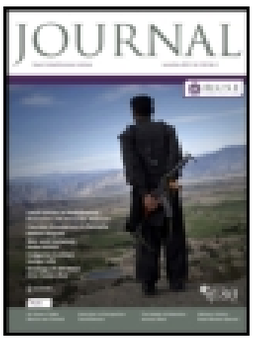

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The Maritime Strategic Imperative

James Wirtz, Jeffrey Kline, Phillip Pournelle and Mie Augier

The US naval services are facing a strategic imperative. The US Navy is no longer the most numerous in the world, nor does it hold the technological edge in all maritime domains; yet, measured by individual warship capability, it remains supreme. Nevertheless, that metric may be less important in the face of adversary numeric superiority and the presence of disruptive, emerging technologies. As we see a resurgence of great power competition and new technologies that can be employed to gain advantage across the spectrum of conflict, James Wirtz, Jeffrey Kline, Phillip Pournelle and Mie Augier argue that the US naval services need to capture opportunities to employ disruptive technologies and to think through how to adapt to the changing security environment.

The US naval services are facing a strategic imperative. China now has a larger navy and the US no longer holds the technological edge in all maritime domains. However, measured by individual warship capability, the US Navy remains supreme. Nevertheless, that may be less important in the face of an adversary's superior numbers and the presence of disruptive, emerging technologies, which in the words of Art Corbett may 'bend the character of future war'.[1]

Without a major conflict at sea since 1945, advances in US naval capabilities have been constrained by a requirements-based programming process that slows procurement and produces marginally innovative advances at a leisurely pace. Granted, nearly 80 years of technological developments have been incorporated into naval procurement, operations and tactics. Nuclear weapons and propulsion, submarine-launched ballistic and cruise missiles, the Aegis combat system and the 'revolution in military affairs' enable the US Navy to stay longer, reach farther and hit better than before. Still, today's naval officers conduct undersea warfare, amphibious warfare and power projection in roughly the same way as their Second World War predecessors. By contrast, US adversaries have embraced missile, cyber and robotics innovations to employ discontinuous, game-changing weapons. Such adversary capabilities threaten the US Navy's more traditional platforms, interfering with their ability to defend the US's global sea lines of communication. By threatening the US homeland with conventional covert attacks in various domains, adversaries are also beginning to raise concerns about the ability to undertake the most fundamental naval missions in the future.

With the resurgence of great power competition and the emergence of technologies that can be employed to gain advantage across the spectrum of conflict, the US naval services need to capture opportunities to employ disruptive technologies and to think through how to adapt to the changing security environment. With constrained budgets resulting in fewer, more expensive multi-mission platforms – which means a smaller fleet unable to provide sufficient forward presence while being too technologically advanced to integrate with allies – meeting the Tri-Service Maritime Strategy's mandate to prevail in long-term competition is a serious challenge. Specifically, the US Navy's ability to accomplish key missions is increasingly in doubt. These include:

1. Art Corbett, 'The Military Innovator's Dilemma', Krulak Center, 23 January 2021, 35:00, 1:03:00, <https://www.youtube.com/watch?v=7r8Bk0wBZJo&t=142s>, accessed 26 June 2021.

The aircraft carrier USS *Gerald R Ford* conducts high-speed turns in the Atlantic Ocean, October 2019. *Courtesy of US Navy/Connor Loessin*

- Preserving a stable and secure global maritime environment that is free and open, and advances prosperity through transit, trade and lawful pursuit of national resources.
- Defending allies from aggression and enabling partners to counter coercion and subversion.
- Expanding collaboration and interoperability with allies and partners, and reinforcing favourable balances of maritime power.[2]

Given the pace of ongoing strategic and technological developments, the failure to meet these mission objectives is not a problem consigned to a distant future. Instead, it conceivably lurks just over the horizon.

This article proposes a response to these challenges: the creation of a fleet that can employ smaller, local reconnaissance strike complexes that can act independently or as part of a larger network. This increases the US Navy's ability to employ maritime forces in the competition phase, and is a more cost-effective fleet for maintaining presence. To justify this solution to a shifting maritime situation, the article analyses important aspects of the strategic imperative created by the growing maritime-technical challenge facing the US Navy by first surveying its strategic, operational, industrial and organisational components.

It begins by describing the strategic setting, highlighting the emergence of two cycles – one geopolitical and the other technological – that provide the catalyst for the maritime strategic imperative now faced by the US. It then addresses how a basket of new technologies is enabling ever-smaller warships to carry increasingly lethal weapons, and how these innovations raise important operational questions. This is followed by an exploration of two factors that rarely rise to prominence in discussions of maritime strategy – the industrial base and organisational culture – that will shape the response to these strategic and operational developments. In other words, potential changes to force structure will require overcoming organisational inertia and a military–industrial complex comfortable with providing large expensive platforms. After examining these challenges, the article proposes a force structure that offers a potential way to make the US Navy more relevant across all levels of conflict.

2. US Department of Defense, 'Advantage at Sea: Prevailing With Integrated All-Domain Naval Power', December 2020, <https://media.defense.gov/2020/Dec/16/2002553074/-1/-1/0/TRISERVICESSTRATEGY.PDF>, accessed 26 June 2021.

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The Rise, Decline and Rise of US Naval Primacy

The intersection of two 'long cycles' – one in world politics, the other in maritime affairs – has called into question the force structure and operational preferences of US naval officers. The first cycle is the rise and decline of great powers and in great power competition.[3] Unfolding over decades, this competition sometimes occurs between continental powers, which possess interior lines of communication and generally wield significant land forces, and maritime powers, which, as Alfred Thayer Mahan anticipated, engage allies and harness resources on a global scale.[4] All things being equal, the maritime power has an advantage in this competition. It can control access to the oceans, allowing it to harness resources globally. It can also deny those same resources to a continental opponent.[5]

To minimise the advantages enjoyed by their maritime rivals, continental competitors sometimes make a concerted effort to develop a blue-water navy. The Anglo-German naval arms race that occurred before the First World War is an example of a continental challenge to a maritime competitor.[6] Building a navy capable of taking on a blue-water rival is a long-term proposition. Rising powers, however, tend to look for asymmetric weapons or tactics that can negate the naval advantages enjoyed by the maritime power. They also benefit from a newcomer's advantage. New entrants into a naval arms race are not constrained by the capital costs of an existing fleet.

The second cycle is related to the speed of naval innovation and the relative durability of ships and tactics once they are deployed and adopted. Unless it is jump-started by a destructive external shock, innovation in the US Navy takes between a long-decade and 30 years.[7] For instance, in 1910, the first US Navy officer flew an airplane. In 1921, the US Navy established a Bureau of Aeronautics. By 1934, a long-decade later, it possessed four aircraft carriers, including the first purpose-built aircraft carrier, which was used for experimentation.[8] By 1939, the first metal monoplane for carrier use, the F2A Brewster Buffalo, was introduced to the fleet. This was the aircraft flown by US Marine aviators in the defence of Midway.[9]

Once these innovations are in place, however, things can become sticky. Innovations take root in the form of new ship construction, the rise of new bureaucratic communities and the creation of new personnel training pipelines. Acquisition policy and operational preferences can be remarkably resilient despite changes in the external environment. The current US Navy shipbuilding plan, for example, envisions that the aircraft carrier will be the country's capital ship by 2100 – more than 150 years after the Japanese demonstration of the offensive capability of carrier aircraft over Pearl Harbor.[10]

Occasionally, these two long cycles of great power competition and innovation intersect, creating an abrupt change in the military situation at sea with the arrival of an emerging competitor employing asymmetric technologies. The net result is block obsolescence of a large and seemingly effective fleet. The convergence of these two long cycles can threaten the ocean dominance of the maritime great power.

This situation has occurred three times since 1900. The first intersection occurred with the rise of a Japanese challenger to US naval dominance in the Western and Central Pacific. Although Japan was seen at the time as a weak great power competitor

3. Richard Rosecrance, 'Long Cycle Theory and International Relations', *International Organization* (Vol. 41, No. 2, 1987), pp. 283–301; George Modelski, *Long Cycles in World Politics* (London: Palgrave Macmillan, 1987).
4. William R Thompson (ed.), *Great Power Rivalries* (Columbia, SC: University of South Carolina Press, 1999); George Modelski and William R Thompson, *Seapower in Global Politics, 1494–1993* (London: Palgrave Macmillan, 1988).
5. On how the world's ocean pathways can serve as both efficient highways and effective defensive barriers, see Patrick Porter, *The Global Village Myth: Distance, War, and the Limits of Power* (Washington, DC: Georgetown University Press, 2015).
6. Matthew S Seligmann, 'The Anglo-German Naval Race, 1898–1914', in Thomas Mahnken, Joseph Maiolo and David Stevenson (eds), *Arms Races in International Politics: From the Nineteenth to the Twenty-First Century* (Oxford: Oxford University Press, 2016), pp. 21–40.
7. James J Wirtz, 'Innovation and Navy Time', in Alessio Patalano and James A Russell (eds), *Maritime Strategy and Naval Innovation* (Annapolis, MD: Naval Institute Press, 2021), pp. 187–202.
8. George W Baer, *One Hundred Years of Sea Power: The U.S. Navy, 1890–1990* (Stanford, CT: Stanford University Press, 1994), pp. 135–45.
9. William H Langenberg, 'Finland's Flying Buffalos', *World War II* (Vol. 20, No. 6, 2005), p. 20.
10. US Department of Defense, 'Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels', 9 December 2020, <https://media.defense.gov/2020/Dec/10/2002549918/-1/-1/1/SHIPBUILDING%20PLAN%20DEC%2020_NAVY_OSD_OMB_FINAL.PDF>, accessed 26 June 2021.

that was caught between its continental ambitions in China and its maritime ambitions in the Pacific, it wielded its superior carrier aviation to good effect at Pearl Harbor, eliminating a significant portion of the US surface fleet. While the US Navy possessed the asymmetric weapon used effectively by the Japanese – carrier aviation – the battleship admirals that dominated the US Navy were slow to recognise aviation's offensive potential. Instead, they were preoccupied by a 50-year-long effort to perfect battleship tactics and gunnery in preparation for an expected, climactic capital ship showdown between the US and Japan somewhere in the Western Pacific.[11] By 1942, the US Navy, despite a lingering affinity for the battleship and a hankering for that showdown of opposing battle-lines, shifted quickly to carrier aviation as the primary naval weapon of the Second World War. That carrier-shaped trajectory persists today.

The US emerged from the Second World War with a navy that could dominate the world's oceans, and it used that fleet to good effect in the first 25 years of the Cold War. However, by the mid-1970s, following the long and costly distraction of the Vietnam War, naval officers discovered that their environment had changed again. A second intersection between a rising challenger and a stable US Navy fleet occurred when Soviet naval and air forces began to assert their presence in the North Atlantic and Western Pacific.[12] Using long-range anti-ship missiles, air-launched cruise missiles carried by modern bombers, and increasingly sophisticated submarines, the Soviets began to challenge US naval supremacy with an eye towards keeping the US Navy at bay and preoccupied by the need to defend its carrier strike groups.

The demise of the Soviet Union left the US Navy without competitors. With its fleet of aircraft carriers, *Ticonderoga*-class cruisers and *Arleigh Burke*-class destroyers, there was little to stop it from projecting power ashore from stations just a few miles from hostile coasts. In many respects, the US Navy had entered a 'golden age' of sea power.[13] Carrier battle groups and expeditionary strike groups were responsive and 'right-sized' for hard-to-anticipate regional crises, requests for projecting power ashore, and humanitarian operations that were common in the 1990s and early 2000s.

In the past decade, US Navy leaders have recognised that since the Gulf War, Russia and China have undertaken significant programmes to hold the US Navy at risk, especially in the oceans close to their shores. Beijing has been especially busy in the South China Sea and within the waters between its coastline and the 'first island chain' in the Western Pacific, launching a massive shipbuilding programme and constructing artificial islands to be used as naval and air bases.[14] By 2030, China will deploy 450 surface ships and 99 submarines – double the number of ships in the US Navy in 2020.[15]

The third intersection between a rising maritime peer competitor intent on exploiting asymmetric technologies and a stable US Navy fleet structure is well underway in the Western Pacific. US Navy officers must devise new capabilities and ways of employing them to counter the growing sea-denial capability of potential adversaries. The maritime strategic imperative demands a significant departure from the tried and true. The US cannot build enough *Arleigh Burke*-class destroyers to meet the challenge created by the convergence of these long cycles in world politics and maritime affairs.

The Technological Challenge at Sea

The reconnaissance-strike complex that emerged by the end of the 1980s had a significant effect on warfare by combining very effective sensors, precise weapons and real-time guidance from commanders, who now enjoyed an enhanced degree of situational awareness. The effects of this complex became apparent in the lightning-fast defeat of Iraq's air and ground forces during the Gulf War. But technological diffusion has not only spread these

11. Trent Hone, *Learning War: The Evolution of Fighting Doctrine in the U.S. Navy, 1898–1945* (Annapolis, MD: US Naval Institute Press, 2018).
12. Paul H Nitze, Leonard Sullivan Jr and the Atlantic Council Working Group on Securing the Seas, *Securing the Seas: The Soviet Naval Challenge and Western Alliance Options* (Boulder, CO: Westview Press, 1979).
13. James J Wirtz, 'QDR 2001: The Navy and the Revolution in Military Affairs', *National Security Studies Quarterly* (Vol. 5, No. 4, 1999).
14. Jane Perlez, 'Beijing, With an Eye on the South China Sea, Adds Patrol Ships', *New York Times*, 11 April 2015; Anthony H Cordesman, 'China and the United States: Cooperation, Competition, and/or Conflict', Center for Strategic and International Studies, 1 October 2019, <https://www.csis.org/analysis/china-and-united-states-cooperation-competition-andor-conflict>, accessed 26 June 2021.
15. James E Fanell, 'Asia Rising: China's Global Naval Strategy and Expanding Force Structure', *Naval War College Review* (Vol. 72, No. 1, 2019), p. 13.

systems horizontally to more and more state and non-state actors, but also vertically to lower and lower echelons of command. Technology has also enabled smaller and smaller units to wield greater and greater firepower. In terms of naval forces, patrol boats can now carry weapons capable of neutralising the largest warships.[16] This is partly because the weapons and sensors now available are 'smarter' – they are able to identify an intended target located in a complex environment with limited or no external guidance. The precision of these weapons is matched by their greater lethality, which is derived from nanotechnology-based explosives.[17] Some observers even point to the potential of generating nuclear-like effects without fission or fusion materials.[18] These smarter weapons and sensors, combined with small, high-power warheads, can be incorporated into relatively small weapons and employed from platforms that in the recent past generally lacked significant combat capability. UAVs that incorporate these same characteristics also enable complete reconnaissance-strike complexes at lower and lower echelons using a limited number of weapons platforms.[19]

In the future, the advantage will generally go to the force that is able to develop and maintain small and independent reconnaissance-strike complexes that are not dependent on vulnerable command, control and communication elements such as satellites or fixed facilities.[20] These small complexes will use line-of-sight communications with low probability of intercept characteristics, often employing UAVs to take over the role of communication relay from satellites. These local networks will direct fires on enemy forces by linking low-signature units operating forward as scouts to high-capacity platforms operating at a distance. More flexible, self-aligning formations will overwhelm and destroy larger fixed-structure reconnaissance-strike complexes.

Small Craft

With the lethality of small craft increasing, the US Navy faces a dilemma on how to respond. Does it continue to eschew deployment of smaller platforms, or does it embrace them? How does it square the short endurance of such craft with its global responsibilities and need for a surge capacity?

The challenge involved in a decision to turn to small craft is that these platforms possess a correspondingly small volume to carry fuel and other supplies, which greatly limits their endurance. While small missile attack craft can potentially carry as many weapons as their larger destroyer cohorts, they lack the range to travel across the Pacific Ocean without significant logistical support. A solution to this problem involves the use of tenders to transport and support smaller platforms. Modern crane systems carried by tenders can launch and recover the missile craft at sea, outside the combat area.

Once in theatre, missile boats can join with existing large-capacity warships to form local maritime reconnaissance-strike complexes that can act independently to attack the enemy. Missile boats, acting as a low-signature scouting and strike force, can be linked to accompanying cruisers or destroyers via communication links created by UAVs operating in the vicinity or carrier-launched aircraft operating outside the combat area.

Directed Energy Weapons

The effectiveness of directed energy weapons, such as lasers or high-powered microwave weapons, currently constitutes a wild card in terms of designing future fleet architectures. If these systems do not perform as well as expected, flotillas of small platforms will need to operate forward of large surface ships. If these defensive systems meet operational expectations, then there will be less of a need for flotillas. As a hedge, the US Navy

16. For example, the USS *Chancellorsville* (CG-62) was struck by a BQM-74E unmanned aerial target drone, which contained no explosive warhead. It required over $30 million in repairs to render it combat effective. See *USNI News*, 'Navy: Six Months of Repairs to Drone-Struck Ship Will Cost $30 Million', 30 December 2013.
17. Michael Berger, 'Military Nanotechnology: High Precision Explosives Through Nanoscale Structuring', Nanowerk, 5 June 2008; Vitaly V Chaban, Eudes Eterno Fileti and Oleg V Prezhdo, 'Buckybomb: Reactive Molecular Dynamics Simulation', *Journal of Physical Chemistry Letters* (Vol. 6, No. 5, 2015), pp. 913–17.
18. If experiments with metallic hydrogen are accurate and the substance remains stable, it would be an extremely energetic explosive. See Fiona MacDonald, 'It's Real: Metallic Hydrogen Has Been Created for the First Time', *Science Alert*, 26 January 2017, <https://www.sciencealert.com/hydrogen-has-been-turned-into-a-metal-for-the-first-time-ever>, accessed 26 June 2021.
19. Jason Lyall, 'Drones Are Destabilizing Global Politics', *Foreign Affairs*, 16 December 2020.
20. Jeff Cares, *Distributed Networked Operations: The Foundations of Network Centric Warfare* (Bloomington, IN: iUniverse, 2006); Alexander Bordetsky, Stephen Benson and Wayne Hughes, 'Mesh Networks in Littoral Operations', *USNI Blog*, 12 May 2016, <https://blog.usni.org/posts/2016/05/12/mesh-networks-in-littoral-operations>, accessed 26 June 2021.

should accelerate experimentation with flotillas, while continuing development of directed energy systems. A hybrid approach may be more effective than pursuing a single course of action. While the smaller platforms would probably not be capable of mounting directed energy weapons, larger platforms may be able to use them for area defence. Flotillas might then serve as pickets to provide warning of the direction and nature of potential threats.

The fundamental challenge posed by these new technologies is that they are relatively inexpensive compared with the multi-mission ships deployed by the US Navy. Scores of small craft armed with sophisticated and deadly missile systems can be deployed for the cost of one *Arleigh Burke*-class destroyer. Admittedly, a flotilla of these small craft would lack the endurance, range, sensor and communication suites and multi-mission capabilities of a modern US warship. Nevertheless, under the right conditions, a small-craft flotilla might overwhelm the limited number of warships that are forward deployed by the US Navy. So, the question again emerges: should the US Navy work to defeat this emerging 'small threat', or should it maximise its offensive firepower by deploying its own sea-denial flotillas of small craft?

Impediments: Industry and Organisational Culture

There are industrial and organisational challenges that must be overcome before the US can build a larger, more capable fleet. There are questions about whether US shipyards are up to the challenge of building and maintaining a fleet of large surface combatants and submarines and a new class of small and increasingly autonomous platforms. Even if modest funding increases become available, it is unclear if US Navy officials are prepared to direct these resources towards the development of reconnaissance-strike complexes based on small platforms. Political considerations combined with a lack of awareness of the evolving technological setting might reduce the leeway of US Navy officials to set the fleet on a different course.

Industrial Limits

Challenges are likely to be encountered in the effort to increase capacity to build and maintain a larger fleet while simultaneously creating reconnaissance-strike flotillas using small platforms. During the procurement holiday that followed the end of the Cold War, the defence sector suffered a significant decrease in funding. In response, there was considerable consolidation of defence industries, particularly for companies involved in shipbuilding. Simultaneously, there was a reduction in the shipyard workforce in terms of both the number of employees and the experience of workers.[21] While John M Richardson, the former chief of naval operations, asserted that shipyards could increase the number of ships constructed per year, there is considerable risk that the US Navy will have to pay a premium for that increase, particularly because of the loss of shipyard workers. The premium involved in providing an additional ship to an existing production line may not be as high as the premium to start a new line of ships, but it will be significant. Consolidation in the shipbuilding industry has also placed a significant cap on the number of large dry docks available at any given time, creating a potential trade-off between new ship construction and maintenance.

Launching a fundamental departure in future fleet architecture will require additional funding from Congress. The good news is that building and maintaining new ships may mean an increase in jobs in the districts containing shipyards impacted by the downturn in activity that followed the end of the Cold War. Nevertheless, relatively modest initiatives might be undertaken to move the fleet towards a posture of greater distributed lethality, by using a mix of unmanned platforms while continuing the use of existing or near-to-being-delivered ships. In general terms, the US Navy might opt for continuing some ship construction lines (for example, *Arleigh Burke*-class destroyers or *Virginia*-class attack submarines), restarting an existing line of *Zumwalt*-class destroyers and opening new planned lines (for example, the Light Amphibious Warship), while augmenting this traditional force with small craft optimised for the sea-denial mission. An important advantage of this approach is that small craft might be built in a much wider range of places because most do not require a dry dock or even construction near the water, although they do require tenders that can be built from existing manufacturing lines in San Diego and the Gulf Coast. This removes some of the limits created by a shortage of industrial capacity, while maintaining existing facilities and increasing capacity in diverse locations.

The addition to the industrial base of the capacity to build smaller manned and unmanned

21. Jessie Riposo et al., *Current and Future Challenges to Resourcing U.S. Navy Public Shipyards* (Santa Monica, CA: RAND, 2017).

platforms provides additional strategic advantages. Construction of large vessels usually takes years. Construction of smaller vessels and unmanned platforms takes months and construction activity can be distributed to non-naval construction locations. In the future, additive manufacturing may greatly increase the possibility of quickly diversifying construction of new types of platforms. In the event of a war, the US can employ these non-standard construction locations for surge production of large numbers of these smaller platforms. This means an enemy who wishes to strike the US to remove its maritime warfighting production capacity would have to contend with a large set of targets. This innovative approach to the construction of new types of platforms would provide the US with a distributed and robust wartime industrial capacity to match its new distributed fleet architecture. This would greatly strengthen deterrence by demonstrating a capability to engage and prevail in attritional engagements at sea.

Thinking about Organisational Change

To implement either incremental or radical change in the US Navy (or any organisation), one should first consider some essential dimensions of organisational behaviour and how they influence the leadership of change. Although it may be easy to overlook the importance of organisations in planning future fleet architectures, neglecting them can lead to false assumptions (for example, that change will be automatic or easy) and a flawed understanding of the issues involved, leading to unrealistic and unhelpful policies. Organisational culture, behaviour and structure matter in two key ways.

First, the fact that almost all change and strategy must be developed, executed and implemented by and within organisations has both an upside and a downside for analytical and strategic purposes. On the upside, it implies a certain amount of predictability and stability over time. This element is particularly useful when it comes to understanding competitors as organisations because it provides a framework to understand their strengths and weaknesses and how these factors might influence their military effectiveness in war and peace. On the downside, organisations tend to get in their own way when it comes to implementing change. As former Secretary of Defense Robert M Gates noted, the most difficult wars he had to fight were the organisational and bureaucratic ones.[22] Indeed, a status quo mentality is a key reason organisations fail to adapt: 'Leaders ... often encounter entrenched cultures that make real change difficult, as well as lower-level organizations' resistance to guidance from the top, determined to preserve their piece of the cake and their status'.[23]

Second, individual and organisational resistance to change often interact, combining to create strong barriers to innovation. Individual mental models and beliefs are based on what we recognise as familiar and typical and are sometimes what we would like to see. People who have to lead change in the US Navy may frame incoming information in a way that fits with their beliefs and experiences. Additionally, most people have strong status quo biases when it comes to change that stem in part from a dislike of ambiguity.[24] Individuals and organisations both form routines – patterns of activity that can initially improve organisational effectiveness but, once in place, can be difficult to change or eliminate even if outdated or irrelevant. Organisations can become trapped in competencies and capabilities they execute well, but these activities can lose their usefulness over time, making them less able to adapt to future changes in the external environment. 'Competency traps' or 'success traps' are common in business and government organisations.[25] Organisational stickiness is often reinforced as organisations grow in size or in age.

The existence of multiple managerial layers in organisations slows their ability to change; with growth in size comes growth in specialisation and coordination. When faced with the requirement to change and adapt, managers and leaders of organisations that are interactively complex cannot just disassemble and reassemble the bureaucratic elements that constitute an agency.[26] Organisations also tend to become increasingly hierarchical over time, not because of the requirements generated by the external strategic environment but because of the need to monitor compliance with directives and to create and monitor various metrics. Conflicts of interest among different components of an

22. Robert M Gates, *Duty: Memoirs of a Secretary at War* (New York, NY: Alfred Knopf, 2014).
23. Robert M Gates, *A Passion for Leadership: Lessons on Change and Reform from Fifty Years of Public Service* (New York, NY: Alfred Knopf, 2016), p. 5.
24. James G March, *A Primer on Decision Making: How Decisions Happen* (New York, NY: Free Press, 2004).
25. Barbara Levitt and James G March, 'Organizational Learning', *Annual Review of Sociology* (Vol. 14, 1988), pp. 319–38.
26. Herbert A Simon, 'Near Decomposability and the Speed of Evolution', *Industrial and Corporate Change* (Vol. 11, No. 3, 2002), pp. 587–99.

organisation can further slow down or stifle needed organisational change and adaptation. As Peter Drucker was fond of saying, 'culture eats strategy for breakfast' – a phrase understood and emphasised by national security strategists such as former US Secretary of Defense James Mattis.[27] If the culture of a particular organisation does not embrace change, even brilliant strategies, initiatives or reorganisations will likely be dead on arrival. We must embrace a culture of innovation, not just the innovations themselves, before we can fully utilise them.[28]

So, what can the US Navy do, knowing that change is needed to adjust to the future security environment? How is the effect of a reluctant organisation mitigated, even if it cannot fully be overcome, to achieve necessary change? Correctly understanding the nature of the barriers – only a few were sketched above – is a useful first step. Ideas from the field of organisational behaviour can help to provide insights into mitigation strategies, helping leaders to think through how to better implement needed changes. Organisational agility must be paired with intellectual ingenuity to undertake significant shifts in strategic trajectory in the future.

Recommendations

The US Navy needs to be redesigned to bolster deterrence in the Western Pacific. Such a force must be able to conduct maritime security operations in support of the global order and be able to fight and survive in the event of a sudden attack. The US needs a naval force that can be constantly and visibly present in areas such as the South China Sea and that is capable of surviving as a fleet in being early in a conflict. The US needs a credible deterrent force to prevent China from being able to achieve military objectives in a *coup de main*, while also preventing assimilation of the region via 'salami-slicing' or other maritime insurgency efforts. The current force, centred on a few carrier strike groups and surface action groups made up of *Arleigh Burke*-class destroyers, is ill-suited to these tasks. There are too few carriers and they have too high of a signature, making them relatively easy to detect and target. The Chinese reconnaissance-strike complex is designed to destroy them early in a conflict. Similarly, there are not enough destroyers to achieve the level of presence required to support US allies as they work to maintain governance of their territorial waters and exclusive economic zones.[29] If fighting were to start, the few US destroyers on station would be quickly overwhelmed. To survive, US surface units would be forced to head out to the open ocean, removing them from the scene of action in the waters near the first island chain. In other words, during a critical point in a crisis when US allies most need support, US forces would not be visible as a deterrent to China, and more importantly, they would not be visible as reassurance in the region. Submarines remain survivable in the Western Pacific today, but they provide a limited strike capacity at great expense and have zero visibility when it comes to peacetime operations.

The mismatch of US forces when it comes to actions in peacetime, crisis and conflict limits the US deterrent posture in the Western Pacific. At a minimum, it removes options from the table for future leaders and enables a maritime insurgency campaign by US competitors. If the fleet survives the opening salvo of an open conflict to fight another day, commanders will then have to devise and conduct operations to compel China, or another revisionist power, to abandon any objective it seized. Worse still, if the local fleet does not survive, efforts to use remaining naval assets to compel the opponent to return to the status quo ante bellum will be difficult. Given the humiliation associated with initial losses and the cost of a miserable attritional campaign, policymakers might face a choice between escalation or backing down. If the revisionist power can expand its reconnaissance-strike complex in an expeditionary manner into littoral environments, the US Navy will require a force designed to fight in a contested littoral environment, just to regain access to the region. A fleet based on aircraft carriers, high-end destroyers and submarines is not designed to execute this mission.[30]

The US Navy has access to platforms that can offer the capabilities necessary to meet the threat posed by likely adversaries. Modern technologies enable smaller, more numerous platforms to be present and survivable. Achieving this fleet architecture will require manned and unmanned platforms, and perhaps optionally manned platforms. The smaller platforms are not in themselves globally deployable, but a squadron of them can be made deployable

27. Jim Mattis and Bing West, *Call Sign Chaos* (New York, NY: Random House, 2019).
28. Mie Augier and Wayne Hughes, 'Leading Military Innovation, Past and Present', Center for International Maritime Security, 14 August 2018.
29. Hunter Stires, 'Win Without Fighting', *US Naval Institute Proceedings* (Vol. 146/6/1,408, June 2020).
30. Phillip E Pournelle, 'The Deadly Future of Littoral Sea Control', *US Naval Institute Proceedings* (Vol. 141/7/1,349, July 2015).

using a tender. The same two-stage system – aircraft carrier and aircraft – that has been so successful in the realm of aviation can be applied to these modern versions of the torpedo boat.

From a cost perspective, unmanned systems would be ideal, but they are limited in their mission sets. While unmanned systems can be very effective in surveillance and reconnaissance missions or lying in wait for strike missions, they cannot conduct boarding or other maritime security operations. Additionally, it is still too early to tell if they will achieve desirable deterrent or coercive effects. If past experience is a guide, the potential repercussions for harassing, damaging, sinking or capturing an unmanned system are different from those for a manned platform. In fact, such actions against unmanned systems should be considered new rungs on the escalation ladder, below actions against human systems.

These smaller manned, unmanned or optionally manned platforms should be pursued to augment larger traditional platforms. The US Navy has made large capital investments in ships with service lives of around 50 years and that are capable of operating on a global basis. Admittedly, some missions, such as ballistic missile defence, cannot be undertaken with small platforms. Nevertheless, a new type of surface action group comprising *Arleigh Burke*-class destroyers and unmanned boats carried to a given region by a tender constitutes a way to increase sea-denial capabilities quickly and relatively inexpensively. Such surface action groups will be required for combat in littoral and archipelagic environments. Autonomous platforms could serve as sensors and shooters in support of a destroyer carrying a human crew. The destroyer would act as a command ship and the force could employ existing fire control systems to engage enemy units.

Missile Boats Become the Contact and Blunt Force

China has designed an effective maritime insurgency force comprising armed paramilitary fishing fleets. The People's Armed Forces Maritime Militia has ejected fishermen from their own country's territorial waters and is currently working to gain de facto control over small islands owned by Japan. Maritime militia forces are supported by the overlapping capabilities of the Chinese Coast Guard, Navy and land-based units. To counter these activities, a force of missile boats and motherships should be deployed. These missile boats would provide day-to-day support to US allies and partners in the region as they assert sovereignty and governance of their territorial waters and exclusive economic zones. For a small price, these missile boats could serve as a local conventional deterrent, providing a significant sea-denial capability in support of the maritime security operations undertaken by US allies and partners in their own waters. If a conventional fight begins, it would be nearly impossible for an opponent to destroy a large, distributed lethality force without suffering a major blow in response, eliminating the tempting opportunity to achieve a cheap *fait accompli*.[31]

Destroyers Become the New Strike Force of the Fleet

US competitors have built their reconnaissance-strike complexes to counter the US Navy's primary strike weapon – the aircraft carrier. This is a rewarding approach given the concentration of the fleet's capabilities in so few platforms. Nevertheless, new technology gives the US the ability to distribute this combat capability and achieve greater effect at a much lower cost.[32] To implement this approach requires a shift in doctrine and a change in the way forces are employed. With the ability to reload vertical launch systems at sea, or at austere anchorages in theatre, destroyers can be used to close with the enemy, rapidly launch an attack and retire. Untethered from carrier strike groups, they can devote a larger portion of their vertical launch cells to the attack in place of expensive and indecisive defence.

Deploying UAVs on destroyers and other platforms will give them greater flexibility and independence in the form of elevated sensors and communications nodes. Nevertheless, the fleet will still require aircraft carriers. Only the aircraft carrier enabled with a catapult system can launch long-endurance, high-altitude sensors and communications nodes (for example, E-2D) to enable the fleet to carry out its mission independently of satellite communications.

Reopen *Zumwalt*-Class Production

While the *Arleigh Burke*-class destroyer is a very capable multi-mission platform, it lacks the ability

31. Wayne P Hughes and Robert P Girrier, *Fleet Tactics and Naval Operations*, third edition (Annapolis, MD: US Naval Institute Press, 2018).
32. Phillip E Pournelle, 'The Rise of the Missile Carriers', *US Naval Institute Proceedings* (Vol. 139/5/1,323, May 2013).

to conduct long-range hypersonic strikes. The Mk 41 vertical launch cells on the *Burkes* are not large enough to hold first-generation hypersonic missiles. While the next flight of *Virginia*-class submarines could be employed to do this mission with conventional prompt global strike missiles, the limited number they carry and the associated high costs of each shot make this option cost-ineffective on the margins. The *Zumwalt*-class destroyer is equipped with Mk 57 vertical launch cells, which were originally designed to fire a ramjet or scramjet missile.[33] The other alternative would require the modification of the next generation of *Burke*-class destroyers, but a faster and less expensive means to achieve the capability to deliver large numbers of hypersonic weapons would be to start building *Zumwalt*-class destroyers again.

Emphasise Scouting by Carrier Air Wings

With a shift of emphasis away from the aircraft carrier as the main striking arm of the fleet, the carrier air wing will also need to be reconfigured. While it is not advisable to remove strike and fighter aircraft from the fleet, the F-35C is proving to be a very expensive proposition. While the acquisition price tag is alarming, the ownership costs related to maintaining the airframe, the avionics and the stealth features will be significant, drawing resources away from other elements of the fleet and innovation efforts. A restructured carrier air wing can contribute to the new fleet architecture, not the other way around. A new carrier air wing places a greater emphasis on aircraft such as the E-2D, which supports the fleet by providing intelligence and surveillance. Nevertheless, the fleet will need a penetrating scout and it already has experience operating a prototype of this type of aircraft – the X-47B. For its cost, the X-47B has a very effective time on station versus distance curve, which is better than the F-35's, and a relatively small radar profile. Because the X-47B is unmanned, it could serve as a penetrating scout that could find enemy units for the surface fleet and other platforms, allowing them to engage targets with missiles and other weapons.

Improve the Aircraft Carrier as a Weapons System

If the US Navy insists on building additional *Ford*-class carriers and making them central to the fleet operating concept, it must first address several fundamental issues, particularly given the expense associated with aircraft carriers and their associated aircraft. First, the US Navy must address problems encountered with a new type of arresting gear up front during construction of USS *John F Kennedy* (CVN-79) and *Enterprise* (CVN-80), even if this means a Nunn–McCurdy breach in construction costs, which at a minimum would place carrier construction under intense scrutiny.[34] Senior US Navy officers need to add a fourth arresting engine to future carriers to ensure reliability of the barrier capability. This is in addition to the problems associated with the electromagnetic catapult systems.[35]

Issues associated with today's carrier aircraft must also be addressed. Current plans for the air wing do not enable the carrier to achieve the same levels of range, persistence or ordnance delivery that the US Navy enjoyed during the 1980s. The removal of the A-6, KA-6D and S-3B aircraft may have saved the fleet considerable funds during the acquisition holiday, but it came at the cost of reduced capability in terms of the number of bombs the A-6 could deliver and the fuel the other two aircraft could carry to extend the range and persistence of the air wing. Long-range anti-submarine warfare capabilities were also undermined by the loss of the S-3B.

Fortunately, unmanned systems offer solutions to these problems. Just as unmanned systems offer the surface fleet cost-effective capabilities to meet the challenges of the new environment, so do carrier-based unmanned systems.[36] Given the hostility the US Navy's aviation community has directed towards unmanned systems, however, it is uncertain how successful the service will be in making the

33. Andrew Knoedler, 'Hypersonic Air-Breathing Weapon Concept (HAWC)', Defense Advanced Research Projects Agency, <http://www.darpa.mil/program/hypersonic-air-breathing-weapon-concept>, accessed 26 June 2021.
34. Introduced by Sam Nunn and Dave McCurdy in 1982 and made a permanent part of US law by the 1983 Defense Authorization Act, Nunn–McCurdy calls for the Secretary of Defense to provide additional certifications to Congress if Defense Department procurement programmes cross a two-tiered metric (25% and 50%) of cost overruns. The law has led to few programme cancellations, but it has led to reforms of project management.
35. Dan Grazier, 'How Not to Build an Aircraft Carrier', *National Interest*, 5 June 2017.
36. Thomas P Ehrhard and Robert O Work, 'Range, Persistence, Stealth, and Networking: The Case for a Carrier-Based Unmanned Combat Air System', Center for Strategic and Budgetary Assessments, 2008.

necessary adjustments to incorporate unmanned aerial vehicles into the fleet.[37]

Conclusion

Discussions and proposals for future fleet architecture are built on certain assumptions about the nature of future crises and conflicts and the behaviour of the parties involved, and this article is no exception. These assumptions require scrutiny, especially those that are not easily quantified, such as the habits and neuralgias of US institutions and those of competitors. Additional operational and strategic study, analysis and wargaming should be undertaken in a cycle of research to clarify images of future war at sea and to describe the 'systems' employed by potential adversaries.[38] Wargaming must address opponents' responses in peace and war to the presence of new precision strike weapons in the maritime environment. These games will need to feed and, in turn, be supported by new salvo equations, force deployment models, cost estimates, modelling and simulation, and campaign analysis, as well as an understanding of how opponents think and analyses of how to overcome barriers to innovation and how to implement changes in organisations. It is important that wargames, modelling and simulation, and campaign analysis address various concepts of organisation, operations and doctrines. Nevertheless, games and analysis will not be valid if a different force is simply placed into a scenario without changes to the way it would be employed and new thinking about how an opponent might respond to it. Over time, the assumptions built into the US's thinking, analysis, games, and modelling and simulations would need to be informed by real world events, exercises and fleet experiments, especially as new weapons enter the fleet and experimentation identifies potential best practices and effective operating procedures. There is, however, an urgent need to begin these analyses if the US wishes to remain the world's foremost maritime power.

Today's strategic situation in the Western Pacific is not unique. Most observers would also agree that emerging technologies hold out the potential of making smaller platforms increasingly lethal, creating the opportunity to engage an expensive multi-mission warship with something other than an expensive multi-mission warship. These strategic and technological developments demand innovative thinking about future fleet architectures that would satisfy the maritime strategic imperative.

However, a worrying trend is materialising. While the number of new opportunities and approaches to fleet architectures, naval strategy and operations increases, strategists are considering fewer new directions in maritime affairs. The 'default' option of sticking with the tried and true, of doing more of the same, seems to still hold sway as naval officers contemplate the maritime strategic imperative. ■

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37. Jerry Hendrix, 'Below Glideslope: The MQ-25 Stingray Appears to be Heading for a Ramp Strike', *National Interest*, 20 April 2017.
38. Peter P Perla, *The Art of Wargaming* (Annapolis, MD: Naval Institute Press, 1990), chapter 9.