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Navy's Next Destroyer Is Vital as U.S.–China Tensions Escalate

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KEY TAKEAWAYS

The Navy needs a DDG(X) this decade, and the shipbuilding industry is already pressed to meet existing demands.

If Congress and the Navy can agree to it, significant investments today can grow shipyard capacities and workforce while delivering the ships needed.

China will not wait. The Navy should not be forced to be penny-wise and ton-nage-dumb in its approach to DDG(X).

The Navy's next destroyer—the DDG(X)—will need to deliver this decade. Already there are indications that the Navy will delay the program over concerns of costs and misguided assumptions of limited shipyard capacity that threaten to delay the first ship in class until sometime next decade. Waiting until the 2030s for the DDG(X) incurs unacceptable risk for the United States due to the rapid aging of the current fleet and the trajectory of Chinese shipbuilding.[1] The Pentagon needs an invigorated focus on approving the design and should act prudently and quickly to accelerate delivery of an overdue new large surface warship.

Acting on this need will require the DDG(X) to fulfill the air and missile defense missions to protect carrier strike groups, conduct long-range missile-strike missions, and hunt hostile submarines.

The needed capabilities are extant today; only a new hull-form is required. A novel collaborative acquisition strategy, Navy-led ship design, and systems integration and industry approach can better ensure a more seamless progression from design to fabrication—with better odds of delivery at cost and on time.

Background on the Navy's Large Surface Combat Program

The Navy has struggled to replace its warhorse of the large surface combatants, the *Arleigh Burke*–class guided-missile destroyer. This destroyer has proven to be one of the Navy's most successful classes of warship, with capacity for modification to meet evolving missions.[2] Since the first ship's keel was laid in 1988, the class has been through four iterations, referred to as Flight I, Flight II, Flight IIA, and Flight III. For cost-cutting purposes—later viewed a mistake by many naval experts—the first iterations did not have hangars to sustain helicopter operations at sea. Later, Flights IIA and onward were designed with a hangar and capacity to sustain two anti-submarine-capable helicopters.

In a war with China, the Navy's destroyers would defend groups of naval vessels from air, missile, and submarine threats. However, without more capable long-range and survivable strike missiles, the ship's strike mission is limited. The more survivable Tomahawk Block V is helping, but as Chinese defenses improve, more advanced hypersonic missiles will be needed. However, the ones in development are not compatible with the *Arleigh Burke*.[3] Having walked away from a cruiser replacement—the CG(X)—that was studied 15 years ago, the Navy today is also struggling to replace the Cold War–era *Ticonderoga*-class cruisers. The *Arleigh Burke* destroyers are at the end of the line, as future upgrades would be cost prohibitive.[4] To meet fleet sizing goals relative to global threats, the Navy will need to sustain procurement of two or more destroyers a year while modernizing older ships and extending their service lives by five to 40 years.[5]

The Fallacy of Tonnage and Cost

Too often the tonnage of a warship is used to estimate the overall costs. This thinking drives an aversion by some in the Department of Defense to pursue larger, higher cost ships, even though modern destroyers are larger and more expensive than the legacy *Ticonderoga*-class cruiser. Blindly adhering to a tonnage requirement can actually drive up a program's lifetime costs.[6] A smarter approach is to build capacity to add system upgrades

and allow for ease of future component installation and maintenance. The reality is that installed systems drive about half of a warship's cost.[7] South Korean and Japanese warship builders have validated this approach in their respective *Sejong*-class and *Kongo*-class warships. Today's *Arleigh Burke* destroyer design is over 40 years old, and while it was designed for growth, that space has since been used up by modern weapons, sensors, and expanded power supply. A new ship is unavoidable.[8] That said, size constraints are important when considering a new warship's ability to access canals and drydocks for future maintenance.

Existing Power and Propulsion Systems Need a Reconfiguration

Critical for any modern warship is its capacity to generate electrical power for its many systems and—thanks to electric drive technology—propulsion. Electric drive offers a simple engineering approach to electrical power and propulsion with additional savings in fuel efficiencies. The Navy has a hundred-year history with electric drives, which allows gas turbines generating electricity to also propel warships without costly, large, and heavy reduction gears; it was technology used in several War World II warships and all submarines of the time.[9] The Navy in recent years has tested these systems on the destroyer *Truxton* and the integrated power system of the *Zumwalt*. *Truxton*, an *Arleigh Burke*–class destroyer, was a testbed for a limited electric drive system called Hybrid Electric Drive focused on fuel efficiencies, leading to development of Propulsion Derived Ship Service (PDSS).[10] On *Zumwalt* the Navy has almost a decade of experience with an electric drive system called the integrated propulsion system (IPS), which in 2012 completed land-based initial integration and compatibility testing with operational testing to continue through fiscal year 2024.[11] While it is not a simple transplant from these ships to a DDG(X), the experience in the design of IPS and PDSS will benefit what will be for DDG(X) an evolutionary-vice-revolutionary ship design.

Mission-Led Requirements for Systems Installation

On January 11, 2023, the Navy's Director for Surface Warfare, Rear Admiral Fred Pyle, announced, "I think we have a good sight picture of the DDG(X) top level requirements. They have been endorsed." The admiral went on to detail the systems being considered: a scaleable SPY-6 radar, a directed-energy system HELIOS,[12] and a hypersonic missile known as conventional

prompt strike (CPS).[13] Not mentioned was the ship's anticipated submarine-hunting capabilities, though some early reporting indicates that the ship would have at least a towed array to detect submarines.

For decades the *Ticonderoga*-class cruisers have provided the necessary air and missile defense for the Navy's carrier-strike groups. To replace these cruisers, the DDG(X) will need the same or better air and missile defense capabilities. The latest version of the *Arleigh Burke*–class destroyers currently being built (Flight III) are envisioned as only a partial replacement to the cruisers.[14] In a move that minimizes risk, the DDG(X) is currently envisioned to employ existing air and missile defense missiles as well as a radar and fire control system on Flight III *Arleigh Burke*–class destroyers.

To conduct long-range strike missions, the DDG(X) is being designed to carry CPS hypersonic missiles in larger vertical launch cells. CPS is a hypersonic boost glide missile able to travel long ranges in shorter time with high survivability against modern enemy defenses. Currently, the Navy is developing CPS systems for *Virginia*-class Block V submarines in a payload module inserted into existing hull-form for delivery in 2028 and a new vertical launch system to be installed on the *Zumwalt*-class destroyer in 2025.[15] The expectation is that CPS will have matured as a weapons system, reducing risk of its installation on the DDG(X). The Navy is considering inserting a payload module (akin to the *Virginia* submarine payload module) into DDG(X) should CPS development be delayed—and as a cost savings for initial hulls.[16] However, because the long-term intent remains that DDG(X) have a long-range strike capability, it would be wiser to include this payload module up front and install systems later. This would come at added cost of extra steel and lead ballast for ship stability considerations, but doing so avoids more costly and limited drydock time for future modifications.

Unmentioned by the Navy is an organic anti-submarine warfare capability for DDG(X).[17] Logically, as a replacement for cruisers, DDG(X) would require an anti-submarine capability. This would likely require a minimum capacity to employ two helicopters and have towed and hull-mounted sonar arrays. The inclusion of both bow and towed arrays would prevent a submarine from evading detection, as they would operate across a thermocline layer without relying on other ships or aircraft. Moreover, this sonar arrangement would allow other ships and aircraft to conduct broader anti-submarine operations—and given that China has over 70 submarines, this is prudent.[18] Additionally, given the utility of modern unmanned platforms, DDG(X) should be able to support a variety of unmanned craft (e.g., air, surface, and sub-surface).

TABLE 1

DDG(X) Evolutionary (Not Revolutionary) Design Minimizes Shipbuilding Risk

The U.S. Navy's next-generation destroyer, DDG(X), will have a new hull form, but its systems are borrowed from other ships that are in service or soon will be.

ORIGINATING WARSHIP AND SYSTEM	SYSTEM CATEGORY: Propulsion/ Electrical Power	Anti-Submarine Warfare	Air and Missile Defense	Long-Range Strike	Ship Defenses
***Arleigh Burke* Flight IIA/III**					
Gas Turbine Electrical Generator (LM2500)	✓				
SPY-6/Baseline-10 radar and fire control systems			✓		
Vertical Launch System (mk41) 96 cells					
Standard missile series (SM-2, 3, 6)			✓		
Anti-submarine rocket (ASROC)		✓			
Tomahawk cruise missiles				✓	
Hangar/Support (2) SH-60R helicopters		✓			
Sonar: hull and towed arrays (AN/SQQ-89)		✓			
Electronic Warfare Defenses (SEWIP BLK 3)					✓
High Energy Laser point defense (HELIOS/HEL)					✓
Zumwalt					
Propulsion/Electrical Power (IPS)	✓				
Hypersonic Long-Range Strike (CPS)				✓	
***Virginia* Block 5**					
Virginia Payload Module Hypersonic Long-Range Strike (CPS)				✓	

SOURCE: Author's research.

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Industry's Constraints Need to Be Integrated into the Navy's Plan

In the early 2000s, cost constraints and urgency for delivery of the *Virginia*-class submarine forced the Navy to reconsider fabrication processes and reduce complexities in a Navy-Industry Collaborative Design Team, also called an integrated product team (IPT).[19] While industrial concerns did not dictate operational ship requirements, the IPT was able to simplify fabrication in the detailed design work.[20]

Given demands on shipyards today and the need for on-time/on-cost delivery of warships, detailed designing of DDG(X) should also employ such IPTs. Such an approach can enable better consideration of shipyard workload, capabilities, and constraints before shipyard workers begin

cutting steel and shops manufacture systems for DDG(X). This is important, because since 1985, only two shipyards have built the Navy's large combatant ships or destroyers: Huntington Ingalls in Pascagoula, Mississippi, and Bath Iron Works in Bath, Maine.[21]

The nation needs DDG(X) to be a 90-year destroyer design like the *Arleigh Burke* before it. This will require allowances in size and power generation for future variants without slowing shipyard production. Secretary of the Navy Carlos Del Toro echoed this intent at a February 2023 speech before the American Society of Naval Engineers: "Naval architects and naval engineers in 1983 had their eyes on present-day challenges, but, critically, they also had a vision for the future.... We need tomorrow's DDG(X) to be just as successful."[22] The key, as shown above, is setting workable requirements that shipyards can deliver on within reasonable cost constraints while giving the Navy a viable warship when needed.

Recommendations

The Navy's top shipbuilding officer, Vice Admiral Bill Galinis, has made clear in public statements that an increasingly adventurous China has made delivering warships more urgent.[23] This means:

1. The chief of naval operations should set the DDG(X)'s delivery date of the first in class by 2029 with air and missile defense, long-range strike, and anti-submarine capabilities. Additionally, as the Navy advances an at-sea vertical launch system weapons reload capability, this allowance should be included in the DDG(X)'s design. Lastly, a hull extension option should be taken in initial builds. This is an aggressive timeline as preliminary design has not begun, but the urgency of the threat warrants it. That said, as DDG(X) progresses the Navy should also consider interim parallel solutions to mitigate program delays using proven designs—for example, *San Antonio*–class modified for CPS missiles and fitted with SPY-6 radar to fill strike and air defense mission needs this decade.

2. The Secretary of the Navy should brief Congress on an integrated industrial design and build plan for the DDG(X) that meets a 2029 delivery date. This plan should stipulate requirements for system integration and development on existing destroyers and shore testing of key systems before installation on the first DDG(X).

3. Congress should request from the Navy specific systems that are to be installed and not expected to be modified for DDG(X) so as to inform advanced procurement even as detail designing matures. This would ensure that systems are ready for installation as construction progresses; incentivize adherence to original requirements; and prioritize existing, proven systems over unproven technology.

4. The Secretary of the Navy should explore added shipyard capacity in the Pacific to provide sustainment and eventual construction of future ships of the class. This would alleviate workloads at the two existing yards while improving sustainability of warships in the Pacific—the primary theater of operations in a war with China.

Conclusion

The Navy needs a DDG(X) this decade, and the shipbuilding industry is already pressed to meet existing demands. Congress and the Pentagon should send industry a predictable signal of commitment to build the DDG(X) this decade. If Congress and the Navy can agree to it, significant investments today can grow shipyard capacities and workforce while delivering the ships needed. A design anchored in existing and proven systems can mitigate much risk inherent in any new warship.

China will not wait. The Navy should not be forced to be penny-wise and tonnage-dumb in its approach to DDG(X).

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