China, the U.S. Navy Must Build a Connected Fleet at a Faster Pace

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KEY TAKEAWAYS

In 10 years, a quarter of the Navy's warships will reach the end of service life, presenting both a risk and an opportunity to build a new fleet—but it must act now.

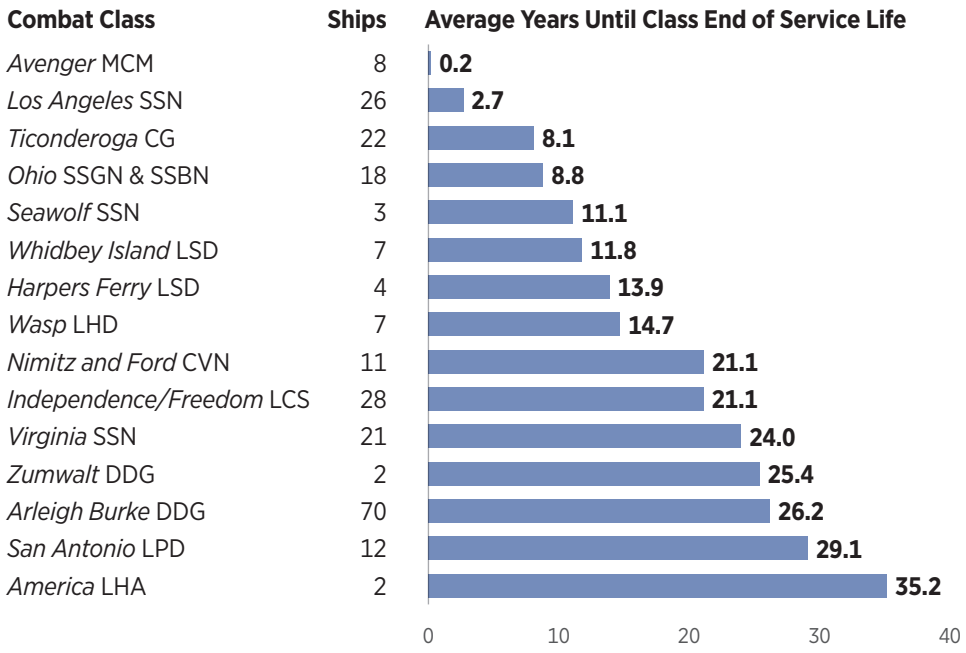
Long-range missile threats are dispersing naval operations over great distances, while combat effectiveness requires a high degree of operational networking.

New ship designs must be informed by shipyard limitations and encourage diversification of where the Navy builds its fleet in order to scale up quickly in wartime.

The Navy is struggling to replace one of its most successful designs: a warhorse of the Navy, the large surface combatant *Arleigh Burke*–class guided-missile destroyer. It is also struggling to replace the Cold War–era *Ticonderoga*-class cruiser, another warhorse. The *Ticonderoga* cruiser's potential successor, the *Zumwalt*-class destroyer, petered out at only three ships. Meanwhile, the *Arleigh Burke* destroyers are at the end of the line for any further upgrades—referred to as Flight I, Flight II, Flight IIA, and, soon, Flight III, which will be the fourth and last iteration. As the Navy rethinks its fleet design, given the need for warships to meet the threat from China this decade, it will have to consider how its current and future large surface ships align with and complement its fleet of littoral combat ships (LCS), new *Constellation*-class frigates, and unmanned platforms.

CHART 1

Navy Combat Ships Nearing End of Service Life



NOTE: Figures are based on calculations for June 2022.
SOURCE: Naval Sea Systems Command, Naval Vessel Register, "Fleet Size," http://www.nvr.navy.mil/NVRSHIPS/FLEETSIZE.HTML (accessed June 15, 2022).

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Determining the appropriate fleet design—the numbers of ships and the balance of classes of warships—requires an appreciation of the engineering challenges, the military threat, and the trajectory of technological advances for the life of a warship (at least 30 years). The Navy's 2020 Future Naval Force Study (FNFS), Future Surface Combatant Force (FSCF), and 2022 amphibious ship study are intended to address this question but are not publicly available. Based on its public statements, the Navy is planning a future fleet of larger surface combatants capable of employing larger long-range missiles (hyper-sonic missiles), directed-energy systems, and integrated-power systems that incorporate electric-drive propulsion and distributed-power generation. Furthermore, in an era of heightened tension with China and Russia, the ability to pace competitors' shipbuilding will also be an important consideration, especially in a long war with China.

To get the balance right, the Navy will need to align its missions with the class of warship that has the capabilities required to execute them. The Navy must ensure that the ship designs include adequate margins to build in future capabilities to stay ahead of evolving Chinese and Russian threats. Specifically, the Navy will need next-generation command-and-control capabilities, as it relies on networked platforms distributed over great distances, employing its Distributed Maritime Operations (DMO) fleet-operating concept. The Navy's effort to achieve next-generation command and control is Project Overmatch, now part of the Joint All-Domain Command and Control (JADC2), which will be a critical element in actualizing the DMO.

Finally, the Navy must advance a sustained long-term expansion of its shipbuilding and industrial base capacity with the goal of being able to scale up and diversify quickly in wartime. Budgetary constraints—while unavoidable—given the threats today, should not preclude needed investments in expanding the Navy to the size and capability that the nation needs to deter and, if needed, win, a war with China or Russia. Heritage Foundation experts have determined possibilities for savings in the defense budget and elsewhere to allow the nation to build the fleet it needs to counter China and other adversaries.[1]

Mixed Bag of Multi-Mission Platforms

As the U.S. military's primary maritime arm, the Navy is charged with providing enduring forward global presence to execute the President's defense strategy while maintaining war-winning forces. To do this, the Navy invests in warships to execute a range of missions.

Currently the Navy is constructing its first *Constellation*-class frigate and is shifting into Flight III upgrade of its *Arleigh Burke*–class destroyers. The last cruiser built was the *Port Royal* in 1994, and after several false starts, details on its successor were hinted at in January 2022 to an audience at the Surface Navy Association.[2] The last LCS was procured in fiscal year (FY) 2019 and will not be continued.[3] Finally, the Navy is developing several unmanned systems that will potentially operate in concert with its large surface ships. Balancing naval missions among these platforms will be critical in determining the appropriate design and operational requirements of each.

The *Arleigh Burke* destroyer is one of the Navy's most successful classes of warship. Its success has been partly due to its capacity for modifications to meet a range of contemporary mission needs—notably air and ballistic missile defense and anti-submarine warfare.[4] Upgraded SPY-6 radar and missile defense systems of the Flight III destroyers with the ability

to simultaneously conduct missile and air defense makes them a partial successor to the *Ticonderoga*-class cruisers. These destroyers also adhere to the class's traditional sub-hunting role with advanced-hull-mounted and towed sonar systems while embarking up to two multi-mission helicopters. Continuing their sub-hunting role, the new Flight III variants will sport a new submarine-detecting towed array. However, these destroyers will be unable to carry next-generation hypersonic weapons and will have only 90 to 96 vertical launch cells (VLS) to employ land attack, air defense, and anti-submarine weapons (compared to 122 on cruisers).

In May 2022, the Navy operated 22 *Ticonderoga*-class cruisers, the oldest commissioned in 1986 and the youngest commissioned in 1994; the *Ticonderoga* cruisers will reach the end of their lifespans by 2038.[5] In their later years, these ships have suffered from leaking fuel tanks, outdated missile defense radars, and cascading operational costs to maintain older systems after years of deferred maintenance.[6] Since 2000, the Navy has attempted to build a replacement that can provide air defense for carrier strike groups. The Flight III destroyer's limited-weapons load and space constraints for embarked air defense component command staff provide a partial replacement. After several life extensions and modernizations to these venerable cruisers, there is no escaping the need to begin producing a successor with comparable capabilities and capacities.

The three *Zumwalt*-class destroyers were never intended for air defense, but for land-attack and anti-surface ship warfare.[7] This mission remains the focus as the Navy considers installing hypersonic missile systems on these ships.[8] The next-generation guided-missile destroyer (DDG(X)), based on publicly released conceptual diagrams, is expected to fulfill the cruiser's mission of air defense for carrier strike groups.[9] Fulfilling this mission would require between 11 (one per carrier strike group) and 22 (one-for-one replacement of cruisers), with the lower end of that number being delivered by 2038 when the last cruiser reaches its end of life. However, the Navy had planned to procure the first DDG(X) in FY 2028, but the proposed FY 2023 budget pushes that to 2030, and based on the past shipbuilding track record, an optimistic projection would see the first DDG(X) delivered several years later, in the mid to late 2030s.[10] This means that for some time the Navy will employ both Flight III destroyers and the DDG(X) in a carrier strike group defense role.

The Navy classifies the LCS and the new *Constellation*-class frigate as small surface combatants (ships able to perform limited independent operations). Until the President's proposed FY 2023 budget, the Navy had planned to acquire 35 LCSs with 44 interchangeable mission modules: 10

anti-surface warfare modules, 10 anti-submarine warfare modules, and 24 counter-mine modules.[11] The frigate, on the other hand, will have greater at-sea endurance and be a multi-mission warship, and is expected to carry 32 VLS cells, up to 16 containerized naval strike missiles (NSM), and one helicopter.[12] Its sensors include a scaled down SPY-6 radar, also installed on *Arleigh Burke* destroyers, and a variable depth sonar system. Paired with an embarked helicopter, the ship can be a capable submarine hunter with limited air defenses.

Several revolutionary platforms will likely play an important role in the future surface fleet design: the large optionally manned surface vehicle (LUSV), the medium unmanned surface vehicle (MUSV), and the extra-large unmanned undersea vehicle (XLUUV). Together, these platforms provide the Navy with the potential to increase its at-sea firepower and sensor coverage rapidly with shorter fabrication times.

The LUSV is currently being envisioned as an auxiliary weapons carrier with up to 32 VLS cells capable of employing anti-air, strike, and anti-ship missiles. The MUSV concept is an electronic warfare and sensor platform to jam or decoy enemy sensors; it has limited weapons capacity. Lastly, the XLUUV is being developed to penetrate undetected enemy waters to monitor activity and to lay mines. Given this submersible's utility to pass targeting data to surface ships, it should inform the design of future surface warships as it relates to command and control as well as the ability to sustain these craft at sea.

Mission sets and design requirements for the LUSV, the MUSV, the XLUUV, and the frigate have not been finalized, offering an opportunity to ensure that together the Navy's surface forces are designed to meet pressing threats. Whatever the final design requirements, they will have a significant impact on future fleet operations. That said, it is important in this decade that these new platforms complement legacy platforms such as the *Arleigh Burke* destroyers, the *Ticonderoga* cruisers, and the LCS.

Lightning Bolts and Power Points—in Pursuit of Modern Command and Control

When it comes to how the Navy would fight a major war with China, one aspect has been consistent for the better part of the past 20 years: the need for a common operational picture and resilient communications. Countless Power Point briefings have been presented with graphics that any staff officer can attest to having seen at least half a dozen times: satellites, ships, aircraft, soldiers, tanks connected by nondescript lightning bolts. These

images are meant to convey a systems approach to warfare that relies on the connections between platforms. But investments have overwhelmingly been in the nodes—the platforms like ships and aircraft. As the Navy contemplates a family of unmanned platforms joining its fleet as part of its operational DMO concept, how these lightning bolts are actualized becomes vital. This is what the Navy's Project Overmatch contribution to the JADC2 must address.

On October 1, 2020, the Chief of Naval Operations (CNO), Admiral Michael Gilday, signed two memos establishing Project Overmatch. The goal was to achieve situational awareness and effective command and control over a geographically dispersed Naval force. In his two memos, the CNO directed that investments be made to deliver network architectures, unmanned capabilities, and data analytics to ensure that the Navy can operate and dominate in a contested environment.[13] The CNO also directed the Navy to leverage related Air Force efforts in JADC2—now an undertaking involving all the military branches. Remarkably, despite the significance of the effort, little information has been made public about Project Overmatch; what is known is that it involves three classified funding lines with initial deployment slated for 2023.[14] In unofficial venues, it has been hinted that the first platform to employ JADC2 capabilities will be an aircraft carrier. That said, public statements indicate that Project Overmatch's objective is to connect all platform data flows, analyze them for classification, and make predictive targeting recommendations. If successful, artificial intelligence paired with resilient communications and big data analytics can enable a key element of DMO: decision-centric warfare.

Decision-centric warfare aims to enable effective and faster decisions by operational commanders, while degrading the same of an adversary. While not publicly stated, Project Overmatch is likely also developing the ability to degrade an adversary's decision-making through traditional electronic warfare and cyber operations. To this end, the Defense Advanced Research Projects Agency (DARPA) has formulated an approach and tested it in a series of simulations and war games called Mosaic Warfare. What DARPA analysts have found is that disaggregated decision-making enabled by artificial intelligence can generate greater simultaneous operations at greater complexity than traditional command and control, greatly degrading an adversary's ability to orient its forces in response.[15]

Central to realizing greater simultaneous operations will be a commitment to mission command or the delegation of authority to act in accordance with general mission orders emphasizing ship-level initiative. This approach confounds rigid Russian and Chinese operational hierarchies,

while also mitigating attacks against U.S. networks—or, in Chinese operational terms, system destruction warfare.[16] However, to actualize Mosaic Warfare requires sensors, communications, data analytics, electronic warfare capacity, and training not yet present in the fleet.

With this reality in mind, the next generation of shipboard electronic warfare suites—called the Surface Electronic Warfare Improvement Program (SEWIP)—can provide needed development in some of these areas. SEWIP, it is hoped, will be able to provide the Navy's large warships with electronic jamming ability, and prevent detection and defeat enemy attacks.[17] Efforts are progressing to develop a "lite" version of SEWIP for the LCS and the frigate, and new Block III versions will include advanced electronic attack capabilities utilizing active electronically scanned arrays (AESA) technologies and artificial intelligence to more rapidly discern enemy signals to avoid detection or combat those signals.[18] But the Navy's fleet must be able to do more if it is to dominate the naval domain in conflict: It must execute information maneuver warfare. To do this, warships and their crews must be able to attack the enemy's cognitive decision cycle and entice him into actions that lead to his own loss.[19] This means employing capabilities that disrupt as well as condition an enemy's sensors and analytical systems—which is not the same thing as jamming or decoying.

In the future, the Navy's ships must be the nodes in the network as well as the lightning bolts connecting them. According to a recent Government Accountability Office study, however, the Navy's divided approach to unmanned platforms along subsurface, surface, and air units will not deliver the integrated inter-domain and inter-platform architecture required.[20] Left unaddressed, the Navy is at risk of developing unmanned platforms without the required digital architecture. That architecture must include decision support systems, dynamic network management, and interoperability tools to ensure that data in various formats can be integrated across different datalinks. Worse still, the Navy does not have a dedicated office that is responsible for developing this needed architecture since the 2018 disbanding of dedicated unmanned systems offices (the Navy's N99 unmanned systems office). The workaround to this lack of leadership was a congressionally mandated portfolio manager and the formalization of processes between the Office of Naval Research and Naval Sea Systems Command. The CNO's late 2021 formation of a task force dedicated to coordinating the Navy's unmanned systems efforts is helpful, but without centralized authority and budgets its effectiveness is doubtful.

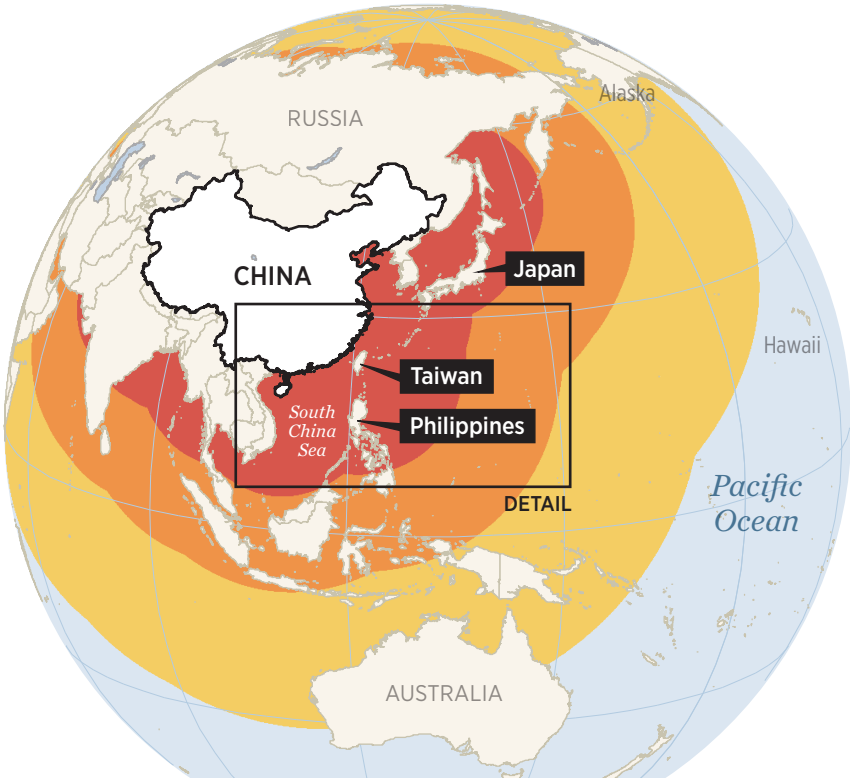
The goal is, in the CNO's words, to be able to "swarm the sea...every axis, and every domain."[21] The Navy's years-long commitment to actualizing its

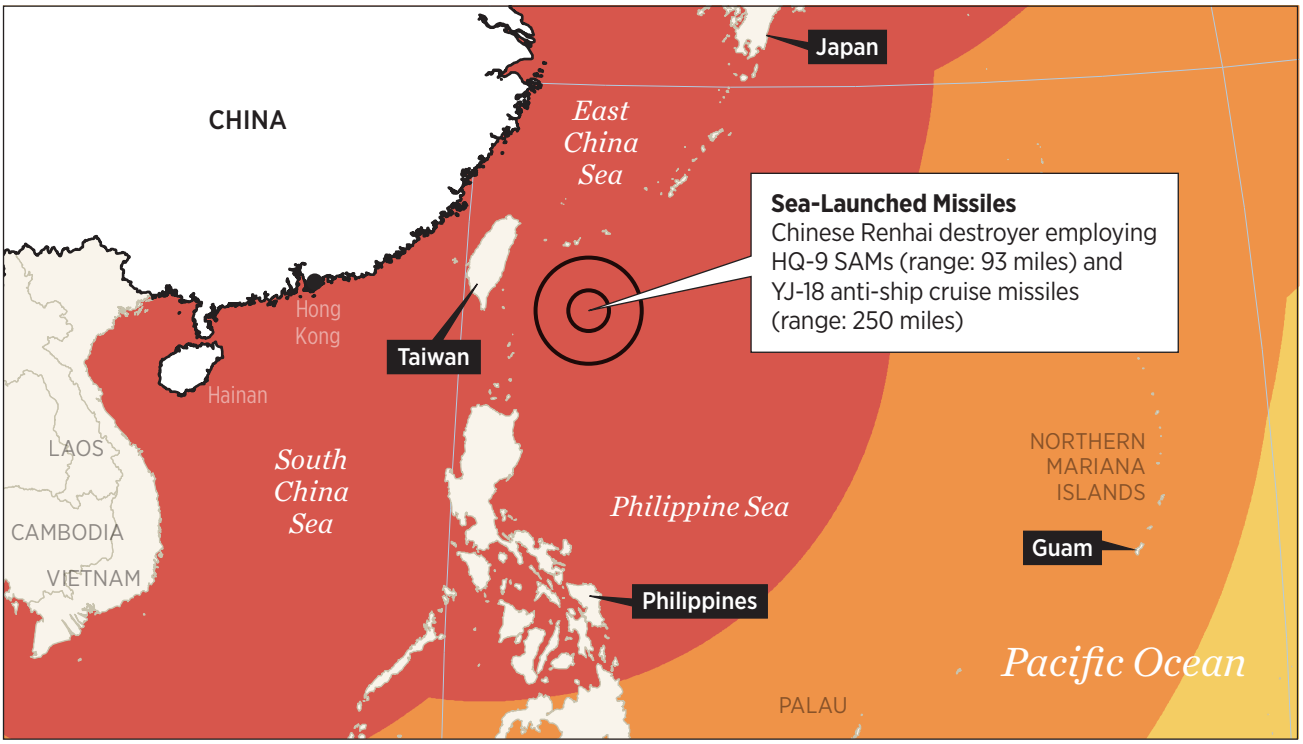
MAP 1

China's Formidable Yet Localized Missile Threat

China's missile arsenal includes intermediate-range ballistic missiles that can reach deep into the Pacific Ocean, but its sensor and weapons density is more intense closer to mainland China.

- **Short-Range Ballistic Missiles and Ground-Launched Cruise Missiles**
  - 350 launchers
  - Up to 1,500 km
- **Medium-Range Ballistic Missiles**
  - 250 launchers
  - Up to 3,000 km
- **Intermediate-Range Ballistic Missiles**
  - 200 launchers
  - Up to 5,500 km





SOURCE: Author's research.

FIGURE 1

Navy's Communication Challenge in Hostile Waters

As a surface action group approaches enemy territory, such as the Chinese mainland, it must constantly adapt its communications strategy to contend with enemy sensors and weapons.

PERMISSIVE COMMUNICATIONS

- Low risk of detection
- Low electronic interference of communications
- Limited enemy strike capacity

DESCRIPTION. A surface action group can operate with maximum dispersion, relying on satellite and long range communications. This dynamic is most appropriate during peacetime and outside the threat range of an enemy attack.

CONTESTED COMMUNICATIONS

- Moderate risk of detection
- Episodic electronic inference of communications
- Within weapons range, but enemy platforms may need to reposition and coordinate targeting for an attack

DESCRIPTION. A surface action group can rely less on long-range communications and must increase use of unmanned air and surface systems. This results in a tighter configuration, with some allowance for independent manned operations, and greater autonomy for unmanned platforms operating further than line-of-sight.

PERSISTENTLY CONTESTED AND THREATENED COMMUNICATIONS

- High risk of detection under maximum enemy sensor and weapons coverage
- Enemy platforms do not need to reposition or coordinate targeting for an attack
- Electronic interference is sustained and satellite communications are unreliable/unavailable

DESCRIPTION. A surface action group would minimize any non-line-of-sight communications to avoid detection. Minimizing communications means the group operates with high independence from shoreside headquarters, but intense local coordination critical for group defense as well as offensive operations.

SOURCE: Author's analysis.

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DMO concept and Project Overmatch are clear indications of a commitment to a future fleet capable of information maneuver warfare within a Mosaic Warfare framework that shapes fleet design.

Mission-Force-Package Platform Matching

An effective fleet will need to execute several key missions to defend itself while pressing the fight onto an enemy. Traditional missions according to the Navy's doctrine include air and missile defense, expeditionary operations, and information, strike, surface, and undersea warfare.[22] However, the CNO has made clear that, to compete in combat against the Chinese, the U.S. naval forces (including the Marine Corps and Coast Guard) must

be integrated across all domains.[23] Achieving this integration relies on the success of Project Overmatch and JADC2, as well as deploying ships with the necessary sensors and weapons. Expense, limited shipbuilding capacity, and operational risk due to too few large multi-mission warships carrying the Navy's workload have led many to call for more small combatants. Cross-domain integration enhances distribution of forces as part of the DMO concept, further mitigating the threat from China's long-range weapons, but requires the Navy to rethink how to balance missions across large and small combatants.

Information maneuver warfare enabled by systems underlying Mosaic Warfare rely on supplying crews with real-time target discrimination and predictive assessments of where to best place platforms to monitor and attack an enemy. Effective information maneuver warfare, likewise, requires massive amounts of data to ascertain patterns of behavior of maritime activity, while emphasizing information collection as a mission in and of itself. A data-hungry fleet will need persistent screening of a wide maritime area to build the databases that enable AI systems to discern patterns of maritime activity and make useful command recommendations to human commanders. This reliance on sensed data and its secure sharing adds to the urgency for the Navy bolster its cyber and electronic warfare competencies.

The Navy is making commitments in shipbuilding that are shaping how its surface fleet will operate in the future; notably cancelation of LCS production. Additionally, Naval aviation plays a key role in long-range strike, anti-submarine warfare, and air defense of Naval forces, but given the Chinese and Russian long-range air defenses, the surface fleet will play a larger role in the strike mission. Advanced enemy air defense (such as the Russian S-400 or China's HQ-9) and anti-ship ballistic missile systems (such as China's DF-21D and DF-26) are necessitating the Navy to field strike missiles with greater range. In turn, missiles need to be larger in order to have the required range, making them heavy and very large, which makes them most suitable for ship launch. The need to carry these larger missiles will in turn be a critical design consideration for future classes of warships. The Navy must also consider the following key mission areas:

Air Defense and Missile Defense. The *Ticonderoga*-class cruiser was designed for air defense and missile defense and today protects the Navy's aircraft carriers. As these ships age out, the cruisers will initially be replaced by the Flight III *Arleigh Burke*–class destroyers. The air and missile defense mission has expanded to include regional missile defense, especially against North Korean and Iranian ballistic missile attacks that have necessitated a

persistent ballistic-missile-defense (BMD)–capable cruiser and destroyer presence in the Mediterranean Ocean, the Sea of Japan, and waters around Guam. The platforms that are expected to execute this mission are the *Ticonderoga*-class cruisers, *Arleigh Burke*–class Flight III destroyers, and the DDG(X).

Undersea Warfare. Three elements make for an effective anti-submarine surface ship: (1) variable-depth towed sensors, (2) the ability to embark anti-submarine helicopters, and (3) hull-mounted sensors and processors such as the SQR-15 and SQQ-89.[24] Having all three elements in one ship is good, but not critical, as long as a dispersed action group retains the ability to rapidly place a weapon on a hostile submarine target. Attacking a hostile submarine necessitates either having platforms with anti-submarine weapons dispersed near possible submarine detections, or development of longer-range VLS-launched anti-submarine rockets. To take advantage of the widest sensor coverage, which can also enable rapid localization of a submarine threat, *Arleigh Burke* destroyers, future *Constellation* frigates, and undersea-sensor-equipped MUSVs should operate together. Incorporating MUSVs, and potentially unmanned helicopters like Fire Scout,[25] in distant (more than 50 miles) submarine searches would provide early detection and allow attack before a hostile submarine can get within effective weapon's range. Coordinating these types of screening operations will require adequate unmanned system command, control, and support crews onboard nearby frigates and destroyers.

Meanwhile, the Navy is looking to prematurely decommission up to 10 LCSs due to the class's unsatisfactory performance and unsuitability for a high-end war with China.[26] In concert with this decision, the Navy announced it is discontinuing development of the LCS anti-submarine mission modules in favor of developing anti-submarine capabilities in the *Constellation*-class frigate.[27] After 15 years of LCS anti-submarine module development, the Navy is betting that without a bow-mounted sonar, a reliance on towed sensors for submarine detection in the new frigate will be successful. The platforms that are expected to execute this mission are the *Arleigh Burke*–class destroyers, the *Constellation*-class frigate, and MUSVs.

Strike Warfare. As the cruiser fleet shrinks, the remainder will be constrained to air defense roles for aircraft carriers, leaving *Arleigh Burke* and *Zumwalt* destroyers to meet long-range strike mission needs—to include attacks against naval vessels as well as land targets. In the near term, the *Zumwalt* is the only surface ship planned to employ hypersonic long-range weapons, a system still in development.[28] At the same time, the four *Ohio*-class guided missile submarines (SSGNs) with their capacity for over 154

cruise missiles will all retire by 2027. The Pacific Fleet commander recently began a review of further life extensions of at least some of the *Ohio*-class submarines.[29] Analysts at the Center for Strategic and Budgetary Assessments have noted that, to mitigate this significant loss of strike firepower, LUSVs could serve as launch platforms for strike weapons.[30] While the new frigate will offer some strike capacity when the first ship is delivered in FY 2026, with 32 VLS cells and the numbers of ships planned, it is not an adequate replacement for the loss of SSGNs and cruisers. The platforms that are expected to execute this mission are the *Zumwalt*-class and *Arleigh Burke*–class destroyers, and LUSVs.

Information Warfare. The technical demands of DMO require that systems supporting Mosaic Warfare be installed across all future platforms. However, power and space limitations will constrain the role of smaller ships in this future network architecture. Likewise, these constraints will drive the need to center a group of warships around those with the capacity for local command and control, moving away from a reliance on satellite communications and moving operational control from distant shore-based headquarters to afloat flagships. Additionally, the Navy will need to meet a new mission—managing massive amounts of data and historical databases, which will require the fleet to include ships designed to sense, aggregate, analyze, and transfer learning to unmanned systems.[31]

While, ideally, all the Navy's surface warships would be capable of performing this mission, there will be varying degrees of capability across different classes of ship. Given this varying capability and the need to operate manned and unmanned platforms with degraded communications, there will be increased need for nearby command ships acting as mobile at-sea centers for data fusion, sharing of machine learning, and operational control at the numbered fleet level, such as the Seventh Fleet. Feeding these databases will require broad-area and persistent-maritime domain sensing. Aircraft carriers would be expected to play this role for ships in its associated strike group, but more distributed surface operations will require additional command nodes in addition to the aircraft carrier. While all manned warships would have to execute limited command and control over nearby unmanned platforms, larger surface action groups would require greater communications capacity over a larger area—so a theater or regional command ship with associated staff, communications equipment, and targeting processing capacity is called for. A repurposed *San Antonio*–class amphibious warship would be a good candidate for a command ship. This class has the space and power generation to host limited strike capacity, berthing, sensors, and communications to act as a command cruiser (CGC).

Production and Manning Considerations

When it comes to fleet design, typically the pace at which classes of warships can be built is not considered. However, in the naval competition with China, the ability to pace its shipbuilding both in peacetime and while at war must animate the Navy's decision about the balance of surface ships built. Here, two elements are paramount: (1) diversifying production shipyards, and (2) procuring more platforms that can be built in months, not years. Addressing these two elements requires that missions be spread across platforms to ensure a by-hull cost, and that complexity and size do not overly constrain the capacity to build ships in large numbers. The complex designs and systems installed on a warship require exquisite skills and materials, including suppliers for microelectronics, steel mills for metal plating, casting of specialized machinery parts, and design of complex control systems. Moreover, highly complex nuclear submarines and exquisite fabrication techniques impose significant constraints on how fast production can be increased or diversified. With this in mind, the Navy should:

- **Accelerate the designation of a second shipyard so that additional frigate construction can be done there by the time the lead ship is delivered to the Navy.** This acceleration would also allow time for lessons from the lead ship's first deployment to be fed back to inform production as this second shipyard begins operations. The second-shipyard approach would increase the numbers of frigates commissioned annually while allowing modest design modifications based on at-sea experience. Additionally, as *Arleigh Burke* Flight III construction continues apace with the advent of a future DDG(X), the Navy should support shipyard expansion or new yards. Doing so can mitigate drawing resources away from work on destroyers to allow building a modified *San Antonio* outfitted as a command ship with some strike capacity (a CGC).

- **Seek new entrants into the Naval shipbuilding industry, focused on smaller vessels with less complex hull and propulsion systems.** There is an opportunity to do so with MUSV and LUSV production, where lower-risk hull and traditional propulsion fabrication could be done at new shipyards. More complex automated control systems and weapons fabricated by shipyards or factories familiar with these systems would then b**e** transported to these new shipyards

for installation. This approach is intended to increase the speed and volume of production while preventing competition for scarce shipyard resources where large manned vessels are being built.

- **Diversify production to increase industrial resilience and access to larger skilled workforce.** Shipbuilders have struggled to expand their workforce and have been recruiting further and further from their shipyards.[32] Rather than continuing this trend, the Navy can seek out new shipyards in areas where it has had success in recruiting, and where new hires with key technical skills want to work. Such an approach could complement efforts to achieve fleet-wide flexibility in meeting sustainment needs by giving the Navy more options for preplanned product improvement (P3I).

  This shipyard expansion comes at a cost. For example, replicating the Fincantieri Marine Group's shipyard equipment and infrastructure used in building the *Constellation*-class frigate in Wisconsin would cost more than $700 million. While this cost should not be borne by taxpayers, broadening the nation's shipbuilding capacity has become a national security interest due to China's rapidly expanding navy and maritime industrial capacity. New approaches and policies are urgently needed to encourage new entrants to this sector and current shipbuilders to expand capacity.

- **Develop, incrementally, new systems on ships that are already in serial production, in order to "de-risk" future designs—in particular the DDG(X).** Fleet experimentation, such as the Pacific Fleet–led Unmanned Systems Integrated Battle Problem and establishment of unmanned platform Task Force 59 in the Fifth Fleet, can also provide valuable operational lessons to inform ship design. Additionally, inviting private commercial industry into typically highly classified campaign analysis may lead to better appreciation by the Navy and operational planners of industrial limitations of wartime shipbuilding.

  One way of de-risking development of the DDG(X) is by continuing production of the *San Antonio*–class amphibious warships while incorporating the proposed DDG(X) propulsion system based on the *Zumwalt*-class destroyer. This could give a CGC variant added speed, up to 28 knots, which is more suitable for offensive naval operations

than slower amphibious warfare ships. The CGC or other variants of the *San Antonio*–class amphibious warship could, in time, incorporate the Aegis radar intended for *Arleigh Burke* Flight III and include the same hypersonic systems being designed for the *Zumwalt*-class destroyer. (The original design of the *San Antonio*–class amphibious warship allowed the inclusion of the Aegis radar and VLS. Using the larger and excess space of a repurposed *San Antonio*–class ship could also enable development of a capability for VLS reload of LUSV at sea—a critical capability if the Navy employs LUSV in a strike role.)

- **Develop a large cadre of experienced sailors and officers to man the future fleet, especially one that may have to rapidly expand in number of ships.** Decommissioning ships too quickly removes platforms that are vital for developing the limited human capital the Navy has and will rely on in a future war. New incentives and creative approaches to recruiting and retaining officers and sailors are needed.[33] Decommissioning ships early as a means to more fully man remaining ships is not a way to achieve the fleet needed to confront the very real and pressing threat from China.

  At the same time, the further erosion of the Navy's aggregate firepower must be halted in the near term. The most recent (April 2022) long-range shipbuilding plan includes a tremendous drop in the fleet's firepower: a 17 percent reduction by 2027.[34] The Navy should reverse this decision to massively cut its firepower. Instead, the decommissioning of any future warship must be conditioned on the delivery of new warship firepower matching or exceeding that which would be lost**.** The track record so far is not reassuring, as the Navy, with Congress's help, has underdelivered by an average of 10 warships a year according to plans from 2016 to 2021.[35] If the Navy and Congress can reverse decades of downward shipbuilding trends, it may be possible to regain balance in the fleet by ensuring that the Navy is sustaining its already limited firepower while continuing investments to expand the fleet and the number of its future sailors and officers.

Recommendations for Congress and the Navy

The Navy is facing a severe capacity strain at the same time that China is rapidly pulling ahead in its capacity to wage war while increasing its lethality with new and capable modern weapons. Confronting this challenge will

require urgent action in this decade to ensure that the Navy and the nation are ready for a long war with China.

Congress should:

- **Require the Department of Defense to conduct a national review and recommend locations for potential new shipyards (public and private).** These recommendations would inform future plans to restore needed national shipbuilding capacity. The goal would be to ensure that the Navy is able to expand its fleet during a prolonged war with China. This restoration of shipbuilding capacity would be in addition to the Shipyard Infrastructure Optimization Program that is limited to modernization of the existing four government-owned and -operated shipyards for maintenance on nuclear-powered warships.

The Secretary of the Navy should:

- **Incorporate an integrated approach into the long-range shipbuilding plan, as well as associated military and civilian manpower needs, that sustains the fleet's aggregate firepower.** Long-range plans that the Navy submits to Congress in the future should include a way to expand and sustain the fleet's firepower and manpower capacity through 2030. Likewise, the decision to prematurely retire LCSs with decades of life left should be reconsidered, especially as the Navy needs to find ways to mitigate operational demands on a smaller fleet. While these ships have limited utility in a war with China, this does not diminish their capacity as platforms to develop sailors and officers needed in the day-to-day competition with China, let alone to man new warships this decade. Until the Navy builds replacements for the LCS, the Navy should employ them in regions where high-end conflict is less likely to occur.

- **Propose a plan to de-risk development of the next generation destroyer DDG(X).** The plan should include options to install propulsion, communications, and advanced weapons systems on a modified *San Antonio*–class amphibious warship.

- **Expand unmanned-fleet-platform experimentation to all numbered fleets and invite industry to participate** in campaign analysis to accelerate learning and evolutionary design improvements. To ensure that operational and design lessons are being implemented

fleet wide in a manner coherent with Defense Department-wide efforts, the Navy should consider re-establishment of an unmanned directorate at Navy headquarters in the Pentagon.

Conclusion

The number of ships matters and drives shipyard capital investments and development of the officers and sailors to crew them. However, what is as important as numbers, given the nature of DMO and Mosaic Warfare, is that all ships of the fleet must be integrated into a comprehensive operational fleet design. Given the nature of the Chinese threat, this integration will mean that the United States must develop the capacity to build, sustain, and recapitalize losses of a larger fleet needed to deter and fight a long war with China. Doing so requires new designs allowing ships to be built in multiple shipyards and at faster rates, without jeopardizing the viability of existing shipyards that are producing major combatants, such as nuclear submarines and aircraft carriers. Getting the balance of mission, capability, and production times right will be critical in this shipbuilding race with China.

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Endnotes

1. The Heritage Foundation, "Budget Blueprint for Fiscal Year 2022," 2022, https://www.heritage.org/budget/index.html.
2. Sam LaGrone, "Navy Unveils Next-Generation DDG(X) Warship Concept with Hypersonic Missiles, Lasers," *USNI News*, January 12, 2022, https://news.usni.org/2022/01/12/navy-unveils-next-generation-ddgx-warship-concept-with-hypersonic-missiles-lasers (accessed April 8, 2022).
3. U.S. Navy Office of Information, "Resources–Fact Files: Littoral Combat Ship Class–LCS," February 9, 2022, https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2171607/littoral-combat-ship-class-lcs/source/littoral-combat-ship-class-lcs/#:~:text=Current%20Ship%20Status&text=A%20total%20of%2035%20LCS,year%20programmed%20for%20LCS%20seaframes (accessed June 6, 2022).
4. Norman Friedman, *U.S. Destroyers* (Annapolis: Naval Institute Press, 2004), pp. 425–427.
5. Naval Vessel Register, "Ship Class: CG 47, Guided Missile Cruiser," https://www.nvr.navy.mil/NVRSHIPS/HULL_SHIP_CG_47_2_1.HTML (accessed March 21, 2022).
6. Megan Eckstein, "Navy 'Struggling' to Modernize Aging Cruiser Fleet as Tight Budgets Push Pentagon to Shed Legacy Platforms," *USNI News*, April 5, 2021, https://news.usni.org/2021/04/05/navy-struggling-to-modernize-aging-cruiser-fleet-as-tight-budgets-push-pentagon-to-shed-legacy-platforms (accessed March 21, 2022).
7. Early studies pointed to one potential future where the *Zumwalt*-class could evolve into a CG(X) role; this of course did not materialize, and the class ended.
8. Sam LaGrone, "Latest Zumwalt Hypersonic Missile Installation Plan Calls For Removing Gun Mounts," *USNI News*, March 16, 2022, https://news.usni.org/2022/03/16/latest-zumwalt-hypersonic-missile-installation-plan-calls-for-removing-gun-mounts (accessed March 21, 2022).
9. Ronald O'Rourke, "Navy DDG(X) Next-Generation Destroyer Program: Background and Issues for Congress," Congressional Research Service, March 2, 2022, https://crsreports.congress.gov/product/pdf/IF/IF11679 (accessed March 21, 2022).
10. Commander Naval Sea Systems Command, "PEO Ships: DDG(X)," updated August 2021, https://www.navsea.navy.mil/Home/Team-Ships/PEO-Ships/DDG-X/ (accessed May 22, 2022).
11. Ronald O'Rourke, "Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress," Congressional Research Service, December 17, 2019, p. 5, https://crsreports.congress.gov/product/pdf/RL/RL33741/257 (accessed March 22, 2022).
12. Kevin Smith, "Guided Missile Frigate (FFG 62) Update National Symposium—Surface Navy Association," Naval Sea Systems Command, January 2021, https://www.navsea.navy.mil/Portals/103/Images/Exhibits/SNA2021/SNA2021GuidedMissileFrigate-FFG62Update.pdf (accessed March 22, 2022).
13. Megan Eckstein, "Navy Focused on Strengthening Networks to Support Unmanned Operations," *USNI News*, October 27, 2020, https://news.usni.org/2020/10/27/navy-focused-on-strengthening-networks-to-support-unmanned-operations (accessed June 6, 2022).
14. Megan Eckstein, "Navy Remains Mum on Project Overmatch Details So China Won't Steal Them," *Defense News*, February 25, 2022, https://www.defensenews.com/naval/2022/02/25/navy-remains-mum-on-project-overmatch-details-so-china-wont-steal-them/ (accessed April 8, 2022).
15. Bryan Clark, Dan Patt, and Harrison Schramm, "Mosaic Warfare: Exploiting Artificial Intelligence and Autonomous Systems to Implement Decision-Centric Operations," Center for Strategic and Budgetary Assessments, 2020, pp. IX, 23–25, and 48–55, https://csbaonline.org/uploads/documents/Mosaic_Warfare_Web.pdf (accessed April 8, 2022).
16. Jeffrey Engstrom, "System Confrontation and System Destruction Warfare," RAND, 2018, pp. 15–22, https://www.rand.org/pubs/research_reports/RR1708.html (accessed April 8, 2022).
17. Jason Hall and Jesse Mink, "SEWIP / AN/SLQ-32(V) Electronic Warfare System Overview and Program Status," Naval Sea Systems Command, January 13, 2022, https://www.navsea.navy.mil/Portals/103/Documents/Exhibits/SNA2022/SNA2022-CAPTJasonHall-SEWIP.pdf (accessed April 8, 2022).
18. Brett Tingley and Tyler Rogoway, "Navy's New Shipboard Electronic Warfare System Is Being Shrunk Down for Smaller Ships," The Drive, January 15, 2022, https://www.thedrive.com/the-war-zone/43824/navys-new-shipboard-electronic-warfare-system-is-being-shrunk-down-for-smaller-ships (accessed April 8, 2022).
19. Brian Kerg and Gary Lehmann, "The Information Environment Is Primed for Maneuver Warfare," USNI *Proceedings*, Vol. 148, No. 2 (February 2022), https://www.usni.org/magazines/proceedings/2022/february/information-environment-primed-maneuver-warfare (accessed April 13, 2022).
20. Shelby S. Oakley, "Uncrewed Maritime Systems: Navy Should Improve Its Approach to Maximize Early Investments," U.S. Government Accountability Office, April 2022, pp. 18–24, https://s3.documentcloud.org/documents/21580882/gao-22-104567.pdf (accessed April 14, 2022).
21. Chief of Naval Operations Admiral Mike Gilday to Rear Admiral Douglas W. Small, U.S. Department of the Navy, Memorandum on Project Overmatch, October 1, 2020, https://www.documentcloud.org/documents/7276835-Project-Overmatch-Memos (accessed April 14, 2022).
22. David Berger, Michael Gilday, and Karl Shultz, *Naval Warfare*, Naval Doctrine Publication 1, April 2020, pp. 33–35, https://cimsec.org/wp-content/uploads/2020/08/NDP1_April2020.pdf (accessed April 27, 2022).
23. U.S. Navy Chief of Naval Operations, "CNO NAVPLAN 2021," January 2021, pp. 2 and 3, https://media.defense.gov/2021/Jan/11/2002562551/-1/-1/1/CNO%20NAVPLAN%202021%20-%20FINAL.PDF (accessed April 27, 2022).

24. Friedman, *U.S. Destroyers*, pp. 307–313 and 344.
25. The Navy has developed two variants of the unmanned helicopter Fire Scout—the MQ-8B and larger MQ-8C—and began deploying the MQ-8C on warships in January 2022. See Northrop Grumman, "Fire Scout," https://www.northropgrumman.com/what-we-do/air/fire-scout/ (accessed April 27, 2022).
26. Lee Hudson, Paul McLeary, and Connor O'Brien, "Navy Revives Push to Scrap LCS Hulls in Upcoming Budget," *Politico*, March 17, 2022, https://subscriber.politicopro.com/article/2022/03/navy-revives-push-to-scrap-lcs-hulls-in-upcoming-budget-00018185?source=email (accessed March 17, 2022).
27. Michael Fabey, "Pentagon Budget 2023: US Navy Looks to Cut LCS ASW Module, Decommission 9 Freedom-Class Ships," *Janes*, March 29, 2022, https://www.janes.com/defence-news/news-detail/pentagon-budget-2023-us-navy-looks-to-cut-lcs-asw-module-decommission-9-freedom-class-ships (accessed April 8, 2022).
28. LaGrone, "Latest Zumwalt Hypersonic Missile Installation Plan Calls for Removing Gun Mounts."
29. The fifth modification to the *Virginia*-class nuclear attack submarine will include a so-called Virginia Payload Module (VPM) that can carry cruise missiles and, in the future, hypersonic weapons. The first of these new submarines is not due to enter the fleet until the mid to late 2020s, and will not match the loss in firepower when the SSGNs decommission. See Ronald O'Rourke, "Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress," Congressional Research Service, April 28, 2022, p. 10, https://sgp.fas.org/crs/weapons/RL32418.pdf (accessed May 16, 2022), and Emma Helfrich, "Navy Eyeing Life Extension of Nine Ohio Class Submarines," The Warzone, May 18, 2022, https://www.thedrive.com/the-war-zone/navy-eyeing-life-extension-of-nine-ohio-class-submarines (accessed May 24, 2022).
30. Bryan Clark and Timothy A. Walton, "Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare," Center for Strategic and Budgetary Assessments, December 31, 2019, pp. 65–68, https://csbaonline.org/research/publications/taking-back-the-seas-transforming-the-u.s-surface-fleet-for-decision-centric-warfare/publication/1 (accessed June 9, 2022).
31. U.S. Navy, "Department of the Navy Unmanned Campaign Framework," March 16, 2021, pp. 17 and 22, https://www.navy.mil/Portals/1/Strategic/20210315%20Unmanned%20Campaign_Final_LowRes.pdf?ver=LtCZ-BPlWki6vCBTdgtDMA%3D%3D (accessed May 11, 2022), and Joan Johnson and Lorin Selby, "Science & Technology Strategy for Intelligent Autonomous Systems," U.S. Navy, July 2, 2021, pp. 8 and 17, https://s3.documentcloud.org/documents/21019491/2021-dist-a-don-st-strategy-for-intelligent-autonomous-systems-2-jul-2021.pdf (accessed May 11, 2022).
32. Ronald O'Rourke, "Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress," Congressional Research Service, April 27, 2022, pp. 27–35, https://sgp.fas.org/crs/weapons/RL32665.pdf (accessed May 11, 2022).
33. Heather Mongilio, "Navy Predicts Challenging Future Recruiting Environment, On Target to Hit Retention Goals," *USNI News*, May 16, 2022, https://news.usni.org/2022/05/16/navy-predicts-challenging-future-recruiting-environment-on-target-to-hit-retention-goals (accessed May 22, 2022).
34. Elaine Luria, "Rightsizing the Fleet: Why the Navy's New Shipbuilding Plan Is Not Enough," Center for International Maritime Security, May 2, 2022, https://cimsec.org/rightsizing-the-fleet-why-the-navys-new-shipbuilding-plan-is-not-enough/ (accessed May 11, 2022), and U.S. Navy, "Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2023," April 2022, https://s3.documentcloud.org/documents/21660365/fy2023-pb23-shipbuilding-plan-18-apr-2022-final.pdf (accessed May 11, 2022).
35. Matthew Hipple, "20 Years of Naval Trends Guarantee a FY23 Shipbuilding Plan Failure," Center for International Maritime Security, May 9, 2022, https://cimsec.org/20-years-of-naval-trends-guarantee-a-fy23-shipbuilding-plan-failure/ (accessed May 11, 2022).