# “To Take and Keep the Lead:”
# A Naval Fleet Platform Architecture for Enduring Maritime Supremacy

By

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# AUTHOR'S NOTE

This monograph attempts to define the future maritime competitive environment and to design a naval fleet platform architecture attuned to its emerging requirements. It is the written report associated with a detailed CSBA PowerPoint briefing entitled *Winning the Race: A Naval Fleet Platform Architecture for Enduring Maritime Supremacy*, dated March 1, 2005. Taking advantage of the time passed since this briefing was published, as well as valuable input received on the original PowerPoint briefing, this report contains new information, thoughts, and recommendations.

Designing a new naval platform architecture proved to be far more challenging than I originally expected. The connections between all components of a recommended architecture are many and they required detailed exploration and explanation. As a result, this report, originally scoped for about 100 pages, ultimately grew to four times that size and took far longer than expected to complete. So long, in fact, that news of a new 313-ship Navy fleet platform architecture plan broke just as this manuscript went into final editing for publication. However, since the thinking that went behind the architecture outlined in these pages had not changed, I decided to press forward with this paper's publication without further modification. As should become evident when reading this manuscript, I believe that debating the reasoning behind a particular platform architecture is far more important that debating its associated ship numbers.

Early on, I had to make a decision on the report's intended audience. This decision would determine if I could write at a broader level, with few details and acronyms, or at a much more detailed level, touching on platform and system characteristics. The fact that this report is 400 pages long and has a 12-page glossary indicates the direction I chose. I decided that making recommendations with potential impacts of billions of dollars demanded a high degree of amplifying detail—and an unavoidable liberal use of acronyms!

Similarly, as I am wont to do, I attempt to explain my thinking and recommendations within some sort of historical framework. Because there are not likely to be many new choices that would suffer from comparisons with choices made by past Department leaders, I believe this to be especially important when discussing alternatives for future naval platform architectures. Those not interested in the historical set up—or who disagree with my interpretation of important events—should jump ahead to the later chapters.

So, readers be warned: this is a lengthy, detailed report aimed at those with some knowledge of the Department of the Navy, the US Navy and US Marine Corps, and especially the platforms that make up the Department's "Total Ship Battle Force." Keep the Glossary handy! I hope those who read it find it useful.

# I. INTRODUCTION

## THE ENDURING RACE

The global naval competition is an enduring "race" between an ever-changing, disparate group of competitors. A few select competitors enter the race to "win"—to become the number one contemporary naval power. Other competitors enter the race for nationally important but more modest goals, such as becoming a respected regional navy. Still others enter the race only to be part of the sea-going "community of commercial interests and righteous ideals,"[1] with no intention of competing against stronger, more capable naval opponents.

Ever since it was officially created in 1798, the Department of the Navy (DoN) has been responsible for monitoring the global naval competition, and developing and executing the US naval "racing strategy."[2] This strategy has changed over time as DoN strategists and planners have iteratively worked to answer three basic questions. First, given the national security roles assigned to the US armed forces in general and the DoN in particular, what is the most appropriate naval competition strategy? Second, is the DoN's "competition racer"—its naval fleet platform architecture, the collection of ships and capabilities used by the United States Navy and Marine Corps in pursuit of DoN competition goals—optimally designed and on the right course and speed to execute the strategy? Third, if not, what architecture design or course changes are necessary?

The purpose of this report is to answer these three questions.

## "…TO TAKE AND KEEP THE LEAD"

Around 1890, the Department of the Navy, with the strong backing of the nation's political leadership, changed its guiding strategy for the global naval competition. Up until then, the DoN was content to participate in the race, but not to win it. Although powerful in its own hemisphere, the US fleet had never before sought to compete directly with or to surpass the world's top naval powers. After 1890, however, the DoN's new strategy—sometimes explicitly stated, sometimes not—was to become the world's number one naval power.[3] To paraphrase the motto of Thomas

[1] Alfred Thayer Mahan's reference to maritime multilaterism, as cited by Geoffrey Till, "Navies and the New World Order," *Proceedings,* March 2005, p. 62.

[2] The Department of the Navy and the Office of the Secretary of the Navy were established by an act of Congress approved on April 30, 1798 (1 Stat. 553; 5 U.S.C. 411-12). See "United States Navy," in the 1945 edition of the *United States Government Manual,* found at http://www.ibiblio.org/hyperwar/ ATO/USGM/ Navy.html.

[3] See Chapter 7, "Not Merely a Navy for Defense," in Kenneth J. Hagan, *This People's Navy* (New York: The Free Press, 1991). There are many superb one-volume histories of the Navy. I consider this book among the best of them. It is one of the primary historical references for this report.

Hardy, a friend of Horatio Nelson and British First Sea Lord in the mid-19th century, the DoN decided that, "Happen what will, America's duty is to take and keep the lead."[4]

This was an audacious strategy for a Navy that had for more than a century emphasized a strategy of hemispheric blockade breaking and global commerce raiding against stronger naval powers. Moreover, at the very time the United States decided to change its racing strategy, the naval competition was on the verge of an expensive naval *armaments* race between the great powers, centered around the armored, big-gun battleship. The new strategy thus promised to consume a fair share of the nation's resources. Nevertheless, with the blessing of both the Executive and Legislative Branches, the DoN set about building "incomparably the greatest Navy in the world."[5]

Five-and-a-half decades later, the DoN achieved its goal. Late in 1945, at his retirement ceremony as the Chief of Naval Operations, Fleet Admiral Ernest King was presented with a leather-bound text by the British Chiefs of Staff. The text read, in part: "Under your leadership as Commander-in-Chief, the United States Navy has grown, with unprecedented speed, into the most powerful in all the world."[6] This was a gracious acknowledgement that a century-and-a-half of British naval supremacy had come to an end, and the honor of being the top competitor in the global naval race had passed to the American Navy. Despite being pushed hard by the Soviet Navy during the long Cold War, it has yet to relinquish that position.

## TIME TO UPDATE DON'S RACING STRATEGY

After the fall of the Berlin Wall and the dissolution of the Soviet Union, US defense strategists and planners struggled to divine the outlines of a new national security era. As part of this effort, DoN planners began to forecast future naval challenges and to debate what changes in its strategy would be required for the United States to retain its lead in the maritime competition.

The Congress, vested with the Constitutional authority to maintain a navy, naturally expected that one key output of this process would be a new fleet platform architecture and an associated steady-state shipbuilding plan to go along with it.[7] The architecture and plan would outline—in a

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[4] Arthur Herman, *To Rule the Waves* (New York, NY: HarperCollins Publishers, 2004), p. 450. This is a great one-volume history of the British Royal Navy's rise to the top as the world's number one navy.

[5] The call for a Navy that was the "greatest in the world" came from none other than Woodrow Wilson, during his run for President. At the time, he was chided by many for being so bold as to challenge the primacy of the British Royal Navy. See Hagan, *This People's Navy*, p. 252.

[6] Stephen Howarth, *To Shining Sea: A History of the United States Navy, 1775-1991* (New York, NY: Random House, 1991), p. 472. This is another great one-volume historical reference of the US Navy. It tells the story of how the US Navy came to be the number one naval power through the eyes of a British historian.

[7] The Constitution adopted in 1787 required the Congress to "provide and maintain a Navy." However, it was not until 1798 that the US got around to forming a Department of the Navy. Peter M. Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002* (Alexandria, VA: Center for Naval Analysis, July 31, 2002), p. 15. This is a wonderful piece of work, which explains in detail the changing deployment patterns of the US Battle Force since 1775. It is packed with useful information, and is another of the primary sources used for this monograph.

very practical and concrete way—the judgments made by DoN leadership about the future they expected to unfold, the challenges or challengers they expected to face, and the platforms and capabilities needed to take them on and to prevail. Armed with this knowledge, the Congress could work to fund and help shape the future architecture.

Predicting the future is never easy. This is especially true during shifts between national security eras and during the demobilizations that generally follow the end of an especially serious national security challenge. Perhaps because of this, Congress was relatively patient throughout the 1990s as the DoN moved to reduce the size of its Cold War fleet, to consider and then describe the broad challenges it expected to face in the future, and to develop a coherent shipbuilding plan that would begin to shape its 21st century fleet platform architecture.

However, by 2002—more than a decade after the Soviet Union had officially disbanded—Congress was becoming increasingly frustrated with the inability of DoN leaders to articulate consistently their future fleet requirements; with the constantly changing rationale behind the DoN's future fleet platform architecture; and with the incessant and often dramatic changes that seemed to occur from year to year in its shipbuilding plans. This was reflected in the language of the conference report on the Fiscal Year 2003 (FY 03) Defense Authorization Act, which stated:

> In many instances, the Department of Defense ship acquisition program is confused….The conferees…believe that the DoN shares blame for the confusion because it has been inconsistent in its description of force structure requirements….Additionally, the conferees believe that the cost of ships will not be reduced by continually changing the number of ships in acquisition programs or by frequently changing the configuration and capability of those ships, all frequent attributes of recent DoN shipbuilding plans.[8]

This frustration was especially evident in the House of Representatives. In 2003, at the urging of Representative Roscoe Bartlett (R, MD), the House briefly considered mandating up to *six* independent, non-DoN analyses to help Congress to identify future fleet operational architecture and shipbuilding requirements. In Conference, the House decided to require the Secretary of Defense to submit to Congress *two* "Naval Fleet Platform Architecture Studies." The House directed that one of the studies be conducted by the Office of Force Transformation (OFT), Office of the Secretary Of Defense, and the other by an independent Federally Funded Research and Development Center (FFRDC). The Secretary of Defense assigned the second study to the Center for Naval Analysis (CNA), an FFRDC managed by the CNA Corporation, headquartered in Alexandria, Virginia. The studies were to be submitted to Congress in January 2005.[9]

The Center for Strategic and Budgetary Assessments (CSBA), a not-for-profit, non-partisan think tank, decided to conduct a third, independent Naval Fleet Platform Architecture Study.

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[8] Conference Report (House Report 107-722, November 12, 2002) on the Fiscal Year 2003 Defense Authorization Act (House Resolution 4546, passed as Public Law 107-314), pp. 449-50.

[9] Fiscal Year 2004 (FY 2004) Defense Appropriations Bill (House Resolution 1588, passed as Public Law 108-136).

CSBA anticipated that the CNA plan would evolve into an analytical explanation of the DoN's evolving strategies and plans, and that the OFT Study would be focused more on the "Navy After Next." CSBA hoped to provide a bridge between the two legislatively mandated studies by postulating near- to mid-term naval operational requirements and developing a practical roadmap for "transforming" the DoN Battle Force for the 21st century.

A key goal of the CSBA approach was to "design to budget." That is, CSBA tried to forecast future fleet operational challenges, to prioritize fleet requirements, and then to design a future DoN Battle Force that could both meet all fleet requirements *and* be built within expected shipbuilding budgetary ceilings. The result of this effort, outlined in this report, was a naval platform architecture designed to assemble distributed and scalable **Integrated Naval Battle Networks** effective in all potential maritime access conditions and against all potential challengers. The ships that are part of the aggregate naval network architecture—or **Total Force Battle Network (TFBN)**—can be built with a steady-state total shipbuilding budget of approximately $11-12 billion in Fiscal Year 2005 (FY 05) constant dollars.

## SCOPE

As will be discussed, Integrated Naval Battle Networks consist of much more than just ships. Indeed, the future DoN Total Force Battle Network will include, at a minimum:

- Warships, including aviation power-projection platforms, surface combatants, and submarines;

- Sea-based expeditionary maneuver platforms, such as amphibious landing and maritime prepositioning ships;

- Combat logistics and fleet support ships like fleet oilers and ammunition ships;[10]

- Aircraft, ranging from strike fighters like the F/A-18E and the Joint Strike Fighter, to air battle management aircraft, like the E-2C;[11]

- A wide variety and potentially large number of unmanned systems, ranging from unmanned aerial vehicles (UAVs) and unmanned combat air vehicles (UCAVs),[12]

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[10] The primary reference for US ships and vessels used for this report is Norman Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition (Annapolis, MD: Naval Institute Press, 2005).

[11] The primary reference for US naval aircraft used for this report also is Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition.

[12] For a good general discussion on UAVs and UCAVs, see David A. Fulghum. "Unafraid and More Than Alone," *Aviation Week and Space Technology*, December 15, 2003. The Department of Defense has recently replaced the term *unmanned aerial vehicles* with *unmanned aircraft systems*. However, this report will use the old terms to prevent confusion. See Vince Crawley, "Pentagon: Don't Call Them UAVs Anymore," *DefenseNews.com*, August 17, 2005.

unmanned surface vehicles (USVs),[13] and unmanned underwater vehicles (UUVs), especially autonomous underwater vehicles (AUVs);[14]

- A variety of Marine Air-Ground Task Forces (MAGTFs) and combat units;[15]

- A variety of Naval Special Warfare (NSW) units;[16] and

- The officers, Sailors, and Marines who operate and employ the networks and their various platforms.

All or these components will be linked together by a dense web of man-to-man, man-to-machine, and machine-to-machine interfaces, and operate as a single collective network, referred to in the contemporary DoN vocabulary as "ForceNet."[17]

However, in the keeping with the intent of the House of Representatives' legislation, this study focuses on *the ships and vessels that carry DoN and Joint personnel into harm's way, and from which DoN and other service personnel operate and employ the Total Force Battle Network's full range of ships, units, sensors, weapons, aviation platforms, and unmanned systems.* As a result, the study will comment on DoN aviation and unmanned system requirements, and the makeup and organization of US Marine and Naval Special Warfare Units, only insofar as they impact on overall platform (ship) architecture design and operations.

## ORGANIZATION

As should now be evident, this report uses a naval racing metaphor to present the rationale behind the recommended changes to the DoN's naval competitive strategy and to describe its associated fleet platform architecture. This metaphor is not meant to imply that the United States is in the midst of a general naval *armaments* race. Indeed, at this point in the naval competition, the naval armaments race is relatively sedate. The "race" herein refers to the enduring competition that occurs between naval powers on the world's oceans, and between naval and continental powers in the coastal intersection between sea and land—the littorals—to achieve either global or regional naval superiority.

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[13] A good overview on USVs is found in Nick Brown, "Not Just a Remote Possibility: USVs Enter the Fray," *Jane's Navy International*, January/February 2004, pp. 14-19.

[14] AUVs are the subject of Mark Hewish and Joris Janssen Lok, "Silent Sentinels Patrol the Depths," *Jane's International Defense Review*, April 2003, pp. 49-54.

[15] See "Marine Air Ground Task Forces (MAGTFs)," at http://www.globalsecurity.org/military/library/policy/army/fm/90-31/Appb.htm.

[16] See "Naval Special Warfare Command," at http://www.globalsecurity.org/military/agency/navy/navspecwarcom.htm.

[17] For a good general overview of ForceNet, see Rear Admiral Thomas E. Zelbor, US Navy, "'FORCEnet' is the Navy's Future," *Armed Forces Journal*, December 2003, pp. 48-50.

In keeping with this metaphor, Chapter II, Reviewing the Ship's Log, looks at the DoN Battle Force's performance on previous race "legs"—or national security eras—with an eye toward gaining a better understanding of the cause-and-effect of past decisions regarding changes to the DoN's racing strategy and naval platform architectures. These past decisions and their outcomes help to frame better the decisions facing contemporary DoN strategists and planners.

Chapter III, Waiting for the Plot to Settle, reviews what is now known about the current race leg, and the strategy adjustments and design changes already taken by the DoN in response to the era's new maritime requirements. It then examines the gathering winds of change, and how they should affect DoN strategic planning.

Chapter IV, "Noon Shot," measures the DoN's relative position among world naval powers by taking a metaphorical navigational "sighting." Knowing where the US stands in the global maritime competition will help to determine the urgency of needed changes to the DoN's naval platform architecture.

Chapter V, Racing Forecasts, makes predictions about the range of maritime access conditions in which future naval forces must be capable of operating; the key operational challenges and challengers that these forces might confront in the first two decades of the 21$^{st}$ century; and expected future architecture design budgets.

Based on an understanding of how the competition has unfolded so far, the relative standing of the United States among world naval competitors, and how the future competition might unfold, Chapter VI, Race Prep, recommends a new naval competition strategy, and identifies the design philosophy and attributes that should guide the development of its supporting naval fleet platform architecture. It then outlines the specific guidelines that helped shape the alterative naval platform architecture developed in this report.

Informed by these discussions, the next eight chapters outline the rationale behind the recommendations for the four conceptual component "fleets" of the future Total Force Battle Network:

- Chapter VII discusses and develops the requirements for the ***Strategic Deterrent/Dissuasion Fleet***;

- Chapter VIII discusses and develops the requirements for the *National* ***Global Patrol/Irregular Warfare/Homeland Defense Fleet***; and

- Chapter IX discusses and outlines the development of the ***Counter-Anti-Access/Area-Denial Fleet***.

- After a brief interlude discussing the conceptual rationale behind the ***Sea as Base Power-Projection Fleet*** in Chapter X, the next four chapters discuss its component parts:

- Chapter XI discusses requirements for Aviation Power-projection Platforms;

- Chapter XII discusses the requirements for the Surface Combatant "Battle Line;"
- Chapter XIII develops the requirements for the Sea as Base Expeditionary Maneuver Fleet; and
- Chapter XIV looks at the Combat and Mobile Logistics Forces and other support ships.

Chapter XV then summarizes and outlines the entire naval fleet platform architecture, and compares it against the architecture design goals outlined in Chapter VI.

# II. REVIEWING THE SHIP'S LOG

> Whether you are sailing a state-of-the-art racing boat or the smallest dinghy, the main idea in sailing is to collect the force of the wind and to redirect it so you can move forward.[18]
>
> *Riding the Wind and Water*

> …the best strategies, like the most efficient navigators, keep the winds behind them.[19]
>
> John Lewis Gaddis, 2005

## PAST AS PROLOGUE

Taking the lead in the global naval race required good strategic planning by DoN leaders, sound changes in naval fleet architectural design, and smart battle execution by the DoN's Battle Force. In sailing terms, it required DoN strategists and planners to skillfully harness the winds of change; Battle Force designers to continually tune the naval platform architecture to account for changes in the competitive environment; and Navy and Marine officers to make sound tactical decisions under actual racing conditions.

Before DoN strategists and planners attempt to collect the gathering winds of change and redirect it to help move the Battle Force in a new direction, it might be helpful to review past changes to the DoN competition strategy and architecture design ordered by past DoN leaders. The purpose of this review would be to answer some preliminary questions: What shift in the global naval competition prompted these changes? What were their intended results? What impacts did the changes have on the contemporary naval platform architecture? Were the changes effective? Why or why not?

The answers to these questions will be helpful on at least two levels. First, they might provide hints on how to better harness the contemporary winds of change to move the Battle Force forward into the 21st century. Since 1775, when the Continental Navy and Marine Corps were formed, American naval forces have sailed under varied racing conditions and have confronted many challengers. Only the most arrogant and stubborn of modern naval strategists and architecture designers would ignore the hard-fought lessons learned on previous "legs" of the competition. Indeed, these lessons learned might suggest how best to handle *future* conditions

[18] In "Riding the Wind and Water," found at http://www.riverdeep.net/current/2000/03/front.060300.sail. html.

[19] John Lewis Gaddis, "Grand Strategy in the Second Term," *Foreign Affairs,* January/February 2005, p. 14.

and challengers. As strategist Colin Gray reminds us, "The past is an uncertain guide to the future, but it is all we have."[20]

Second, reviewing past performance may help naval platform architects to identify and eliminate key sources of Battle Force friction. As any designer knows, friction prevents the efficient performance of any sailing craft:

> In an ideal situation, the wind [will] blow hard, and the sailboat [will] go full speed ahead. But there are other forces a sailor—and a boat designer—have to consider. For starters, the contact between the water and the boat's hull produces friction. This friction can become substantial because the boat's keel—which is needed for stability—extends downward several feet into the water.[21]

It is therefore imperative that naval strategists and planners work to reduce or eliminate sources of friction that will impede the Battle Force's forward progress. In this regard, Battle Force friction comes in two varieties. The first, institutional friction, comes from the Battle Force's constant contact with its past. Indeed, after over 200 years of competition, the Battle Force's "keel" runs quite deep. Influences from past eras may be inappropriate for the new one, and actually work against implementing the changes necessary to improve Battle Force racing performance.

The second source of friction results from there being no less than seven major stakeholders for the American entry in the naval competition: the Executive Branch; the Legislative Branch; the Office of the Secretary of Defense (OSD); the Office of the Secretary of the Navy; the shipbuilding industry; and, perhaps most importantly, the two services that man the Battle Force in actual competition—the US Navy and the US Marine Corps. Any change to DoN competition strategy and Battle Force design must satisfy, to some extent, each of these stakeholders. As history has proven, this is often a difficult task.

By taking the time to review the "Ship's Log"—a recapitulation of Battle Force performance, design decisions made by Battle Force planners and designers, and the outcomes of discussions and interactions between Battle Force stakeholders on previous "race legs"—today's DoN strategists and planners might be better prepared to design a future naval platform architecture. Said another way, by shining a light on the past and being better aware of the similarities and differences between contemporary and past circumstances, contemporary planners should be able to better understand the architecture choices and decisions now before them. They should also be better able to anticipate how the two sources of architecture friction might manifest themselves, and better understand the design steps necessary to minimize their drag. If so, the chances of repeating past mistakes will be greatly lessened.

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[20] Colin Gray, March 15th Notes, Principles of War Seminar Series, "What Do We Know About Future Warfare?" found online at http://jhuapl.edu/POW.

[21] "Riding the Wind and Water."

## Identifying Previous Race Legs

There are many different ways to interpret the history of the Battle Force's participation in the global naval race. This author prefers the framework suggested by Samuel Huntington in a 1954 article published in the *US Naval Institute Proceedings*, entitled "National Policy and the Transoceanic Navy."[22] In this article, Huntington wrote that the history of the United States could be divided into broad national security policy eras. In each era, the armed services were each tasked to perform different missions in support of contemporary national security policy. These taskings often required the individual services to adjust significantly their strategies and force structures developed during the previous strategic era. How successful the services were in accommodating the requirements of a new strategic era was reflected in the relative level of national resources devoted to each of them. Services that contributed less to the accomplishment of new national security goals or which refused or were unable to adjust to the new strategic environment lost out when national security resources were apportioned by the Congress.

By 1954, Huntington reasoned that the United States had transitioned through two previous national security eras and was well into a third. During each of the two previous eras, DoN leadership had worked to understand what national leaders expected the Battle Force to do; to analyze the strengths and weaknesses of its actual or perceived competitors; and to assess the state of contemporary naval technology. Informed by these efforts, the leadership developed new strategies for the global maritime competition and made necessary changes to the Battle Force's design. These changes were reflected in the contemporary naval fleet platform architecture, which defined a distinct supporting Battle Force Era. Huntington argued that the shift to the third national security policy era should trigger similar changes to DoN's overall naval competition strategy, as well as to the size, shape, and character of the DoN Battle Force. He cautioned that unless the DoN leadership made such changes, the Department's relevancy would decline, as would its share of defense resources.[23]

Huntington's broad national security eras, appropriately modified, thus help to define the previous legs of the global naval competition, at least since America first entered the competition. Accordingly, what follows is a brief summary of what happened on these legs. The lessons illuminated will help to frame many of the recommendations found later in this report. Those readers not interested in this brief historical recap should skip to the next chapter.

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[22] Samuel Huntington, "National Policy and the Transoceanic Navy," *US Naval Institute Proceedings*, May 1954, pp. 483-93. This is a superb short article, written by Huntington nine years after the end of World War II. It is, in essence, a call to naval leaders to think more broadly about the Battle Force's role in a new national security policy era. Huntington's powerful thoughts inform my thinking, and infuse this monograph.

[23] As will be seen, Huntington's line of thinking was shaped by historical experience though 1954. During peacetime, the US would devote the majority of its resources to a single, dominant service. Today, with the rise of Joint warfare and emphasis on "Unified Action of the Armed Forces," this dominant service model no longer applies. Nevertheless, the importance of explaining a service's contributions to the furtherance of contemporary national security policy remains vitally important, especially given the incessant defense reviews that have marked the post-Cold War period.

# THE REVOLUTIONARY WAR, 1775-1783: WARMING UP (TESTING THE WATERS)

> It is the maddest idea in the world to think of building an American fleet…we should mortgage the whole continent.[24]
>
> Samuel Chase, 1775

That the United States should even enter the global naval competition was an idea hotly debated, even after American delegates decided to fight the British Empire for their independence. On October 3, 1775, the Rhode Island delegation to the Continental Congress introduced a resolution that the Congress build and equip a fleet as soon as possible. Samuel Chase of Maryland—among others—disagreed. As indicated by his words above, Chase believed that the cost of such a fleet, and the unhappy prospect of taking on the British Royal Navy, argued against sponsoring an entry into the global naval race.[25]

Soon thereafter, however, Congress learned that two unarmed and unescorted brigs, loaded with war supplies, had left England bound for America. The Congress asked that Massachusetts, Connecticut, and Rhode Island provide armed schooners to capture the brigs "on the continental risque (*sic*) and pay."[26] Building upon this Congressionally-sponsored, State-executed adventure, on October 13, 1775, Congress authorized the fitting out of two small armed vessels to intercept British transports approaching the east coast. The Continental Navy was born. Less than one month later, on November 10, 1775, the Continental Marine Corps was also established. Marines would augment the crews of US warships at sea and form the core of the fleet's landing forces. Although not called so at the time, the first American Naval Battle Force—an integrated force consisting of both the Navy and Marines—was born.[27]

Unfortunately, as was pointed out by skeptics like Samuel Chase, the new Battle Force had to compete immediately against the world's number one naval competitor, the British Royal Navy.[28] With little more than courage and pluck, the results were predictable: all fleet/squadron actions fought by the Continental Navy along the North American coast led to US defeats. Out of

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[24] Samuel Chase, October 1775, as cited in Hagan, *The People's Navy,* p. 1.

[25] See Hagan, *This People's Navy,* p. 1; and Howarth, *To Shining Sea,* p. 6.

[26] Hagan, *This People's Navy,* p. 2.

[27] Hagan, *This People's Navy,* pp. 3-4; and Howarth, *To Shining Sea,* pp. 6-7.

[28] From the very beginning, US naval officers both admired and feared the Royal Navy, and dreamed of one day surpassing them as the number one naval power. As John Paul Jones stated: "I propose not our enemies as an example of our general imitation—yet as their Navy is the best regulated of any in the world, we must in some degree imitate them, and aim at such further improvement as may one day make ours vie with and exceed theirs." As cited in Howarth, *To Shining Sea,* p. 19.

pure necessity, the DoN's initial racing strategy turned to waging *guerre de course*—French for "war of the chase"—or privateering and commerce raiding. The Continental Battle Force's emphasis on commerce raiding is best summed up by the following figures: the total number of ships in the Continental Navy from 1775-1783 never exceeded 80, of all classes. In contrast, the total number of Congressionally-authorized privateers reached 1,647 ships carrying almost 15,000 guns, and these numbers did not include the privateers authorized by the individual states, such as Massachusetts and Rhode Island, which authorized 1,000 privateers on their own.[29]

It was only with the help of battleships provided by the French Navy that the Continental Battle Force was ever able to contest British naval superiority along the eastern coast of America. Even these instances were relatively rare, occurring only twice, between September 1779 and July 1780, and again between August and October 1781. However, the second period—spanning the Battle of Yorktown—proved to be the most decisive battle of the war.[30]

## The Navy-Marine Corps Team: a Blissful Courtship

The Navy and Marine Corps were born within one month of each other, and they bonded together in the intense heat of wartime competition. Marines sailed with, fought with, and died alongside Sailors in all major ship actions, and Sailors accompanied, fought with, and died alongside Marines on all landing parties. Although Marines sometimes fought on land under the control of Army commanders, the operational linkages between the two naval services remained necessarily strong.[31]

## Influences on Change

The Revolutionary War "warm up" period was to have a great influence on the first American leg in the global naval race, since it helped to outline a strategy that might allow the new United States to compete at a reasonable cost and with significant payoff, even if it had little chance (or desire) to win the race. According to historian Kenneth J. Hagan, the elements of this strategy were based on "four emotions:" a distrust of large fleets; a reluctance to challenge a strong opposing navy; a fondness for attacking an enemy's merchant vessels and cargo ships; and a desire to limit naval defense expenditures.[32]

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[29] Hagan, *This People's Navy,* pp. 16-17; and Howarth, *To Shining Sea,* pp. 14-16. The Continental Navy was essentially a 50-ship force, although its numbers varied widely. With the state privateers, the American Navy comprised perhaps the 13th largest naval force in the world. Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002* p. 13.

[30] Hagan, *This People's Navy,* pp. 18-20; and Howarth, *To Shining Sea,* pp. 43-48.

[31] Jack Murphy, *History of the US Marines* (New York, NY: Exeter Books, 1984), pp.14-16.

[32] Hagan, *This People's Navy,* p. 2.

# THE CONTINENTAL ERA, 1783-1889: READY, SET, GO (BACK IN THE PACK)

> This country is particularly fitted for a navy: abounding in all kinds of naval resources, we have within ourselves the means which other navies are obliged to obtain from abroad. The nature of our situation, and the navigating disposition of a considerable proportion of our citizens, evince still more the propriety of some Naval Establishment.[33]
>
> William Smith

The first national security policy era started with the disestablishment of the forces that fought and won the Revolutionary War: the Continental Army, the Continental Navy, and the Continental Marine Corps. The last remaining Revolutionary War warship—the 32-gun frigate *Alliance*—was sold in 1785.[34] The primary intent of the disestablishment of the Continental Naval Battle Force was to save money. A secondary intent was to limit the tools that might induce the new republic to indulge in great power struggles overseas.[35]

However, attacks by the Barbary pirates on US ships in the Mediterranean (believed by the United States to be instigated by the British) were continuous from 1783 on, prompting a long-running debate over the merits of once again entering the global naval competition. Those against the idea believed that buying the pirates off would be cheaper in the long run than building a fleet, and that the "sending of armed ships into the midst of the fleets of Europe would certainly produce a quarrel." Those for the idea pointed out that the cost of outfitting a fleet would be small in comparison to the high insurance rates being paid by US traders, and the repugnant tributes being paid to pirates.[36]

By 1794, attacks on US merchantmen had reached a level that even a reluctant Congress could no longer ignore. In March of that year the President signed *An Act to Provide a Naval Armament*, which authorized the purchase of four 44-gun and two 36-gun frigates. With this Act, the United States appeared set to officially enter the global naval race. However, the Act proved to be a false start; an attached Amendment stipulated that if the United States achieved peace with the Barbary States, then there would be "no further proceeding…under this act." Continued diplomatic maneuvering by the United States led to successive ship production delays.[37]

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[33] As cited in Hagan, *This People's Navy,* p. 30.

[34] Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002,* p. 14.

[35] Howarth, *To Shining Sea,* pp. 48-49.

[36] Hagan, *This People's Navy,* pp. 21-30; and Howarth, *To Shining Sea,* pp. 48-51. The embedded quote is attributed to William B. Giles from Virginia, in Hagan, p. 29.

[37] Hagan, *This People's Navy,* pp. 31-32; and Howarth, *To Shining Sea,* pp. 48-51.

Finally, in 1798, faced with a "quasi-war" with France and stung by continued attacks and insults from the Barbary Pirates, Congress decided that the United States needed to build and maintain a navy, despite the high associated costs, Thus, on April 30, 1798, Congress passed an act establishing an independent executive Department of the Navy. Soon thereafter, on July 11, 1798, the US Marine Corps was also re-established, and the DoN Battle Force was reformed, for good.[38] The number of ships in the Battle Force quickly grew; by the end of the Quasi-War in 1801, the fleet numbered more than 50 warships, augmented by eight revenue cutters and 365 privateers.[39]

However, Congress continued to be reluctant to fully fund a large fleet of warships. After the Quasi-War with France, the number of ships in the Battle Force was once again reduced, this time to 14 ships. Then, President Jefferson, in a bid to save money, shifted the already meager DoN appropriations toward buying small gunboats designed to augment Army shore-based batteries protecting US ports. By 1812, on the eve of the second war with the British, the Battle Force included only 17 true warships.[40]

After the War of 1812, however, the Congress finally learned its lesson: a country with global interests required a competent Naval Battle Force. In the words of one naval historian:

> For the first time the American [Battle Force] did not have to face the burning question of whether it should continue to exist. This, at least, had been settled for the foreseeable future…Indecisive in all other ways, the war of 1812 was the greatest single factor in preparing the United States [Naval Battle Force] for the destiny that awaited it.[41]

Although the War of 1812 settled the question of whether the United States should have a competent Naval Battle Force, the character of the Battle Force and its naval fleet platform architecture was shaped first by the national security policy imperatives of the Continental Era: to forge, protect, and preserve the Union; to repel attacks on the Union from outside and inside the hemisphere; and to screen the national expansion to the limits of the US continental borders. As suggested by these broad missions all major wars, during this era were fought on the North American continent; the American military mounted no major "out of area" (extra-continental) operations, except for relatively small naval expeditionary missions designed to protect US interests overseas.[42] The dominant armed service throughout this period was the US Army.[43]

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[38] Howarth, *To Shining Sea,*, pp. 58-72.

[39] Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002*, p. 14.

[40] Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002*, pp. 16-18.

[41] Captain Edward L. Beach, USN, ret., *The United States Navy: 200 Years* (New York, NY: Henry Holt and Company, 1986), p. 142. This is another great one-volume history of the US Navy.

[42] The largest "expeditionary" operation mounted outside America's continental borders during the period occurred during the Mexican War, when the Battle Force mounted a blockade of the Mexican coast and launched attacks on Mexican soil from the sea. Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002*, p. 21.

Given these circumstances, the DoN's competition strategy did not entail winning the global naval competition, or even rivaling the top competitors. In addition to protecting US global trade and interests in peacetime, the strategy focused on coastal defense, blockade-breaking, *guerre de course*, and support of US land forces during wartime. This strategy—clearly influenced by naval lessons learned during the Revolutionary War—accepted relative US naval weakness in transoceanic "away games," but demanded stronger performance in hemispheric "home games."

As suggested by Huntington, this naval competition strategy had a major impact on both the Battle Force's naval platform architecture as well as its operational patterns. Although the United States did operate a few "ships of the line," DoN leadership elected to "devote scarce resources to small ships that could protect US maritime trade in peacetime and raid enemy sea-based commerce in wartime." Accordingly, the "capital ship" of the fleet was initially the sailing "frigate," and later the steel "cruiser," and the fleet included numerous small vessels.[44] As a result, the first Battle Force Era is best described as the Frigate Era.

Throughout the Continental/Frigate Era, the DoN's peacetime mission of protecting US trading interests and its wartime mission of commerce raiding demanded that US ships operate globally. Despite the Battle Force's small size—or perhaps because of it—DoN leaders decided to operate the Battle Force from a forward-deployed posture.[45] This posture led to the gradual development of naval "forward stations." Except during the Civil War, between 1815 and 1889 the DoN Battle Force operated out of several forward stations, although not all were maintained simultaneously or continuously. The most important of these stations were the East India Station (Western Pacific); Pacific Station (West Coast of South America); West India Station (Caribbean); Brazil Station (East Coast of South America/South Atlantic); Africa Station (West Coast of Africa); North Atlantic Squadron/Station; and the Mediterranean Station.[46]

Since the DoN racing strategy was to avoid direct competition with the top naval competitors, the DoN Battle Force was a relative lightweight among world naval powers throughout the era. Two snapshots help to summarize the Battle Force's standing in the global naval competition. Just after the War of 1812 broke out, the US Navy had 17 seaworthy ships with 442 guns and 5,025 officers and men; in contrast the Royal Navy had 640 commissioned ships—including 124 ships of the line and 116 frigates—carrying 27,800 guns and 151,572 men.[47] Over seventy years

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[43] Huntington, "National Policy and the Transoceanic Navy," pp. 485-86.

[44] See the discussion in Hagan, *This People's Navy*, pp. 45-48, and p. 93. The DoN did commission a few ships of the line, but not many. For example, between 1815 and 1841, the Battle Force had no more than six, and only one or two were deployed forward at a time. Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002*, p. 18.

[45] It was President James Monroe who "transformed the United States Navy from an episodic scourge of North Africa into a worldwide policeman." See Hagan, *The People's Navy*, pp. 94-95.

[46] The Battle Force actually manned forward stations through 1905. For discussions about fleet stations, see Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002*, pp. 18-21 and pp. 65-67.

[47] Benjamin W. Labaree, et al., *America and the Sea: A Maritime History* (Mystic, CT: The Museum of America and the Sea, 1998), p. 213.

later, when Congress authorized the ABCD steel ships in 1883, the US Navy ranked twelfth among world naval powers. In between, the Battle Force never rose above fourth place among the world's navies.[48]

### The Navy-Marine Corps Team: An Institutional Marriage

For over three decades after its reestablishment in 1798, the Marine Corps—equally adept at fighting onboard ship or on land—was part of the Army or the Navy "according to the nature of the service in which they shall be employed." This was an awkward arrangement; Marines were regulated alternately by either the Army's Articles of War or by Navy Regulations, depending on which service they reported to during operations. Moreover, it opened the door for repeated efforts by the Army and the Congress to either disband the Marines outright or to incorporate them into the Army.[49]

Finally, on June 30, 1834, an "Act for the Better Organization of the Marine Corps," made the Marines a semi-autonomous part of the US Navy with its own Headquarters and Commandant. This suited Major Archibald Henderson, who had served as Commandant of the Marine Corps since 1820, just fine. As he had written in 1823:

> The Marine Corps is, and must continue to be, an appendage of the Navy, participating in its prosperity or sharing in its adversity—in war braving with it the same dangers, and in peace asking nothing of it but sheer justice.[50]

In effect, this Act cemented the official institutional marriage between the two services that made up the Department of the Navy. As a result, the operational linkages between the Navy and Marines remained relatively close and strong throughout the Continental Era. The Battle Force's primary tactical unit of action remained the individual fighting ship; Marines continued to be an integral part of a shipboard combined arms fighting team, and Sailors and Marines continued to fight side-by-side in both ship actions and on landing parties. Although Marines could and did conduct sustained operations ashore (e.g., the Seminoles War and the Mexican War), after 1834 they would be forever be known as "Soldiers of the Sea."

### Influences on Change

Although more than a century past, the winds from the Continental/Frigate Era continue to exert at least four strong influences today. First, the value of being forward-deployed—referred to today as forward presence—was ingrained throughout the Battle Force during this nearly

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[48] The "ABCD ships" were the first US warships made of steel. They included the cruisers *Atlanta*, *Boston*, and *Chicago*, and the dispatch boat, *Dolphin.* Labaree, et al., *America and the Sea: A Maritime History;* Beach, *The United States Navy: 200 Years*, p. 322. Information on the Battle Force's world ranking was drawn from Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002.*

[49] Murphy, *History of the United States Marine Corps*, p. 18.

[50] Murphy, *History of the United States Marine Corps*, p. 27.

century-long era. Although the country's national security policy was continental in focus, and the size of the Navy and Marine Corps small in relation to the top three global naval competitors, DoN Battle Force operations were decidedly global in scope. The Quasi-War with France and expeditions to quell the Barbary pirates between 1798 and 1805 set the tone for Battle Force operations for the remainder of the era. The preferred DoN operational pattern was *distributed squadron operations* and *distributed, independent ship operations*, so as to provide the greatest global coverage with a relatively small number of ships. The desire for a strong forward-deployed naval posture continues to exert a powerful influence on all DoN racing strategies.[51]

A second strong influence was the ingrained expeditionary mindset that identifies all Sailors and Marines to this day. Throughout the era, the Sailors and Marines that manned the small forward deployed squadrons and their individual ships conducted numerous small expeditionary operations in support of US interests. Operating independently and out of communications with "higher headquarters," commanders trained their crews to respond flexibly and adapt to circumstances, and, when the situation dictated, to conduct decisive and aggressive action. The emphasis on rapid situational assessment, adaptation, and opportunistic, independent action remains a hallmark of contemporary naval expeditionary operations.

A third influence is the consistent inclination of US naval designers to "over-spec" US warships.[52] In the early years of the Continental/Frigate Era, the pursuit of the most technologically advanced ships was the natural result of the Battle Force's inferiority in numbers,[53] and a tactical doctrine which required its frigates to operate "alone and unafraid." The initial result was the development of a class of "super-frigates," true "transformational" warships whose firepower and speed gave their commanders the "power to engage, or not, any ship, as they may think proper; and no ship, under sixty-four guns, now afloat, but what must submit to them."[54] While the DoN's emphasis on building ships that could overmatch any ship in their respective classes was the classic response of an inferior Battle Force, its predilection for seeking a dominant naval technological overmatch in its ship classes lasted long after the US Battle Force became the number one world naval power. As a result, US ship designs often chase technological improvement for improvement's sake, unbounded by budget considerations.

Finally, the "contract" forged between Congress, the DoN, and the US shipbuilding industry in the Continental/Frigate Era continues to exert a strong contemporary influence. During this era,

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[51] Swartz's *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002* is especially good at portraying the global operations of the Battle Force throughout this era, and up to the present day.

[52] "Over-spec," short for over-specify, refers to levying operational requirements on ship designs above those called for by the ship's mission.

[53] Howarth, *To Shining Sea,* pp. 55-58.

[54] Hagan, *This People's Navy,* pp. 32-34. For a great explanation for why these first US ships were "transformational," see The Johns Hopkins University Applied Physics Lab (JHU-APL), "Technology, Navy & the Budget at the Dawn of the New Millennia," an undated PowerPoint presentation, provided to the author by Duncan Brown. See also Steve McQuillan, "US Super Frigates—America's High-Tech Weapons of the 1790s," at http://www.geocities.com/Broadway/Alley/5443/supfrig.htm.

the ability to build technologically advanced ships was a proud reflection of growing US technological prowess. More to the point, the ability (or inability) to build advanced ships would have a major impact on US naval competition strategy. Congress, attuned to this point, and ever mindful of the nation's limited appetite for peacetime defense spending, took early steps to ensure that key states would support the resources necessary to maintain both a strong navy and a vibrant shipbuilding base. In essence, this involved their sanctioning of an inefficient shipbuilding base spread over several states. Indeed, when building the six aforementioned "super-frigates," the Congress decreed that they be built in six different shipyards![55] Since this first fateful decision, "efficient" construction strategies have often given way in the face of Congressional determination to gain state support for a strong navy and to maintain a capable industrial base.

## THE OCEANIC, OR EXPEDITIONARY, ERA, 1890-1946: RACING TO WIN (STALKING THE LEADERS)[56]

> The American people must either build and maintain an adequate navy, or else make up their minds definitely to accept a secondary position in international affairs.[57]
>
> President Theodore Roosevelt

In 1890, two unrelated events marked the shift to a new national security policy era. First, Wounded Knee—the last "battle" inside the borders of the continental United States—was fought and won; the continent was finally secure.[58] This resulted in a natural expansion of the United States' national security aperture. As Senator Henry Cabot Lodge declared in 1895, "We are a great people; we control this continent; we are dominant in this hemisphere: we have too great an inheritance to be trifled with…It is ours to guard and defend."[59] Second, Alfred Thayer

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[55] See Howarth, *To Shining Sea*, p. 57; and JHU-APL, "Technology, Navy & the Budget at the Dawn of the New Millennia."

[56] Huntington refers to this era as the Oceanic Era. The term "Expeditionary Era" is my own, for reasons explained in the text.

[57] Howarth, *To Shining Sea*, p. 275.

[58] There were actually two more Indian battles fought after Wounded Knee—one in 1913 and one in 1915. However, the Battle of Wounded Knee is recognized as being the last "battle" of the long war against the plains Indians. See "The Battle of Wounded Knee," at http://college.hmco.com/history/readerscomp/rcah/html/ah094200woundedkneeb.htm; and "The Last Battle: Wounded Knee," at http://www.wealth4 freedom.com/ truth/1/ indian5.htm.

[59] As cited in Hagan, *This People's Navy.*

Mahan's *The Influence of Seapower on History* gave the nation's leaders a concrete reason to extend the country's national security perimeter, and outlined the means to do so.[60]

As described by historian Walter MacDougal in his book, *Promised Land, Crusader State,* these two events, among others, helped to trigger an intense debate between two groups of passionate national security policy advocates.[61] One group generally subscribed to the four books of the "Old Testament" of US foreign policy, which taught that the United States was a promised land in a dangerous world. This group sought to prevent the outside world from shaping America's future; it believed the proper US global role was to be an example of state responsibility and freedom. The other group subscribed to the four books of the "New Testament" of US foreign policy, which taught that the United States should be a confident crusader for freedom in a dangerous world. This group believed that America should actively work to shape the outside world's future toward one compatible with its own values and ideals.[62]

The debate between these groups and their two world views continued throughout the 1890s. However, one thing the two groups generally agreed upon was that the United States needed a navy that could compete against the world's best—either to enforce the Monroe Doctrine and to protect its shores from foreign invasion, or to protect US interests and to project US values throughout the world. As a result, throughout the 1890s the Congress approved the development of a "New Navy" better able to compete in the global naval competition:[63]

> At the end of the nineteenth century, in the interval between the Anglo-German-American crisis over Samoa and the Spanish-American War, the Congress reshaped the navy to meet new national goals. Having rounded out its continental borders, the United States was seeking…a place of equality with the greatest navies of Europe.[64]

Indeed, the stunning success that this New Navy enjoyed during the Spanish-American War helped to settle the debate between the adherents of Old and New Testaments of US foreign

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[60] See Hagan, *This People's Navy,* pp. 189-92; and Howarth, *To Shining Sea,* pp. 233-38. Mahan actually wrote and delivered his lectures on "sea power" at the Naval War College between 1885 and 1889. However, he published them nationally in 1890. A.T. Mahan, *The Influence of Sea Power Upon History, 1660-1783,* 12th edition, (Boston, MA: Little Brown & Company, 1890).

[61] Walter A. McDougall, *Promised Land, Crusader State: The American Encounter With the World Since 1776* (Boston, MA: Houghton Mifflin Company, 1997). This slim volume is a joy, describing the eight books found in the American "bible" on foreign affairs.

[62] McDougall, *Promised Land, Crusader State: The American Encounter With the World Since 1776,* pp. 1-12. As MacDougal writes on p. 5, "The fact that even today all eight traditions [i.e., books] still command loyalty from at least a portion of the American people helps to explain why—except in times of immediate danger—we find it so hard to agree as a people on how to behave beyond our own borders."

[63] The radical transformation of the US Battle Force from a frigate force focused on commerce raiding to a battleship force focused on the destruction of an opposing battle line is often referred to as the building of the "New Navy." See Howarth, *To Shining Sea,* pp. 231-34.

[64] Hagan, *This People's Navy,* p. 389.

policy—at least for a time. After the elections of Presidents McKinley and Theodore Roosevelt, the teachings of the New Testament guided US national security policy more often than not, and national leaders generally supported—however reluctantly—an ever-expanding US involvement on the world stage.[65]

Accordingly, the primary role of US armed forces during this era gradually shifted away from a focus on hemispheric defense and toward mounting large-scale expeditionary operations overseas in support of US global interests.[66] In an age before air power, and as outlined by Mahan, this meant that the DoN competition strategy had to shift away from that of *guerre de course* to *guerre d'escadre*—or fleet battle actions—in which a US armored battle line could confidently confront any opposing battle line, destroy it, and control the seas.[67] In other words, the DoN's basic naval competition strategy would need to change from racing not to lose to racing to win—to becoming the number one naval power in the world.[68]

Strong national support for this new naval competition strategy sparked a remarkable national naval shipbuilding and technology development program. In the process, the Navy supplanted the Army as the service with greatest claim on the nation's resources.[69] The frenzied pace of naval building activity during the early decades of the Expeditionary Era reflected the need to completely revamp the Battle Force's naval platform architecture to accommodate the shift from a Battle Force focused on hit-and-run commerce raiding to a Battle Force that could slug it out with the most powerful navies and warships in the world. The capital ship of the Navy thus shifted from the wooden frigate and steel cruiser to the larger, more complex, and more expensive battleship, which give its name to the second Battle Force Era.

The US decision and determination to be able to compete with the world's greatest naval powers was reflected by the Navy's standing in the global naval competition. As mentioned earlier, in 1883 the US Navy stood twelfth among the world's naval powers. By 1900, the United States boasted the sixth largest navy in the world, and it steady expansion continued. In 1901, 60 ships of all classes were under construction and the $78 million appropriations bill passed in the fall of

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[65] Congress and the national electorate concurred with President McKinley's initiative in taking on imperial responsibilities, and supported Roosevelt's muscular approach to foreign policy. While the national ardor for international action cooled somewhat in the second and third decades of the 20th century, the US presence on the world stage grew progressively stronger after the Spanish-American War. Benjamin W. Labaree, *et al., America and the Sea: A Maritime History* (Mystic, CT: The Museum of America and the Sea, 1998), p. 452.

[66] Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military Terms* defines an *expedition* as a "military operation conducted by an armed force to accomplish a specific objective in a foreign country." See JP 1-02 online at http://www.dtic.mil/doctrine/jel/doddict.

[67] Hagan, *This People's Navy,* p. xi.

[68] While US politicians and Navy officers were careful in their statements about challenging or surpassing the British Royal Navy, as has been discussed, it is clear that the Royal Navy's coveted number one spot was always in their sights. See Chapter 8, "Incomparably the Greatest Navy in the World," in Hagan, *This People's Navy.*

[69] Huntington, "National Policy and the Transoceanic Navy," pp. 487-88.

that year was the largest appropriation in US peacetime history.[70] In 1905, courtesy of the Imperial Japanese Navy's crushing defeat of Russia, the United States rose to number five among world naval powers, behind Britain, France, Germany, and Italy. The delivery of no less than thirteen armored cruisers and battleships in 1907, followed by six more in 1908, jumped the United States to the number two spot, behind only the Royal Navy. From that point on, the Battle Force never fell below third among the world's naval powers.[71]

The rapid rise of US naval power occurred at time of great technological change, which made the made the inter-era shift between the Frigate and Battleship Eras an especially difficult and extended one. The shift from coal to oil-fired propulsion systems; the development of the steam turbine; the introduction of the radio; the development of long-range, director-controlled gunnery; rapid advancements in armor and naval guns; and the appearance of the all-big gun battleship sorely tested naval designers and strained the nation's resources. Indeed, it was not until the 1916 commissioning of the USS *Nevada,* 26 years after the transition to the Battleship Era, that DoN designers felt they had finally got the basic component of the Battle Force right.[72]

Other major changes occurred during the turbulent shift between the Frigate and Battleship Eras. Chief among them was that the forward stations of the Frigate Era gradually gave way to two major fleets—one in the Atlantic Ocean and one in the Pacific—concentrated in US home waters.[73] Once the Panama Canal was completed, these two fleets could quickly combine, if needed, to meet threats in either ocean. However, the creation and concentration of the two large fleets did not result in the elimination of forward deployed naval forces. The influence of the Continental Era was too strong and the idea of forward naval presence was too indelibly imprinted in Battle Force operations to cause a complete redeployment to US home waters. The DoN Battle Force thus maintained forward presence in the Western Pacific and China as well as Europe, generally with squadrons of small combatants, occasionally augmented by cruisers and battleships. The Marines also maintained a Regiment in China after 1929, supported by the Asiatic Fleet. The reality of a battle line concentrated in home waters and forward presence relegated to smaller or older, less capable combatants and Marines was summed up nicely by a Naval War College monograph on the Interwar years entitled, *The Battle Fleet Trains While the Gunboats Fight*.[74]

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[70] Hagan, *This People's Navy,* p. 232.

[71] The US Navy gave up the number two spot to the German Navy for a short time before World War I. See Howarth, *To Shining Sea,* p. 295-96.

[72] Hagan, *This People's Navy,* p. 240. For a good short description of the evolution of the US battleship, see Chapter 14, "Idealism and Reformers," and Chapter 15, "World War I to Pearl and Midway," in Beach, *The United States Navy: 200 Years*. For comments on the *Nevada,* see p. 429.

[73] The creation of the Atlantic and Pacific Fleets and the concentration of the Fleets in home waters is a broad generalization of this Era. For a more thorough description of the details, see Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002,* pp. 28-47.

[74] Bernard D. Cole, "The Interwar Forward Intervention Forces: The Asiatic Fleet, the Banana Fleet, and the European Squadrons: The Battle Fleet Trains While the Gunboats Fight", a paper prepared for the US Navy Forward

Indeed, training the concentrated fleet battle line for combat became the over-riding focus of the peacetime DoN, especially after World War I. The natural inclination of any navy focused on sea control is to size up potential naval competitors and to prepare to fight and beat them. Britain had suffered grievous losses in World War I and was in no financial condition to block a US move toward naval parity. Therefore, by the early 1920s, DoN planners had concluded that the Imperial Japanese Navy (IJN) was the only worthy naval opponent left in the global naval competition, and the most likely opponent the US Battle Force might face in a future head-to-head competition.[75]

This conclusion helps to explain the three key US goals in the negotiations leading up to the Washington Naval Treaty: to achieve formal parity with the British Royal Navy in terms of aggregate tonnage; to establish an advantage over the IJN in terms of battleships and tonnage; and to end the two-decade old Anglo-Japanese Naval Alliance. Each of these three goals was achieved with the formal signing of the "Four Power Agreement"—one of nine treaties and twelve resolutions agreed to in the Washington Naval Conference of 1921-22. With this done, DoN planners turned their complete attention to refining War Plan Orange, the plan to defeat the Imperial Japanese Empire.[76]

Across the Pacific, IJN planning mirror-imaged that of the Americans'; it too saw a confrontation with the US Battle Force as the most likely of any future potential conflict.[77] The Interwar period was thus characterized by the patient preparation and training by the US and Japanese Navies, both of whom had the other in their sights. And in this regard, the US battle line's concentration in home waters facilitated both training as well as fleet operational experimentation, which took place during annual fleet battle problems:

> Freed from the need to plan and conduct large "real-world" forward presence and [Military Operations Other Than War], the fleet was principally a giant training center and laboratory, and its operations giant training drills and fleet battle experiments.[78]

The preparations for a naval war by both the United States and Japanese were constrained by the treaties and resolutions agreed to in the Washington Naval Conference, as well as subsequent

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Presence Bicentennial Symposium, June 21, 2001. See also Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002,* p. 39.

[75] Hagan, *This People's Navy,* p. 268-72. Hagan writes that by 1922, American naval planners regarded Japan as the only potential challenger to US naval supremacy. See his comments on p. 273.

[76] Howarth, *To Shining Sea*, pp. 337-342.

[77] A superb review of IJN planning can be found in David C. Evans and Mark R. Peattie, *Strategy, Tactics, and Technology of the Imperial Japanese Navy 1887-1941* (Annapolis, MD: Naval Institute Press, 1997).

[78] Swartz, *Sea Changes: Transforming U.S. Navy Deployment Strategy, 1775-2002,* p. 39. The cycle between war games at the Naval War College and Fleet Battle Problems and more war games at the War College is captured well in Thomas Hone, Norman Friedman, and Mark D. Mandeles, *American & British Aircraft Carrier Development 1919-1941* (Annapolis, MD: Naval Institute Press, 1999), pp. 32-37.

agreements. Moreover, during the 1920s the United States did not build up to its treaty tonnage limits, while the IJN built nearly 100 percent of its allowable tonnage—three-fifths of that authorized for the US and Royal Navy. Then, the arrival of the Great Depression initially slowed the rate of ship building in both countries, although by the mid-1930s both had picked up the pace.[79] The net result of all of these circumstances was that throughout most of the Interwar Period, the DoN Battle Force and the IJN were generally equally matched, and both navies spent enormous effort developing the weapons, tactics, techniques and procedures needed to beat the other in combat.

In this regard, War Plan Orange was shaped in no small part by the US overseas basing structure, another key developments in the Expeditionary Era. This structure resulted from the US victory in the Spanish-American War and a series of shrewd US island annexations. It included bases on Hawaii, Midway and Wake Islands, Guam, and the Philippines. Although the United States did occasionally erect modest forward operating bases on non-sovereign territory (e.g., China), US military planners clearly preferred basing US forces on sovereign or US-controlled territory. Over time, the pre-emptive loss of these Pacific forward bases became a constant focus of War Plan Orange.[80]

DoN strategists and planners assumed that the IJN would attempt to seize the Philippines early in a war, and would set up what today would be referred to as an "anti-access/area denial" (A2/AD) network, anchored by island-bases and airfields supported by mobile naval forces.[81] The challenge of penetrating such a network, forcing a decisive battle with the IJN, and relieving US forces on the Philippines spurred two decades of Fleet Battle Experiments, practical analysis, war gaming, and doctrinal development. The results included the development of carrier aviation, amphibious warfare strategy and tactics, and combat and mobile logistics concepts. All of which helped to ease the abrupt transition to war, initiated by IJN surprise attacks in

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[79] Howarth, *To Shining Sea*, p. 358. President Hoover pledged in the 1928 presidential campaign to build the Navy up to its treaty limits, but failed to do so, either before or after the Depression. President Roosevelt saw building warships as one of many government sponsored programs to pull the US out of the Depression. The National Industrial Recovery Act of June 1933 thus signaled that the US would build up to its treaty limits. The Naval Parity Act, signed the following year, confirmed this. See Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development 1919-1941*, pp. 56-58.

[80]As described in Hagan, the post-war Japanese acquisition of the German archipelagos in the Marianas, Caroline, and Marshall Islands and its sovereign possession of the Bonins and Ryukyus made US plans to hold or to rapidly reinforce the Philippines "practically impossible." The US tried to ameliorate the Japanese position by negotiating the "nonfortification" of all islands to the west of Hawaii and Alaska. See Hagan, *This People's Navy*, pp. 265-67.

[81] Anti-access and area-denial are modern terms use to describe actions which prevent US access to bases in a theater, or actions taken by an adversary to prevent US freedom of action in space, air, land and sea in a contested battlespace. The Japanese intent to set up what would today be referred to as an A2/AD network was revealed in a 1934 conference of Japanese admirals and field marshals. See Howarth, *To Shining Sea*, p. 358. A good visual depiction of the Japanese World War II A2/AD network can be found in Howarth on pp. 398-99. For a complete discussion on anti-access and area denial threats, see Andrew Krepinevich, Barry Watts, and Robert Work *Meeting the Anti-Access and Area Denial Challenge* (Washington, DC: Center for Strategic and Budgetary Assessments, 2003).

December 1941, and the relatively abrupt subordination of the battleship to the aircraft carrier that came with it.[82]

Over the course of World War II—during the waning years of the Expeditionary Era—the aircraft carrier replaced the battleship as the fleet's primary capital ship, and the fleet platform architecture changed to reflect this fact. Instead of fighting as a single concentrated battle line, the World War II Navy formed distributed fast carrier task forces capable of rapid concentration.[83] In the process, every ship class in the fleet except mine warfare ships played a different role than that for which it was originally designed.[84]

While the organization of the Battle Force changed, its purpose remained the same. As long as the Imperial Japanese and German Navies remained viable threats, the focus of Battle Fleet operations was to establish *sea control*—that is, to destroy the enemy fleets. However, by the latter part of World War II, after both the Imperial Japanese and German Navies had been rendered ineffective, the focus of the fleet turned to *power-projection*—projecting fleet and Joint combat power ashore in support of land campaigns. Reflecting this reality, by the end of World War II amphibious ships made up 37.6 percent of the entire TSBF, and the ratio of "amphibs" to major surface combatants in the Battle Force reached three to one.[85]

By 1945, as the Second World War came to a close, the United States achieved its guiding naval competition goal, set 55 years before. With 6,768 ships of all types and six Marine Divisions, its Battle Force had surpassed the British Royal Navy and Marine Corps as the largest and most

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[82] As decribed by Hone, Friedman, and Mandeles, DoN planners developed these concepts through two different types of games: "chart maneuvers," which covered such topics as the best route across the Pacific, and the kinds and locations of bases that needed to be seized to support the advance; and "board maneuvers," which dove into tactical details such as fleet formations, offensive and defensive techniques, and force mixes. While these games highlighted many of the problems associated with a cross-Pacific drive as well as the potential of the aircraft carrier, DoN planners still did not completely foresee the coming "carrier revolution." Nevertheless, the thorough examination of the carrier operations and tactics undoubtedly eased the transition to the Carrier Era. See Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development 1919-1941*, pp. 33, 74-82. For a great discussion of the overall effectiveness of both US and Japanese preparations for the war, see Allan R. Millet and Williamson Murray, eds., *Military Effectiveness, Volume II: The Interwar Period* (Boston, MA: Unwin Hyman, 1988).

[83] There were competing concepts for carrier aviation. One emphasized the carrier as the primary means to attack land targets; another envisioned the carrier as an auxiliary to the battleship; still another saw the carrier as the centerpiece of a long-range striking force. The "carrier revolution" did not fully manifest itself until 1943, when the DoN perfected the equipment, the procedures, and techniques required to forge the carrier as the centerpiece of a long-range striking force. See Hone, Friedman, and. Mandeles, *American & British Aircraft Carrier Development 1919-1941,* especially pp. 133-43 and p. 150. Another good source for the development of the US carrier navy can be found in Clark G. Reynolds, *The Fast Carriers: The Forging of an Air Navy* (Annapolis. MD: Naval Institute Press, 1968).

[84] Captain Wayne P. Hughes, Jr., USN, ret., "LCS Isn't Right Yet. That's a Good Reason to Build It," a PowerPoint presentation given to the 71st Military Operational Research Society, June 10, 2003.

[85] In 1945, the Battle Force included 2,547 amphibious ships out of a total of 6,768 ships. See "US Navy Active Ship Force Levels, 1945-1950," found at http://www.history.navy.mil/branches/org9-4.htm#1945. For the definitive history about the development of this vast amphibious fleet, see Norman Freidman, *US Amphibious Ships and Craft* (Annapolis, MD: US Naval Institute Press, 2002).

powerful naval force in the world in terms of tonnage, number of ships, and manpower.[86] It was, incomparably, the finest navy in the world.

Ironically, the Battle Force's very wartime success created its most formidable challenge. For the first time in nearly six decades, with no credible hostile navy or naval coalition to fight, *guerre d'escadre* was no longer a viable Battle Force *raison d'etre.* As a result, the DoN leadership was hard pressed to justify why continued resources should be devoted to winning the global naval competition. Indeed, the absence of a clear potential naval challenger on the horizon led some to conclude that the global naval competition was over and done with, and that a strong Navy was no longer central to US national security needs.[87] As one high-ranking Air Force official reasoned:

> Why should we have a Navy at all? The Russians have little or no Navy, and the Japanese Navy has been sunk, the navies of the rest of the world are negligible, the Germans never did have much of a Navy. The point I am getting at is, who is this big Navy planning to fight? There are no enemies for it to fight except apparently the Army Air Force. In this day and age to talk about fighting the next war on the oceans is a ridiculous assumption. The only reason for us to have a Navy is just because someone else has a Navy, and we certainly do not need to waste money on that.[88]

Such questions and thoughts were unheard of during the first five decades of the Expeditionary Era, when the DoN received the lion's share of the nation's peacetime defense resources. However, if defending the need for and size of the Battle Force was a new requirement for DoN leaders, it was to become an enduring one. Indeed, the new need to justify a large Battle Force was but one harbinger of an impending shift to a new national security policy era.

Another harbinger of change was the World War II development of the atomic bomb and guided weapons. The dropping of two atomic bombs on Japan sparked a strategic revolution in military affairs, and rightly captured the most attention from national security leaders immediately after the war. Less noticed, but no less profound, however, was the dropping of a Mk 24 Acoustic Mine (torpedo) by a US Navy patrol plane on a German submarine in the Atlantic Ocean in March 1943. With this first modest attack, the DoN introduced the US armed services to the Guided Weapons Warfare Regime. As will be discussed, the development of guided weapons was to have enormous influence on both the subsequent global naval competition as well as the broader strategic national security competition—indeed, in the end, arguably more so than the development of atomic weapons.

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[86] "US Navy Active Ship Force Levels, 1945-1950."

[87] See Howarth, *To Shining Sea,* p. 476.

[88] An unmanned Air Force officer cited by Huntington in "National Policy and the Transoceanic Navy," p. 484.

## The Navy-Marine Corps Team: Trial Separation

During the early years of the Expeditionary Era, as the Navy began to focus more and more on open-ocean battles against opposing battle lines, their relationship with the Marines underwent a decided change. Between 1890 and 1898, officers in the Navy tried three different times to restrict or eliminate the role of the Marine Corps, or to make it an artillery adjunct to the Army. These assaults were delayed by the onset of the Spanish-American War, the Philippines Insurrection, the Boxer Rebellion, and troubles in the Caribbean, in which the Marines played important roles. However, in 1908, Navy flag officers officially recommended to Congress that the Marines be taken off of sea duty, and both President Theodore Roosevelt and his successor, William H. Taft, worked toward that end.[89]

That the combined efforts of two Presidents failed to do away with the Corps is testimony to the special relationship that service has normally enjoyed with the Congress. However, the more fundamental reason that the Marines remained a part of the DoN was that Navy and Marines leaders gradually agreed upon a suitable operational Battle Force role for the Corps: the seizure and defense of forward operating bases. As early as 1901, the Marines' Advanced Base Force concept envisioned floating battalions of Marines embarked on their own high-speed, armed transports, conducting beach landings and amphibious warfare to seize advanced Battle Force bases. These thoughts were greatly amplified in a series of classified lectures given in 1913 at the Naval War College by a Marine staff officer named Earl Hancock "Pete" Ellis. These lectures presciently foresaw a war with Japan, envisioned a Central Pacific drive, and recommended the development of amphibious assault tactics and systems. After World War I, Ellis expanded on these thoughts in a 1921 operations plan entitled *Advanced Base Operations in Micronesia*.[90]

Faced with the growing prospect of a fight with the Imperial Japanese Navy, Navy planners gradually accepted the requirement to seize and defend advanced naval bases in support of Battle Force sea control operations. However, the special skills necessary to attack and seize advanced naval bases in the face of entrenched, determined opposition ultimately led to a division of responsibilities in the DoN Battle Force. Unlike during the Revolutionary War and the Continental/Frigate Era, when Sailors and Marines fought alongside each other on both ship and shore, by the end of the Expeditionary Era Sailors would increasingly man specialized ships designed to transport and land Marines; man the surface combatants and aviation power-projection platforms that would escort and protect them; and provide the landing force with fires and logistics and other support (e.g., medical). In contrast, Marines would increasingly make up most of the landing forces that would conduct either amphibious maneuvers from a sea base or sustained operations ashore.[91]

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[89] Murphy, *History of the US Marines*, pp. 47-59.

[90] Murphy, *History of the US Marines*, pp. 58-82. Fleet Marine Force Reference Publication 12-46 (FMFRP 12-46), *Advanced Base Operations in Micronesia* (Quantico, VA: US Marine Corps Doctrine Division, August, 1992), is a historical reprint of Operation Plan 712 written by Major Ellis in 1921.

[91] For a more thorough description of the development of amphibious warfare in the Interwar period, see Kenneth J. Clifford, *Amphibious Warfare, Development in Britain and America, from 1920-1940* (Quantico, VA: Marine Corps

In other words, *instead of being a ship commander's asset, the Fleet Marine Forces became a Battle Force asset*. In the process, fewer and fewer Marines and Sailors fought alongside each other. A relatively small number of Marines remained on capital ships and in "ships' platoons" on the amphibious sea base; and a relatively small number of Sailors continued to play specialized roles in the landing force (e.g., corpsmen; underwater demolition teams; Seabees). The specialization of skills and division of responsibilities between the Navy and Marines was relatively clean with the exception of Marine aviation, which would prove to be a continual sticking point between the two services.

In any event, this division of responsibilities led to a "trial separation" between the Navy and Marine Corps during World War II. This separation suited both services, as well as the Battle Force. Although they would no longer fight along side each other, because both Navy and Marine officers remained mutually committed to the need to seize and defend advanced naval bases, they retained strong operational links, and maintained an effective Departmental working relationship.

## Influences on Change

The Expeditionary Era continues to have at least three strong influences on DoN competition strategy and on Battle Force operations. First, this was the era during which the US naval competition became truly global in scope, and during which several naval powers were fighting to take the lead. It also saw two great wars in which command of the seas was vital to the outcome. The Expeditionary Era therefore forever imprinted in the minds of DoN planners the over-riding requirement for US maritime superiority and dominance in the global naval race. This helps to explain the DoN's enduring first emphasis on sea control, and its corollary, power-projection. Whenever challenged by an actual or potentially hostile fleet-in-being that might contest its lead in the global maritime competition, the over-riding focus of DoN planners is to crush the challenger. In absence of a hostile fleet-in-being or rising naval challenger, the focus of the DoN is to exploit its uncontested lead on, over, and under the seas in order to project US power across the oceans.

Second, the shift between the Battleship and Carrier Eras occurred in conjunction with Battle Force's greatest competitive challenge, and the shift resulted in the DoN Battle Force vaulting to the front of the pack in the global naval race. It therefore should come as no surprise that the aircraft carrier continues to hold a central place in Battle Force operational and doctrinal thought. Even as naval technology has dramatically impacted other components of the Battle Force, and changed the way that naval forces are linked and fight together, the aircraft carrier remains the nucleus of US naval fleet platform architectures.

Finally, because of the great cost associated with the Pacific amphibious assaults, many inside and outside the DoN tend to view amphibious operations with a jaundiced eye. However, during World War II, the Army and Marine Corps conducted many different types of amphibious

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Association Bookstore, 1983); and Norman Polmar and Peter P. Mersky, *Amphibious Warfare, An Illustrated History* (New York, NT: Sterling Publishing Co, 1989).

operations. In the process, they each perfected their own preferred style of amphibious "forcible entry" operations. In the Central Pacific, because both the Japanese and DoN Battle Forces were drawn to the same forward bases, albeit for different purposes, the Marines focused on amphibious assault—attacking where the enemy was—supported primarily by carrier air power. The Army, especially in the Southwest Pacific theater, focused on operational maneuver from the sea—attacking where the enemy was weak—supported primarily by land-based airpower.[92] The contemporary reluctance of many to embrace a renaissance in amphibious warfare appears to be influenced by visions and a rejection of the former approach, rather than appreciation for the possibilities of the latter.

## THE TRANSOCEANIC, OR GARRISON ERA, 1947-1989: RACING TO WIN (FIGHTING OFF A LATE CHALLENGER)[93]

> In the case of surface ships, our deterioration in numbers and in quality was such that they, together with the aircraft carriers and the submarines, gave us by 1971 or '72 only [a] 35 [percent] probability of victory (over the Soviet Navy).[94]
>
> Admiral Elmo R. Zumwalt, Jr.

In 1947, "The Sources of Soviet Conduct," written by diplomat George Kennan under the pseudonym "Mr. X," was published in the prestigious journal *Foreign Affairs.* It had the same galvanizing influence on US national leadership as Alfred Thayer Mahan's work did in 1890.[95] With the announcement of the Truman Doctrine and Marshall Plan, the US drew the line in Europe against further Communist expansion. A new national security era was born.[96]

The primary goals of the US armed forces remained relatively constant over this era: to contain the expansion of communism, and to deter the Soviet Union from forcibly expanding its empire.

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[92] For a good account of amphibious operations in the Southwest Pacific, see Kevin C. Holzimmer, "Joint Operations in the Southwest Pacific, 1943-1945," *Joint Forces Quarterly*, 3d Quarter, 2005, pp. 100-108.

[93] The term "Transoceanic Era" is Huntington's. The author prefers the term "Garrison Era," for reasons that will be made clear.

[94] Elmo R. Zumwalt, Jr., "The Most Dangerous World is One Where the Soviets Have It and We Do Not," an interview with John M. Whitley online at http://www.ucf.ics.uci.edu/~zencin/peace2/interviews/zumwalt.html.

[95] "The Sources of Soviet Conflict" was itself a reprint of the "Long Telegram" sent by Kennan from Moscow in 1946. However, the 1947 *Foreign Affairs* article was much more widely read than the Long Telegram, and the Truman Doctrine and Marshall Plan were not announced until April and June, 1947, respectively. George Kennan, "The Sources of Soviet Conduct," found online at http://www.historyguide.org/ europe/kennan.html.

[96] For a thorough description of Cold War/Garrison Era, see Joseph Smith, *The Cold War, Second Edition, 1945-1991* (Historical Association Studies: Blackwell Publishers, 1997). CNN also has an excellent interactive website on the Cold War at http://www.cnn.com/SPECIALS/cold.war/episodes.

However, in the late 1940s, it was by no means clear how best to accomplish these goals without bankrupting the United States.[97] The first decade-and-a-half of the era saw successive Administrations trying to come up with a cost-effective approach to accomplishing these new national security imperatives. At the same time, all of the US armed services were trying to come to grips with the operational and tactical implications of both nuclear and guided weapons warfare.[98] It was a period of great strategic uncertainty, rapid technological transformation, and confusion among the services as what their exact roles would, or should, be.

The Army and newly created US Air Force had the early advantage. With the 1949 formation of the North Atlantic Treaty Organization (NATO), the United States began to assemble and man large, standing *peacetime* garrisons overseas on allied soil for the first time in its history, expanding on their post-war presence. The Army would serve as a "tripwire" along the Soviet frontier while the nuclear-armed Air Force would provide the primary muscle for deterrence and warfighting. Indeed, it was the central relevance of the Air Force to the era's early national security strategy of "massive retaliation" that caused it to displace the Navy as the dominant peacetime armed service. This dominance was especially evident after 1953, as the Eisenhower Administration's "New Look" defense program took effect, and as long-range airpower and atomic weapons became the primary military instrument.[99] By the mid-1950s, as suggested by Huntington's model, the Air Force received the lion's share of US defense resources.[100]

Defenders of the Battle Force tried to stem the Air Force rise to dominance by arguing that the "[T]he atomic bomb may change the types of ships in our Navy, but it does not affect the mission of the Navy to control the sea and air above the sea."[101] But with no fleet to fight, no forward bases to seize, and large standing garrisons on allied soil supported by ever-more efficient land-based infrastructure, the DoN Battle Force was the odd man out. The number of active aircraft carriers fell to seven by 1950, and the Navy's new super-carrier, the *United States*, was canceled, leading to the famous "revolt of the admirals."[102] Amphibious operations were

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[97] "John Lewis Gaddis on Eisenhower's Economics and the Bomb," at http://www.pbs.org/wgbh/amex/bomb/filmmore/reference/interview/gaddis9.html.

[98] For a good description of the Navy's adjustment to atomic warfare, see Dr. Jeffrey G. Barlow, "The Navy and the Bomb: Naval Aviations' Influence on Strategic Thinking, 1945-1950," found online at http://www.history.navy.mil/colloquia/cch1e.htm.

[99] For a thorough description of the New Look, see Saki Dockrill, *Eisenhower's New Look National Security Policy, 1953-1961* (New York, NY: St. Martin's Press, 1996). For a shorter, more concise treatment on the economic reasoning behind the New Look, see "John Lewis Gaddis on President Eisenhower's Military Strategy," found online at http://www.pbs.org/wgbh/amex/bomb/filmmore/reference/interview/gaddis7.

[100] It was during this period of Air Force ascendancy that Huntington wrote his article, "National Security Policy and the Transoceanic Era."

[101] Rep. Carl Vinson, in 1945, as cited in Hagan, *This People's Navy,* p. 335.

[102] See Hagan, *This People's Navy,* pp. 339-41; Howarth, *To Shining Sea,* p. 485. For a longer, more detailed account of the "revolt," see Jeffrey G. Barlow, *Revolt of the Admirals: The Fight for Naval Aviation* (Washington, DC: Naval Historical Center, 1994).

declared obsolete, and the size of the amphibious fleet was excluded from Joint Chiefs of Staff (JCS) planning guidance.[103] As a result, by 1950, the Battle Force had shrunk from its World War II high of 6,768 ships to 634 ships, and the Marine Corps was reduced to two skeletal divisions.[104]

Partly to arrest the further decline of the Battle Force and partly to demonstrate their continued relevance in the new national security era, in the late 1940s both the Navy and Marines moved to establish and man permanent, rotational "naval garrisons" around the periphery of the Eurasian littoral. However, there was also a real-world rationale for the move: with the Royal Navy now greatly weakened, the role of patrolling the world's sea lanes fell to the United States.[105] The establishment of rotational forward "naval garrisons" was also no doubt influenced by the long DoN practice of maintaining distributed naval forces forward in peacetime, evident throughout both the Continental and Expeditionary Eras. Unlike those eras, however, when naval forward presence was limited to relatively small squadrons of relatively small combatants, in the Garrison Era DoN leadership began to emphasize the deterrent and warfighting value of keeping strong, *"combat credible"* forces forward. Naval officers argued that combat credible forward naval forces could immediately transition to war and begin to mount attacks along the flanks of the Soviet Union.[106]

Given the decisive impact that carriers had had in the recently expired Expeditionary Era, the heart of these combat credible forces would be the aircraft carrier. Indeed, the practice of maintaining US Carrier Battle Groups (CVBGs) in two or three fleet "operating hubs" was to define the Battle Force's basic operating pattern—and to provide the basis for its carrier force structure—for the next 55 years. Similarly, rotationally deployed US Marine combat units, embarked aboard Amphibious Ready Groups (ARGs), provided the nation with a ready, forward-deployed, ground-response capability.[107]

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[103] Michael M. McCrea, Karen N. Domabyl, Alexander F. Parker, *The Offensive Navy Since World War II: How Big and Why?* (Alexandria, VA: Center for Naval Analysis, July 1989), p. 17.

[104] "Marine Corps History," found at http://globalsecurity.org/military/agency/usmc/history.htm. A great recount of the trying years for the Battle Force after World War II is found in Chapter 12, "In Search of a Mission," in Hagan, *This People's Navy.*

[105] Hagan, *This People's Navy*, p. 337.

[106] The move toward forward "naval garrisons"—permanent rotational hubs for US naval carrier and amphibious forces—is best captured in Swartz, *Sea Changes: Transforming US Navy Deployment Strategy, 1775-2002,* pp. 48-49.

[107] McCrea, Domabyl, Parker, *The Offensive Navy Since World War II: How Big and Why?* pp. 14-21. See also Swartz, *Sea Changes: Transforming US Navy Deployment Strategy, 1775-2002,* pp. 48-55. As described in Swartz, the first rotational hubs were in the Mediterranean and the Western Pacific. In the 1970s, a permanent Middle East Force was established. By the 1980s, the Middle East and Indian Ocean had become a third hub.

From this forward-deployed posture, both of the naval services excelled at *crisis response operations* at the lower end of the conflict spectrum.[108] Critically, however, Carrier Battle Groups started to focus on independent *strike operations*, while ARGs with embarked Marine Battalion Landing Teams (BLTs) or Marine Amphibious Units (MAUs) focused on *rapid sea-based intervention operations* such as non-combatant evacuation operations, and crisis response operations.[109] In the process, the training periods and deployments of CVBGs and ARG/MAUs were not synchronized and they generally operated independently. The failure of separate carrier and amphibious task groups to train and operate together led to a weakening of operational ties between the Navy and Marine Corps. However, this circumstance was merely one symptom of a growing split within the traditional Navy-Marine team. This split could be directly linked to an important shift in the strategic environment: *in the new Garrison Era, US armed forces could generally count on access to forward bases in event of war*.

This key operational reality was obscured by the Korean War—the first war of the new era—which saw amphibious operations on both coasts of Korea, and caused a sizable spike in the size of the amphibious fleet.[110] Indeed, the post-Korean War JCS planning guidance for an amphibious fleet capable of lifting one division in the Pacific and a brigade in the Atlantic reflected the judgment that the United States needed to maintain a viable amphibious forcible entry capability.[111] However, after the cessation of armed hostilities in 1953, the United States moved to erect and maintain strong peacetime garrisons on the Korean peninsula and in Japan, just as it was doing in Europe. These two large regional garrisons were, in turn, augmented by a growing number of air, naval, and land bases around the periphery of the Soviet Empire. As a result, a clear Battle Force requirement to seize forward bases inevitably and steadily declined.

Moreover, after the Korean War, during the Garrison Era's unsettled inter-era transition phase when so much emphasis was placed on nuclear warfighting, the Navy and Marines sought to stake out their own niche roles. Not content with a supporting role of securing the sea lanes and delivering supplies and equipment to far-flung forward US garrisons, the Navy opted to place ever-increasing emphasis on *strike* operations, and focused on taking atomic weapons to sea—first on aircraft carriers, and then on submarines.[112] Indeed, one naval historian wrote that by

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[108] In President Eisenhower's "New Look" Defense Strategy, the aircraft carrier and forward-deployed Amphibious Ready Groups played the same role for the United States in the Garrison Era as the frigate played for the British Empire during the age of sail. See Hagan, *This People's Navy*, p. 350.

[109] A Marine Amphibious Unit (now know as a Marine Expeditionary Unit) is a small MAGTF consisting of a headquarters, a Marine infantry battalion, a composite squadron consisting of both rotary- and fixed-wing aircraft, and a combat logistics unit. See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 45-46.

[110] See Hagan, *This People's Navy*, pp. 341-44; and Howarth, *To Shining Sea*, p. 486-94.

[111] McCrea, Domabyl, Parker, *The Offensive Navy Since World War II: How Big and Why?*, p. 18.

[112] The Navy was always tasked with ensuring convoys of supplies could reach both Europe and the Pacific in time of war. See for example the section in the Joint Forces Command (JFCOM) command history entitled "Defending the North Atlantic," found online at http://www.jfcom.mil/about/History/abthist1.htm. However, Admiral Dan Gallery took the offensive against Air Force atomic supremacy when he concluded that the primary mission of the "atomic navy" should be to deliver atomic weapons "on the capital and industrial centers of the enemy." See Hagan,

1957, developing the strategic ballistic missile submarine "had the highest priority of any project in the Navy."[113] Meanwhile, the Marines embraced the role as the nation's *expeditionary force-in-readiness,* poised to respond quickly to "brush fire wars" below the nuclear threshold. The close operational linkages between the Navy and Marine Corps—so important over the previous two national security eras—gradually began to fray.[114]

The weakening of the links that bound the Navy and Marines together was arrested for a short period of time between 1961 and 1964, when the transition period between the Expeditionary and Garrison Eras came to an end. Confronted by the multidimensional threats presented by the Soviet armed forces and their proxy armies, the Kennedy Administration turned away from the impractical strategy of "massive retaliation" to a more balanced strategy of "flexible response." As a consequence, US national leadership opted to maintain strong Army, Air Force, Navy, Marine Corps, *and* special operations contingents.[115] One result was a renewed interest in amphibious landing operations, and the increase of the Battle Force amphibious lift goal to two full divisions—one on each coast.[116] This renewed interest culminated in a 1964 operation dubbed *Exercise Steel Pike I,* during which the DoN Battle Force assembled and landed a full division of Marines and their equipment across the beaches in Spain.[117]

However, *Steel Pike I* was to be the swan song for serious Battle Force interest in large-scale amphibious operations. The next year the Battle Force went to war in Vietnam, where the Marines—like the Army—conducted sustained combat operations ashore. Over the course of this long war, the Marines conducted many small, battalion-size amphibious landings with the Seventh Fleet's Special Landing Force (SLF). However, neither the US high command in Vietnam or the DoN put much emphasis or stock in these operations.[118]

This circumstance was to prove lasting; the SLF was the forerunner for today's Marine Expeditionary Unit (Special Operations Capable) (MEU(SOC)), and its operations cemented the

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*This People's Navy,* pp. 337, 344-46. Howarth writes that the motto of the Navy during the 1950s was "nukes with everything." See Howarth, *To Shining Sea,* p. 495

[113] Hagan, *This People's Navy,* p. 352.

[114] See "Marine Corps Organization," at http://www.globalsecurity.org/military/agency/usmc/overview.htm. The spirit of the Marine Corps' expeditionary-force-in-readiness role is perfectly captured in the III MEF mission statement, found online at http://www.iiimef.usmc.mil/mission_statement.htm.

[115] See "Flexible Response," at NuclearFiles.org, at http://www.nuclearfiles.org/menu/key-issues/nuclearweapons/history/cold-war/strategy/strategy-flexible-response.htm. See also the discussion in Hagan, *This People's Navy,* p. 356.

[116] McCrea, Domabyl, Parker, *The Offensive Navy Since World War II: How Big and Why?* p. 18.

[117] For a concise description of *Steel Pike I* see Major J.W. Hammond, Jr., "Steel Pike I," *Marine Corps Gazette,* January 1965, pp. 51.

[118] Lieutenant Colonel H.T. Hayden, USMC, ret., "Amphibious Operations During the Second Indochina War: 1965-73, *Marine Corps Gazette,* August 2005, pp. 46-48.

transformation of the Amphibious Landing Fleet from a Battle Force operational arm of decision into a rotational transport pool for crisis response forces. It also foreshadowed the post-Vietnam war focus of Marines on crisis response operations during peacetime, and on sustained operations ashore in wartime.[119]

For the Navy's part, the carrier fleet performed a prominent independent strike and close air support role during the Vietnam War.[120] Then, upon returning from the war, the Navy was confronted by a late challenger for the lead in the global naval competition—the Soviet Navy, under the energetic leadership of Admiral Sergey Gorshkov.[121] Given the ingrained lessons learned during the Expeditionary Era, the Navy's response was a given. The *Maritime Strategy*, published in the early 1980s and continually refined until the end of the Garrison Era, was a naval competition strategy that Alfred Thayer Mahan would have instantly recognized and appreciated.[122] Its associated "600-ship" Navy very much reflected the same sea control focus as the earlier Expeditionary Era, with aircraft carriers and nuclear-powered attack submarines—and even four recommissioned battleships(!)—substituting for the armored battle line of that earlier era.[123]

Unlike during the sea control phase of Expeditionary Era, however, Garrison Era DoD and DoN planners were far less worried about the loss of forward access or advanced bases. Indeed, by the end of the era ***all*** US combat operations had become "access dependent." The Army and Air

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[119] For a great discussion of the US Marines and amphibious warfare in the Garrison Era, see Colonel Joseph H. Alexander, USMC, ret., and Lieutenant Colonel Merrill L. Bartlett, USMC, ret., *Sea Soldiers in the Cold War: Amphibious Warfare, 1945-1991* (Annapolis, MD: Naval Institute Press, 1991).

[120] For a discussion of the Navy air war in Vietnam, see Hagan, *This People's Navy*, pp. 362-67.

[121] Between 1917 and through the 1950s, the Soviet Navy was a minor regional navy. Admiral Gorshkov assumed the leadership of the Soviet Navy in 1956 and retained that role until 1985. Over that time, he transformed the Soviet Navy into a formidable force. In 1962, during the Cuban Missile Crisis, the Soviet Fleet was about the size of the US Battle Force, but it was qualitatively inferior in almost every category. By the 1970s, principally in two major "Okean" exercises, the Soviet Navy demonstrated its growing global power, and its ability to contest the Battle Force's supremacy in all oceans. See Howarth, *To Shining Sea*, pp. 528-30. For a short history of the Soviet Navy, see "Soviet Navy," at http://www.reference.com/browse/wiki/Soviet_Navy.

[122] See Admiral James D. Watkins, USN, "The Maritime Strategy," supplement in *Proceedings*, January 1986, pp. 2-17. Hagan's description of the development of the Maritime Strategy is quite good. See *This People's Navy*, pp. 382-84. For a more thorough discussion see Norman Freidman, *US Maritime Strategy* (Annapolis, MD: US Naval Institute Press, 1988).

[123] See John F. Lehman, "The 600-Ship Navy," supplement in *Proceedings*, January 1986. pp. 30-40. That the submarine played so prominently in the Navy's sea control fleet reflected the impact that nuclear power had on undersea warfare, as well as on naval warfare as a whole. Prior to the advent of the nuclear submarine, submarines were more properly thought of as submersible torpedo boats, best suited for commerce raiding. With their relatively slow underwater speeds and limited underwater endurance, submarines were severely disadvantaged against competent ASW forces. Nuclear power completely changed the balance of the ASW competition in favor of the submarine, and transformed them into the greatest predator on the high seas. In addition, the long underwater endurance afforded by nuclear power supported new missions, such as staging ballistic missiles at sea as part of the nation's strategic deterrent force. Indeed, during the Garrison Era, nuclear-powered submarines were second only to the aircraft carrier in terms of TSBF priority. Almost one-third of the Navy's shipbuilding funds spent between 1952 and the end of the era were devoted to nuclear-powered submarines. Drawn from "The Cost of Submarines," found at http://americanhistory.si.edu/subs/history/timeline/cost/index.html.

Force operated from fixed forward bases in Europe and in the Pacific, and both relied on land prepositioning of unit sets and equipment to improve closure timelines for reinforcing forces. Similarly, the Navy's Maritime Strategy assumed access to forward operating bases—especially for the Navy's large fleet of land-based, anti-submarine warfare (ASW) patrol planes, and for the resupply of its underway replenishment groups, themselves tasked with keeping US Navy strike groups supplied with fuel, ordnance, and supplies.

Even the Marines began to rely on "access dependent" prepositioning initiatives to speed their force closure and reinforcement timelines. The Norway Air-Landed Marine Expeditionary Brigade (NALMEB) program housed a brigade set of equipment in caves in Norway, to facilitate the rapid fly-in of Marine reinforcements to the NATO northern flank in support of the *Maritime Strategy*.[124] And the new Maritime Prepositioning Force (MPF), consisting of three brigade sets of equipment stored on ships anchored in three different operating theaters, made the rapid global deployment or reinforcement of Marine forces possible.[125] Tellingly, by the end of the era, the number of Marine brigades that could be deployed with these access-dependent means of deployment (four) outnumbered the total number of brigades that could be delivered by amphibious assault shipping (less than three).

Indeed, by 1987, despite a stated DoN requirement to lift the assault echelons of a Marine Amphibious Force (MAF) and a separate Marine Amphibious Brigade (MAB),[126] amphibious ships comprised only 9.7 percent of Battle Force ships, and the ratio of "amphibs" to surface combatants fell from its World War II high of three-to-one to its post-World War II low of one-to-four.[127] Together, the force could lift just over two brigades of Marines. The decline in the Marines' ability to seize access was mirrored in a general decline in Battle Force "forcible entry" capabilities. For example, after 1972, the US Navy generally "outsourced" mine warfare to allied navies based forward (although it did introduce modern US systems in the late 1980s).[128]

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[124] The Norway Air-Landed Marine Expeditionary Brigade (NALMEB), also called the Norway Air Landed Marine Air Ground Task Force (NALMAGTF), is the Marine Corps' only land-based prepositioned stock. See the description at http://www.globalsecurity.org/military/facility/nalmeb.htm.

[125] See "Maritime Prepositioning Ships," at http://www.globalsecurity.org/military/systems/ship/sealift-mps.

[126] A Marine Amphibious Force (now called a Marine Expeditionary Force) is the largest MAGTF. It consists of a headquarters, a Marine division, a full Marine Air Wing, and a large logistical organization called the Force Service Support Group. It numbers between 30,000-60,000 Marines. A Marine Amphibious Brigade (now called a Marine Expeditionary Brigade) is a medium-sized MAGTF, consisting of a headquarters, a Marine infantry regiment, a Marine Air Group, and a Brigade Service Support Group. It numbers between 4,000-18,000 Marines. Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 45-46.

[127] In 1945, there were 2,547 amphibious ships and 810 major surface combatants (battleships, cruisers, destroyers, and frigates). In 1987, there were 59 amphibious ships and 223 major surface combatants. See "US Navy Active Ship Force Levels, 1945" at http://www.history.navy.mil/branches/org9-4c.htm.

[128] I am indebted to CNA analyst Peter Swartz for making this point plain to me.

## The Rise of Guided Weapons Warfare

Three other major developments during the Garrison Era bear mentioning because of their important influence on all US armed forces, and their direct and indirect influences on the global naval competition and on the DoN Battle Force. The first was the steady development of the Guided Weapons Warfare Regime.[129]

Prior to the advent of guided weapons, the accuracy of a purely ballistic, unguided weapon or munition decreased as the range to target increased. Guided weapons, or, to be more precise, actively guided, *non-nuclear* weapons, are conventional projectiles, rockets, bombs, missiles, torpedoes or other weapons or munitions that can actively correct their flight path, trajectory, or course after being released, fired, or launched, and guide themselves toward a particular object or to a geospatial coordinate.[130] *In essence, active guidance or trajectory correction transformed weapons and munitions that mostly missed into weapons and munitions that mostly hit—or hit close enough to have the desired effect against a chosen target—to the full extent of a weapon's maximum range*.[131]

As mentioned earlier, the first phase of the Guided Weapons Warfare Regime began with the dropping of an acoustic homing torpedo on a German U-boat in 1943.[132] After the war, and throughout the first two decades of the Garrison Era, guided weapons were introduced in a variety of different tactical warfare areas, particularly air-to-air combat; ground-based anti-air warfare; fleet air defenses; anti-submarine warfare; naval surface combat; and anti-tank warfare. Interestingly, it was not until Vietnam that interest in air-to-ground guided weapons manifested itself on a scale evident in other tactical combat domains. During this phase, the development of guided weapons warfare had important secondary effects, such as driving strategic reconnaissance systems into space, out of the range of increasingly accurate and lethal continental, land-based SAMs.

However, a far more important effect was the development of *sensing, planning, targeting and fire control networks* to exploit the extended-range accuracy of guided weapons. For example, the development of naval SAMs and long-range air-to-air missiles lead to the development of automated task force data networks; strategic SAMs lead to the development of automated and integrated continental air defense networks; beyond visual range air-to-air missiles led to new air battle management networks; and tactical SAMs and radar controlled guns spawned integrated

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[129] Much of my thinking on the Guided Weapons Warfare Regime has been shaped by discussions with Barry D. Watts, and especially from reading his *Six Decades of Guided Weapons: An Assessment of Progress and Prospects* (Washington, D.C.: Center for Strategic and Budgetary Assessments). The author used the manuscript dated July 22, 2004 for this report.

[130] Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects,* p. 1.

[131] Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects,* p. 1.

[132] The phases of the Guided Weapons Warfare Regime described in this report were inspired by Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects*, and Michael G. Vickers and Robert C. Martinage, *The Revolution in War* (Washington, DC: The Center for Strategic and Budgetary Assessments, December 2004).

air defense systems (networks). To be sure, engagement networks existed before the development of guided weapons; the World War II British Integrated Air Defense and the US Navy Task Force Defense Networks were both developed to exploit the long-range sensing power of radar, not guided weapons.[133] However, the desire to exploit the full potential of guided weapons over increasingly longer ranges undoubtedly accelerated the development of more and more powerful sensing, planning, targeting, and fire control networks.[134]

Two key events marked the beginning of the second phase of the Guided Weapons Warfare Regime. The first was the sobering combat results of guided weapons warfare during the final year of air operations over Vietnam in 1972 and during the 1973 Arab-Israeli War.[135] Taken together, these outcomes indicated the growing lethality of operations in Guided Weapon Warfare Regime, and suggested an impending revolution in the conduct of military operations.

The second key event was the development of the digital microprocessor, which occurred between 1970 and 1974.[136] The guided weapons used during Vietnam and the 1973 Arab-Israeli War were the product of analog technology and vacuum tubes and, as a result, they were often unreliable. The development of digital microprocessors promised to make guided weapons much more reliable and accurate, the sensors that provided them their targeting information much more sensitive, and the sharing of data between sensors and networks more effective. The implication

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[133] I would like to thank Dr. Andrew Krepinevich for pointing this out, and in helping to craft this section.

[134] Guided weapons and battle networks are inseparable in the Guided Weapons Warfare Regime. See Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects.*

[135] Over 28,500 air-to-ground guided weapons were dropped during the Vietnam War. However, over 10,500 of them were dropped in the last year of air operations over Vietnam. Of these, over 5,100 were assessed to be direct hits, and an additional 4,000 hit within 25 feet of their intended targets. The Egyptian and Syrian Integrated Air Defense Networks, equipped with the SAM-6 mobile surface-to air-missile, shot down 114 Israeli aircraft—most in the first three days of the Arab-Israeli War. Indeed, both air operations over Vietnam and the 1973 Arab-Israeli war indicated the daunting power of modern IADS armed with guided missiles: "Experience in Vietnam and the 1973 Arab-Israeli war indicated that highly defended targets would yield to successful attack only when protected and attacked by large 'force packages' to get strike aircraft into and out of a target area. A typical force package during the 1972 Linebacker I campaign consisted of 62 combat aircraft (less air refuelers) to get 16 fighter-bombers into and out of a target area. This cut down the number of targets that could be attacked at any time." Finally, widespread Egyptian and Syrian use of guided anti-tank missiles severely bloodied Israeli armor units. See See Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects*; Brigadier General David A. Deptula, "Firing for Effects," *Air Force Magazine* April 2001; and Robert S. Bolia, "Over Reliance on Technology In Warfare; The Yom Kippur War as a Case Study," *Parameters,* Summer 2004, pp. 46-56.

[136] Three projects arguably delivered a complete microprocessor at about the same time: Garrett AiResearch's Central Air Data Computer, completed in 1970; Texas Instruments' four-bit TMS 1000, introduced in September 1971; and Intel's four-bit 4004, introduced in November 1971. The first eight-bit microprocessor, the Intel 8008, was introduced in April 1972. It was the predecessor of the famous Intel 8080 eight-bit CPU released in April 1974. Running at 2 MHz, the 8080 is generally considered to be the first truly usable microprocessor CPU design, and is this report's benchmarch for the true start of the "microprocessor revolution." See "Microprocessor," at http://en.wikipedia.org/wiki/Microprocessor#The_first_chips.

was that the fully mature digital Guided Weapons Warfare regime would be even more deadly to fighting forces than in the analog regime.[137]

By 1975, at the same time US military officers and defense strategists were mulling over the ramifications of greatly proliferated and reliable guided weapons, the US defense establishment was turning its attention away from Vietnam and toward the knotty operational problem of defending NATO from large-scale, Soviet combined arms attacks. Up until this time, planners assumed that tactical nuclear weapons might be required to blunt such attacks. Thinking about the impact that more accurate and deadly conventional guided weapons might have on the NATO defense problem led to two key judgments: that "conventional weapons with near zero miss" were technically possible; and that these type weapons would likely lower the likelihood that tactical nuclear weapons would be needed to defeat Soviet attacks.[138]

As a result, the pursuit of guided conventional weapons became an explicit US national security policy objective. Programs such as *Assault Breaker* ultimately led to the development of new sensor systems such as the Joint Surveillance and Target Attack Radar System (JSTARS), as well as new long-range air-to-ground and ground-to-ground guided weapons.[139] Their operational impact was reflected in the new US doctrine of AirLand Battle, and it NATO counterpart, "Follow-on Forces Attack."[140] An additional, indirect result of the maturing of the Guided Weapons Warfare Regime was the determined US pursuit of stealth and unmanned systems, both necessitated by the increasing accuracy and lethality of guided weapons and the networks that employed them.[141]

By the mid-1980s, after carefully considering the impact that conventional guided weapons had had and would continue to have on the conduct of warfare, Soviet military theorists concluded that the gradual combination and integration of networks designed to employ guided weapons in

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[137] One thoughtful officer in the Office of Net Assessment, Colonel Tom Ehrhard, USAF, often refers to the American RMA as a direct spin-off of the "microprocessor revolution."

[138] Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects.*

[139]The DARPA *Assault Breaker* program aimed to develop a system-of-systems to detect and destroy concentrations of mobile tank forces behind the front line. The studies resulted in the development of stand-off airborne sensors like JSTARS, and ground-launched guided missiles armed with TGSMs (Terminally Guided Submunitions), which is guided to the target area by the long-range surveillance and control radar carried on the JSTARs. The missile ultimately became the Army Tactical Missile System (ATACMS); the Avro "Skeet" was one of many resulting submunitions. See "JSTARS," at http://www.airforce-technology.com/projects/jstars/, and "Assault Breaker," at http://www.designation-systems.net/dusrm/app4/ assault-breaker.html.

[140] For a selected biography on the development of AirLand Battle doctrine, see http://carlisle-ww.army.mil/usamhi/ Bibliographies/ReferenceBibliographies/doctrine/airbatt.doc. For a discussion about Follow-on Force Attack and the technologies necessary to make it work, see "Technologies for NATO's Follow-on Forces Attack," at http://www. wws.princeton.edu/~ota/disk2/1986/8630_n.html.

[141] Ever since the development of radar, designers had considered ways by which to lower the radar cross section of aircraft to reduce their detectability. However, the 1973 Arab-Israeli War and air operations over North Vietnam spurred the first pursuit of "stealth" aircraft, which led to the development of the F-117, introduced in 1982. See "F-117 Development," at http://www.vectorsite.net/avf117_1.html#m1.

single operational dimensions (e.g., air-to-air, surface-to-air, air-to-ground) would ultimately lead to the development of powerful conventional air-land "reconnaissance strike complexes," or *guided weapon battle networks.*[142] In their view, because the massed employment of guided conventional weapons promised to achieve the same destructive effects as nuclear weapons, a military technical "revolution" was in the offing, one in which "close battle" would no longer be decisive at the operational level of war.[143]

This conclusion undoubtedly factored into the abrupt end of the Cold War between the United States and Soviet Union. In any event, as the Garrison Era ended, the influence of guided weapons was growing in all US plans and operations, including that of the DoN Battle Force.

### The Rise of an All-Volunteer Joint Force

Another key development during the Garrison Era was the US pursuit of an All-Volunteer Force (AVF). The decision to move away from a conscript to an all-volunteer, professional force was made in 1973. This shift, prompted by the nation's painful Vietnam War experience, was an especially bold move at the time given public sentiment about the war. Indeed, it was not at all clear that such a move was prudent, much less sustainable. However, while the transition to the AVF was by no means easy, by the mid-1980s the shift was considered a major success by the majority of US political and military leaders, and it led to a dramatic improvement in the overall quality of the US armed forces.[144]

The shift to a professional, volunteer military force was followed by the signing of the Goldwater-Nichols Act in 1986. Up until Goldwater-Nichols was enacted, the individual armed services dominated actions in the national security arena. Despite repeated attempts by successive post-World War II Administrations to achieve "unified action of the armed forces," the services were able to jealously guard and maintain their own independence. From the Congressional perspective, this independence did not translate particularly well into collaborative and effective "Joint"—or combined service—operational performance. The outcomes of the Korean and Vietnam Wars, raids such as the Mayaguez Incident and the Iranian Hostage Rescue mission, and interventions in Grenada and Beirut convinced Congress that improved Joint action would never occur unless the dominance of the services was fundamentally challenged. As a result, by the early 1980s, Congress moved ever closer toward

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[142] As far as I know, the Soviets did not use the term "guided weapons battle networks;" this is a convention used by me throughout the report to describe the system of system "complexes" envisioned by Soviet military theorists.

[143] Watts, *Six Decades of Guided Weapons: An Assessment of Progress and Prospects.*

[144] For more on the AVF, see Walter Y. Oi, "The Virtues of the All-Volunteer Force," at http://www.cato.org/dailys/07-29-03.html. For a verdict on the AVF from an American servicewomen, see Staff Sgt. Kathleen T. Rhiem, "The All-Volunteer Force," at http://usmilitary.about.com/od/joiningthemilitary/l/ blvolunteerforc.htm.

legislating measures designed to weaken the power of individual services, and to improve the power of unified Joint commanders and their staffs.[145]

Despite their increasingly tenuous operational ties, Navy and Marine leaders could agree on one thing: such legislation was unneeded at best, and destructive at worst. The Navy and Marine Corps, perhaps more than any of the services, had for the most part, operated largely independently for the better part of two hundred years, and they firmly believed this independence represented the natural order of things. Indeed, this streak of independence was vividly reflected in both the Navy's *Maritime Strategy*, which envisioned independent carrier and attack submarine operations against the Soviet Union, as well as the Marine Corps' cherished expeditionary force-in-readiness role, which emphasized self-contained MAGTFs—combined arms air-ground teams made up solely by Marines.[146]

In the end, over the objections of both the Navy and Marines—and many others within the US armed forces—the will of the Congress prevailed. Enacted toward the very end of the Garrison Era, the Goldwater-Nichols Act, which mandated the move toward an All-Volunteer *Joint* Force, would have an enormous impact on the subsequent strategic era.

## The Fall of the "Dominant Service Model"

Recall that one of Huntington's central themes was that US defense planners, in order to economize defense expenditures during peacetime, were normally inclined to devote resources to one dominant service. This dominant service was the one most attuned to the national security imperatives of the contemporary era. This model saw the Army as the dominant peacetime service during the Continental Era; the Navy as the dominant peacetime service in the Expeditionary Era; and the Air Force as the dominant peacetime service in the early stages of the Garrison Era. However, as explained earlier, the Garrison Era logic of containment and the standing requirement to be able to shift quickly to global combat operations against the Soviet Union convinced the Kennedy Administration that the dominant service model was no longer viable, and that each service needed to be adequately resourced during peacetime, despite the high associated costs.

Secretary of Defense Robert McNamara implemented the Planning, Programming, and Budgeting System (PPBS) to help make sense of and prioritize the competing demands of all of the services.[147] The PPBS marked the first step toward the demise of the nearly two century-old

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[145] See "Goldwater-Nichols Act," at http://en.wikipedia.org/wiki/Goldwater-Nichols_Act; and "The Goldwater-Nichols Act Of 1986: Resurgence In Defense Reform and the Legacy of Eisenhower," at http://www.globalsecurity.org/military/library/report/1989/PGH.htm. The definitive story about the Act's enactment is found in James R. Locher III, *Victory on the Potomac* (Texas A&M University Military History Series, No. 79, 2004).

[146] The naval services fought particularly hard against the Act, as is recounted in Locher III, *Victory on the Potomac.*

[147] See "Robert McNamara" at http://en.wikipedia.org/wiki/RobertMcNamara, and "Planning, Programming and Budgeting System," at http://en.wikipedia.org/wiki/Planning%2CProgrammingandBudgetingSystem. "The basic ideas of PPBS were: "the attempt to put defense program issues into a broader context and to search for explicit measures of national need and adequacy"; "consideration of military needs and costs together"; "explicit consideration of alternatives at the top decision level"; "the active use of an analytical staff at the top policymaking

US practice of having a dominant peacetime service. The "1/3-1/3-1/3" departmental budget split (i.e., between the Departments of the Army, Army Force, and Navy) that evolved after the implementation of the PPBS was, in effect, a negotiated "treaty" to satisfy both the peacetime and wartime needs of all services. After the mid-1960s, major reallocations among the three Departments and four Services proved to be rare, and when they did occur, they generally took the form of equal Departmental "taxes" to pay for episodic high cost service systems or pressing national security requirements (e.g., National Missile Defense).[148]

If the PPBS was the first step toward the demise of the dominant service model, then the Goldwater-Nichols Act was the second. Because the Act was signed in 1986, only three years before the end of the Garrison Era, it had little noticeable influence on operations during that era. However, as will soon be discussed, the Act stirred strong winds of change that were to have a important and lasting influence on decisions about future Battle Force strategy, design, course, and speed. For now, suffice to say that by legislating a requirement for unified action of the armed forces and endorsing the idea of a strong, standing Joint force, the Act validated the logic underpinning the PPBS, making a future return to the dominant service model extremely unlikely.

Nevertheless, the dominant peacetime service remains a seductive ideal for all service planners, and DoN Battle Force planners are no exception. Many continue to believe if they could just explain better the vital role that their service provides for the nation, OSD or Congress would divert other service resources to pay for ships that are increasingly "over-speced" and over-priced. This optimistic and likely unrealistic belief is a key source of OSD and DoN institutional friction, since it works to cause incessant, debilitating inter-service fights over relatively marginal "discretionary" DoD resources.[149]

### The Navy-Marine Corps Team: Filing For Divorce

More than any other reason, the conditions of assured access evident during the Garrison Era caused the relationship between the Navy and Marine Corps to take a turn for the worse. Without the linking operational requirement to seize or defend advanced bases that bound the two services so closely together during the Expeditionary Era, the ties between them became increasingly administrative and ceremonial, and the linkages between them grew less strong. Indeed, by the end of the Garrison Era, the two services had effectively applied for an institutional "divorce."

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levels"; "a plan combining both forces and costs which projected into the future the foreseeable implications of current decisions"; and "open and explicit analysis, that is, each analysis should be made available to all interested parties, so that they can examine the calculations, data, and assumptions and retrace the steps leading to the conclusions." See Robert S. McNamara at http://www.defenselink.mil/specials/secdef_histories/bios/mcnamara.htm.

[148] I am indebted to CNA analyst H. H. "Hank" Gaffney for pointing this out during a review of the pre-publication draft of this report.

[149] A great description of the effect the Quadrennial Defense Review has on the Joint Staff and the services can be found in Lieutenant Colonel Kirk A. Yost, US Air Force, ret., "Fear and Loathing in the QDR," *Proceedings*, May 2004, pp. 70-76.

This divorce was the natural result of the fundamental change in the national security environment and the diverging world views of the two naval services. As indicated by *Exercise Steel Pike I*, up through 1964, Navy admirals, all having been part of the Pacific and Korean Wars, continued to support a strong Battle Force amphibious landing capability. However, as the requirement to seize bases became less important and all Joint forces became accustomed to ready forward access, the *sine qua non* of Navy operations became putting ordnance, not Marines, on target. The gradual Navy emphasis on what is now known as "strike warfare" accelerated after Vietnam, as more and more World War II veterans retired, the memory of the amphibious landing at Inchon during the Korean War gradually faded from the Navy's institutional memory, and as the Soviet naval threat became more apparent.[150] As a result, the Navy planners clamored for ever more capable sea control and strike platforms. In the process, the amphibious landing fleet was increasingly viewed by many Navy officers as an overly expensive *transport force*, which took resources away from the Navy's rightful focus on sea control and strike operations.

For their part, because of the general condition of assured access, throughout the Garrison Era the Marine Corps focused primarily on its own independent crisis response role and fighting sustained operations ashore. This focus was also spurred by the post-World War II emphasis on defining the roles of individual services rather than Departments. As a result, the Marines became a more much independent and assertive DoN partner. Indeed, these two circumstances were closely intertwined. The 1947 National Security Act recognized the Marine Corps as a distinctly separate service within the Department of the Navy, as opposed to a semi-autonomous part of the Navy. And after the Korean War, in response to pre-war attempts to disband the Corps, the Marines began to emphasize their unique role as the nation's combined arms expeditionary force-in-readiness, and to develop scalable Marine Air-Ground Task Forces suitable for operations along the entire spectrum of conflict, from disaster relief and humanitarian operations to major theater war.[151] The Marine Corps' unique role was implicitly accepted by Congress when, in the Defense Appropriations Act of 1979, the Commandant of the Marine Corps (CMC) was recognized as a full-time member of the Joint Chiefs of Staff (JCS).[152]

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[150] Ostensibly, the Navy includes delivery of Marines on target in its definition of strike warfare: "Sea Strike operations are how the 21st-century Navy will exert direct, decisive, and sustained influence in joint campaigns. They will involve the dynamic application of persistent intelligence, surveillance, and reconnaissance; time-sensitive strike; *ship-to-objective maneuver*; information operations; and covert strike to deliver devastating power and accuracy in future campaigns" (emphasis added). However, through scores of interviews conducted for this report, it seems clear that for most Navy aviators, surface warfare and submarine officers the focus of strike is on putting a well-aimed bomb, missile, or guided gun round on target. The definition for Sea Strike was drawn from Admiral Vern Clark, US Navy, "Sea Power 21: Projecting Decisive Joint Capabilities," *Proceedings*, October 2002, found online at http://www.chinfo.navy.mil/navpalib/cno/proceedings.html.

[151] See "Marine Air-Ground Task Force," at "Marine Air-Ground Task Forces," at http://www.globalsecurity.org/military/agency/usmc/magtf.htm; and "United States Marine Corps Mission and Organization," at http://www.navyleague.org/sea_power/ almanac_jan_05_89.php.

[152] From 1947-1978, the CMC served only as a part-time member of the JCS, invited only when matters touched on the Marine Corps.

Even though the world views of the two services were growing apart, a strong, enduring operational link would likely have been enough to keep them together. For example, during the early 1980s, there was a reconciliation of sorts between the Navy and Marines. General P.X. Kelley, Commandant of the Marine Corps from 1983 to 1987, fully supported the tenets of the Navy's *Maritime Strategy*, as indicated below:

> Those who seek to put Marines on the front in Central Europe or in other sustained inland roles as land force division equivalents not only demonstrate their total lack of appreciation for the effectiveness of our Marine air-ground team; they also convey the most profound misunderstanding of the proper use of maritime power, the depth of our naval heritage, and the pride with which we bear the title of "Soldiers of the Sea."[153]

General Kelley's ardent support for the *Maritime Strategy* led to the development of the aforementioned NALMEB; plans for land-based USMC land and air units to cover the advance of Navy Carrier Battle Groups beyond the Greenland-Iceland-United Kingdom (GIUK) Gap; and plans for amphibious attacks in Thrace and in the Pacific. The stated purpose of these planned amphibious attacks was to divert Soviet attention and resources from the NATO Central Front, and to provide direct support for DoN sea control operations. Indeed, the aforementioned requirement to lift the assault echelons of a Marine Amphibious Force and separate Marine Amphibious Brigade was an integral part of the *Maritime Strategy's* associated "600-ship Navy."[154]

However, in 1987, General Alfred M. Gray—the gruff, charismatic 29th Commandant of the Marine Corps—publicly rejected the notion that the United States would ever fight the Soviet Union. General Gray believed that the Soviets were on their last legs, and he conspicuously turned the Corps' focus away from the *Maritime Strategy* and toward the Corps' expeditionary-force-in-readiness role. In the process, he began to divest the Corps of the heavy equipment best suited for combat against Soviet Motorized Rifle Divisions, and he continuously argued that the means of getting Marines to the fight were far less important than being able to get to the fight, quickly.[155]

General Gray's views about the Soviet Union were prescient. However, whether intended or not, his public distancing from the *Maritime Strategy* and his refocusing of the Corps on its expeditionary-force-in-readiness role further weakened the once strong institutional linkages between the Navy and the Marine Corps. General Gray's final replacement of the word

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[153] General P.X. Kelley and Major Hugh K. O'Donnell, Jr., USMC, "The Amphibious Warfare Strategy," Supplement, *Proceedings,* January 1986, pp. 18-29.

[154] For a thorough discussion of the Marine role in the Maritime Strategy, see Alexander and Bartlett, USMC, ret., *Sea Soldiers in the Cold War: Amphibious Warfare, 1945-1991*; and Freidman, *The US Maritime Strategy.*

[155] As General Gray said, "The Corps is an expeditionary intervention force with an ability to move rapidly, on short notice, to whatever needs need to be accomplished." See Thomas C. Linn and C.P. Neimeyer, "Once and Future Marines," *Joint Forces Quarterly,* Autumn/Winter 1994-95, p. 51.

"amphibious" with "expeditionary" in MAGTF titles (e.g., Marine Amphibious Forces and Brigades were renamed Marine Expeditionary Forces and Brigades) represented a symbolic institutional divorce that had been building within the DoN for over forty years.[156]

This divorce had two related impacts. It spurred Navy leadership to place even greater emphasis on strike operations, and to view the amphibious landing force as an increasing drain on "rightful" Navy resources. Similarly, it spurred the Marines to become increasingly assertive in demands for their "fair share" of the DoN budget pie. As a result, the divorce prompted increasingly sharp fights over the equitable division of DoN assets in the post-divorce "settlement dispute." That is to say, disagreements over the DoN allocation of budget shares, always contentious, became even more heated, especially during the deficit-driven budget reductions in the waning years of the Garrison Era.

The disputes between the two services were focused primarily in "Blue-in-Support-of-Green" programs—programs funded by the Navy in direct support of the Marines. The three programs that generated the most spirited debate were amphibious "lift," or shipping; naval surface fire support of Marine operations (e.g., naval gun and missile fire in direct support of Marine ground forces operating ashore); and Marine Corps aviation.

The latter of these three points of debate—the amount of resources dedicated to Marine aviation capabilities—had been a lightening rod between the two sea services ever since the DoN decided to pursue a separate air arm after World War I. As early as June 1919, the Navy's General Board debated over whether or not Marine aviation needs could be and should be provided by the Navy, the Army, or a separate Marine Corps air command.[157] In the event, the Marines developed their own aviation capabilities, paid for by DoN dollars. As aviation capabilities became more central to both Marine Corps and Navy operations, the amount of DoN resources devoted to Marine Corps aviation became a constant bone of contention between the Navy and the Marine Corps.

The fighting over DoN aviation resources grew even more contentious over the course of the Garrison Era, for two reasons. First, throughout the Expeditionary Era and through the first two decades of the Garrison Era, Marine aviators generally flew the same aircraft as Navy aviators. During and after the Vietnam War, however, the two services pursued different aircraft. For example, the Navy introduced the A-7 *Corsair II* attack aircraft and the two-seat F-14 *Tomcat*, while the Marines pursued the *Harrier* vertical take-off and landing attack jet and the two-seat F/A-18D *Hornet* strike fighter. Operating dissimilar aircraft increased Departmental operations and support outlays, and provoked fights between the two services over which aircraft should

[156] General Gray, an ardent Soldier of the Sea, would undoubtedly object to the notion that he caused a divorce from the Navy. But his moves were widely interpreted as a turn away from the Fleet Marine Force amphibious mission and toward a more independent force-in-readiness mission. See for example the comments made by Colonel John M. Collins, USA, ret., "Déjà vu All Over Again?" *Proceedings*, January 2005, found at http://www.military.com/Content/MoreContent1?file=NI_0705_Deja: "In 1988 Al Gray, the realistic Marine commandant, switched the Corps' specialty from amphibious to expeditionary warfare…"

[157] Hone, Freidman, and Mandeles, *American &British Aircraft Carrier Development, 1919-1941*, p. 22.

receive upgrades, and in what priority. Second, the USMC share of DoN aviation dollars had been steadily climbing ever since the Marine development and embrace of the concept of vertical envelopment, which demanded substantial DoN support of Marine rotary-wing aircraft like helicopters and tilt-rotors. Both of these circumstances simply added fuel to the already heated budget debates over Marine aviation.

## Influences on Change

The institutional divorce between the Navy and the Marine Corps during the Garrison Era continues to exert a strong influence on both the relationship between the two services and Battle Force design. Several other powerful winds of change emanate from the era as well. The first, tied directly to the rise of guided weapons warfare, provides a strong impetus towards an ever smaller Battle Force.

Guided weapons made central contributions to US naval operations from their earliest development, starting first with air-dropped and surface- and submarine-launched guided torpedoes. After World War II, the DoN Battle Force focused considerable attention to developing and employing guided weapons in an ever-expanding variety of roles, including air and missile defense of carrier task forces; air-to-air warfare; offensive and defensive ASW; and anti-surface warfare. In this regard, the long-range missile was particularly central to Battle Force efforts:

> Many words have been splashed in business and defense journals to the effect that the 'information age' is now altering civilization as well as the ways of war. A concise response is that the information age is nothing new to the navies of the world. The role of information (scouting) reached fruition in the 1930s with the fusion of air search and radio communications. Information warfare and operations are indeed evolving with technology, but in most respects they are an extension of the past….What we have seen in naval tactics is a new weapon—a well-aimed long-range missile—to take advantage of the sensing and communicating technology, and vice versa.[158]

As emphasized in the passage above, the two key characteristics of the Guided Weapons Warfare Regime are accuracy independent of weapon range, and the rise of the sensing, planning, targeting and fire control networks necessary to exploit extended range accuracy. In the early part of the regime, increased weapons range came at the cost of increased weapons size. For example, a single long-range *Talos* surface-to-air missile and booster, introduced into service in 1959, was 32 feet long and weighed nearly four tons![159] Similarly, the size and complexity of information and combat systems needed to effectively employ guided weapons over longer

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[158] Captain Wayne P. Hughes, USN (ret), *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000), p. 4.

[159] "Bendix RIM-8 Talos," found at http://www.designation-systems.net/dusrm/m-8.html.

ranges grew as well, as indicated by ever-increasing volume and electrical power requirements in new warships.[160]

The shift to naval guided weapons warfare resulted in major changes to the fleet's naval platform architecture. The legacy World War II architecture, characterized by a heterogeneous mix of large, medium, and small focused-mission ships ranging in size from 57,000-ton *Iowa*-class battleships to 250-ton patrol submarine chasers, all armed with relatively short-range guns and unguided weapons (e.g., depth charges, straight-running torpedoes, etc.), gradually gave way to a relatively homogenous mix of multi-mission ships armed principally with long-range missiles and guided weapons. The numbers tell the story: a "cruiser's" FLD fell from 21,000 tons to 9,000 tons; a "destroyer's" FLD rose from approximately 3,500 tons to over 8,000 tons; and a "frigate's" FLD rose from less than 2,000 tons to over 4,000 tons. Even the submarine's submerged displacement grew from a displacement of approximately 2,000 tons to nearly 7,000 tons.

The large, complex, multi-mission combatants built for guided weapons warfare generally proved to be much more effective and efficient than smaller, focused-mission ships. However, they were also much more expensive. Both circumstances—as well as the character of the global maritime competition during the Garrison Era —started an inexorable move toward a smaller, more efficient naval platform architecture. Again, the numbers tell the story: in the decade between 1951 and 1960, the fleet ranged between 872 and 1,113 ships; between 1961 and 1970, the fleet ranged between 743 and 932 ships; between 1971 and 1980, the fleet ranged between 523 and 752 ships; and between 1981 and 1989, fleet numbers ranged between 521 and 594 ships.[161]

The shift from large numbers of focused-mission combatants armed with guns and unguided weapons to small numbers of multi-purpose combatants armed with guided weapons fit naturally with the DoN's long-standing preference for building the largest, most capable warships in class, evident since it built its first six "super-frigates" at the turn of the 19th century. Indeed, this preference was exaggerated during the Garrison Era because the US's naval allies were content to build large numbers of smaller, cheaper, single-purpose combatants such as anti-submarine warfare ships, convoy escorts, fast attack craft, and mine warfare vessels. This relieved any pressure on the US Navy to build smaller, less expensive ships for its own purposes.

Nevertheless, given the strategic conditions of the Garrison Era and the nature of the global naval competition, the US shift to a smaller, more efficient fleet optimized for guided weapons warfare was imminently sensible. However, the continuing influence of the DoN's preference for the most powerful ships in class now appears to be making a vice out of virtue. Indeed, as will be discussed, the DoN's never-ending pursuit of even more capable, more powerful ships is creating

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[160] Muir, Jr., *Black Shoes and Blue Water: Surface Warfare in the United States Navy, 1945-1975,* pp. 2-3.

[161] "US Navy Active Ship Force Levels," found at http://www.history.navy.mil/branches/org9-4.htm#1945.

a "perfect storm" in today's constrained resource environment, and is threatening to sink the Battle Force in a raging sea of red ink.[162]

A second influence from the Garrison Era is the strong attraction that officers in both the Navy and Marine Corps continue to feel toward the rotational presence model. The now six decade-long practice of keeping combat credible force forward drives Battle Force operational thinking to a remarkable degree. For example, keeping three Carrier Battle Groups and three ARG/MEU(SOC)s continually forward is often used by naval officers to justify the number of ships in the naval platform architecture. Indeed, for the carrier force, the number of carriers needed to keep several forward exceeds the number needed for any major combat operation. This helps to explain why, even though the striking power of contemporary carriers is four times greater than it was only 15 years ago, Navy leaders continue to argue for a carrier force of 11 to 12 carriers. It also explains why, even as the Battle Force has become smaller and more efficient, that naval officers continue to resist the idea of (re)concentrating the Battle Force in home waters and concentrating on surge operations.[163]

A third lasting influence of the Garrison Era is the increasing cost of military manpower, which continues to have enormous implications for naval platform architecture design. The costs associated with recruiting, training, and retaining high quality men and women has climbed steadily since the 1973 adoption of the AVF, so much so that by the end of the Garrison Era, crew size had become the single biggest driver of a ship's life-cycle costs. Larger combatants generally have larger crews, and therefore have larger operations and support (O&S) costs. Therefore, a lasting influence of the shift to the AVF has been a steady pursuit of increased automation and reduced crew size for Battle Force ships. By so doing, DoN leaders hope to accrue improved platform "life cycle cost savings," in order to divert funds to shipbuilding and to continue to build the even larger, more complex ships they continually seek.

Finally, as will be discussed in the next chapter, the Congressionally-mandated call for improved "unified action of the armed forces," the resulting increased operational emphasis on Joint operations, and the gradual rise of a new Joint "culture" continues to have a profound impact on the way the two services perceived of themselves, their roles, and their inter-Departmental relationships, as well as the emerging naval platform architecture.

[162] See for example Andrew Koch, "US Navy Shipbuilding Plan Takes on Water," *Jane's Defence Weekly*, June 29, 2005, p. 5.

[163] The development of the Fleet Response Plan and Flexible Deployment Concept may indicate a new willingness to return to the surge model developed during the Expeditionary Era. Both aim to increase overall fleet readiness to facilitate fleet surges during major combat operations; they will be discussed later in the report.

## A New National Security Era, 1989-?: Making the Turn Onto a New Race Leg

The events of 1989 were breathtaking. In March, Hungary decided to hold free elections, and the Soviet Union declined to intervene. In June, the Poles followed suit, voting the Communists out of power. In October, a celebration in East Germany commemorating the 40th anniversary of the founding of the German Democratic Republic was disrupted by 70,000 demonstrators demanding an end to the regime. In response, on November 9, 1989, the East German government lifted travel restrictions between East and West Germany, and began dismantling the Berlin Wall. The Wall, erected in August 1961, was the enduring symbol of the disputed frontier between the Soviet Empire and the West. Its demolition signaled the end of the 42-year long Garrison Era, the beginning of a new national security policy era, and a new "leg" in the global naval competition.[164]

As in past inter-era shifts, US and DoN strategists worked to understand the national security requirements for the new era, to make appropriate design changes to the naval fleet platform architecture, and to settle on a new Battle Force course and speed. However, this quick review of the Ship's Log reveals just how disorienting the shifts between strategic eras can be, and how long it takes to settle on an appropriate naval platform architecture.

Recall that the post-Revolutionary War shift to the Continental Era took approximately 15 years to settle out, as leaders debated the wisdom of even having a navy or competing in the global naval competition. When the debate was settled, the DoN pursued a frigate navy designed for *guerre de course*. The inter-era shift between the Continental and Expeditionary Eras resulted in a two-and-a-half decade period of architectural turmoil as DoN planners struggled to both keep up with rapidly changing naval technology and to completely redesign the naval platform architecture to reflect a battleship navy designed for *guerre d'escadre*. And the inter-era shift between the Expeditionary and Garrison Eras resulted in a decade-and-a-half period of uncertainty as national security planners struggled to adjust to the development of nuclear weapons and a long "cold war," and engaged in a debate over whether long-range airpower had supplanted the need for a strong Battle Force.

Now, with 16 years having passed since turning onto this new racing leg, one might expect the Battle Force to have settled down on a constant course and speed, and the design for the required naval platform architecture to have firmed up. However, even though the new strategic era's broad characteristics are becoming increasingly clear, DoN planners continue to struggle to settle on the changes necessary to prepare for future challenges and competitors. The reason why this is so will be discussed in the next chapter.

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[164] "The End of the Cold War," found at http://www.nebraskastudies.org/1000/stories/1001_0140.html.

# III. WAITING FOR THE PLOT TO SETTLE

> One characteristic of the system is that it has hugely increased the economic interdependence and drastically reduced the importance of geographic distance—so that what happens "over there" matters far more to us "here" than it once did. Hence, navies are being required to act together in common cause to project military powers ashore, particularly in expeditionary operations at a distance from the home base.[165]
>
> Geoffrey Till
> "Navies and the New World Order"

## BEEN THERE, DONE THAT

The abrupt end to the Garrison Era took US defense planners by surprise. Even in 1989, after the dismantling of the Berlin Wall and during the ongoing turmoil in Eastern Europe, the Joint Chiefs still believed the Soviet Union would remain the most serious threat the United States through the 1990s.[166] Typical of all inter-era transitions, the period leading up to the collapse of the Soviet Union in 1991, and just after, was a time of enormous strategic uncertainty.[167]

The first DoD attempt to describe the military requirements for the post-Garrison Era world was the Base Force, published by the elder President Bush's Administration in 1992. The Base Force substituted the idea of forward defense which characterized defense planning for the previous four decades in favor of a greatly reduced permanent forward presence buttressed by periodic deployment of forces from CONUS. In this way, the US could retain its regional influence yet increase its flexibility to respond to regional instability and crises, which were envisioned as being the primary threats to US interests in the world ahead.[168] In other words, the Base Force announced that the primary role of the US military would shift from containing the expansion of communism and confronting the Soviet Union in Europe and Asia to conducting global power-projection operations in support of US national security interests.

The basic outline of the Base Force was affirmed by the Clinton Administration in the 1993 Bottom-Up Review (BUR). With the initial post-Garrison Era defense strategy approved by both Republicans and Democrats alike, the United States conducted a relatively rapid draw-down of the forces assembled and based overseas during the Garrison Era. Both to protect its continuing

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[165] Till, "Navies and the New World Order," p. 61.

[166] Lorna S. Jaffe, *The Development of the Base Force 1989-1992* (Washington, DC: Joint History Office, Office of the Chairman of the Joint Chiefs of Staff, July 1993), p. 2.

[167] The uncertainty that existed is well captured in John Lewis Gaddis, "Toward the Post-Cold War World," *Foreign Affairs,* Spring 1991, pp. 102-22.

[168] Jaffe, *The Development of the Base Force 1989-1992*, pp. 2-3. This slim volume is a wonderful description of the defense planning that occurred during and just after the end of the Cold War/Garrison Era.

regional interests and to reassure its allies that the United States would remain globally engaged, successive US Administrations—Republican and Democrat—decided to keep 100,000 military personnel in both Europe and Asia. The remainder of US combat forces stationed overseas were either demobilized or repositioned in the continental United States (CONUS).[169]

With the benefit of a decade's experience in the new strategic era, the initial cautious reductions in permanent forward garrisons initiated by the Base Force and the BUR were followed by a more ambitious planned reduction, outlined in a Global Defense Posture Review conducted by the younger President Bush's Administration.[170] The Review recommended that all heavy combat forces still in Europe be returned to CONUS. All that would remain would be a medium-weight combat brigade and an airborne brigade. Similarly, the Review recommended that combat forces on the Korean peninsula to be withdrawn and repositioned in the United States, with only one active brigade remaining on the peninsula. This brigade would, in turn, be repositioned to the south of the demilitarized zone that separated North and South Korea, and be postured for intra-theater deployment.[171] The Review also implied further reductions would be forthcoming, particularly in the number of US forces stationed in Japan.

Thus, 16 years into the new strategic era, its basic structure is now apparent—and its outlines are quite familiar. Consider the following statement of Winston Churchill in 1942:

> The whole power of the United States, to manifest itself, depends on the power to move ships and aircraft across the sea. Their mighty power is restricted; it is restricted by the very oceans which have protected them; the oceans which were their shield, have now become both threatening and a bar, a prison house through which they must struggle to bring armies, fleets, and air forces to bear upon the common problems we have to face.[172]

These powerful words highlight the fundamental operational similarity that exists between the Expeditionary Era and this new emerging national security policy era. That is, that primary base for most future overseas US expeditions will be the continental United States. These expeditions will continue to be supported by the residual Garrison Era basing infrastructure. However, these

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[169] See for example the 1996 remarks made by Anthony Lake, National Security Advisor to President Clinton, at http://www.mtholyoke.edu/acad/intrel/lakeapec.htm.

[170] See Statement of Douglas J. Feith, Under Secretary of Defense for Policy, before the House Armed Services Committee, June 23, 2004, at http://www.house.gov/hasc/openingstatementsandpressreleases/ 108thcongress/04-06-23feith.pdf; and Fiscal 2005 Department of Defense Budget Release at http://www.defenselink.mil/releases/2004/ nr20040202-0301.html.

[171] Ann Scott Tyson, "Planned Realignment of Troops Criticized," *The Washington Post*, May 6, 2005, p. A19. See also Michael Noonan, "Reform Overdue: the Geopolitics of American Redeployment," found online at http://www.fpri.org/enotes/20040823.military.noonan.redeployment.html.

[172] Labaree, et al., *America and the Sea: A Maritime History*, p. 9.

overseas locations will increasingly represent “coaling stations” for major US power-projection operations, which will originate primarily from US soil.[173]

There are other striking similarities between the Expeditionary and this new national security era. As in the Expeditionary Era, the focus of US defense strategists and military planners is gradually shifting away from Europe and towards Asia, albeit with a wider aperture. Contemporary planners focus on the Greater Asian littoral that extends from the Persian Gulf (Southwest Asia) to North Korea (Northeast Asia)—an area now often referred to as the “arc of instability.[174]

The emerging US overseas basing network is also eerily similar to that of the Expeditionary Era: Hawaii, Alaska, Midway and Wake Islands, and Guam continue to play either major or supporting roles. The United States no longer has the sovereign western Pacific hub it had in the Philippines in the earlier era, but it does have strong bilateral security treaties with Japan and South Korea, which gives it similar access to major sea, air, and ground facilities in the Western Pacific. As it did in the end of the Expeditionary Era, the United States also continues to rely on Australia. Although it does not base troops on the Australian continent as it did in World War II, the United States has ready access to its superb ports, logistics support facilitates, and training ranges. The two key additions to the US naval overseas basing structure along the Asian littoral are the Fifth Fleet support facilities in Bahrain[175] and the island of Diego Garcia in the Indian Ocean.[176]

Importantly, defense planners are beginning to worry about maintaining forward base access in distant theaters as much as planners did in the First Expeditionary Era. This problem was first raised in a serious way by the 1997 National Defense Panel, an independent body tasked by

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[173] Of course, these expeditions will be supported by rotational, forward-deployed forces. However, as overseas garrisons are dismantled, these forces will also increasingly come from CONUS bases.

[174] The arc of instability is “a swath of territory running…through most of Africa, the Middle East, and Central and Southeast Asia. It is countries along this arc—often failed states—that US officials argue have been left far behind as the rest of the world is brought into the global economy.” See “Arc of Instability” at http://www.sourcewatch.org/index.php?title=Arc_of_instability. Another analyst explains that US attention is drawn to the “gap states”—those states left behind in the ongoing wave of globalization—in Africa and in Asia. See Thomas M. Barnett, *The Pentagon’s New Map* (New York, NY: Putnam and Sons, 2004).

[175] The US Navy has maintained a permanent presence in the Gulf since the establishment of the Middle East Force (MIDEASTFOR) in 1949. For the next 20 years, three or four ships at a time were assigned to the MIDEASTFOR—generally a command ship and two or three small combatants such as destroyers or frigates. When Bahrain became a sovereign state in 1971, the US Navy worked out an agreement to take over piers, radio transmitters, warehouses, and other facilities left vacant by the departing British. USS *La Salle* (AGF 3), an amphibious transport ship converted for Gulf duty, began to serve as the permanent MIDEASTFOR flagship in 1972. Over time, the facilities in Bahrain were dramatically improved. These facilities now support the US Fifth Fleet. See http://www.globalsecurity.org/military/facility/manama.htm.

[176] Diego Garcia is a British Indian Ocean Territory. The Navy Support Facility (NSF) on Diego Garcia was established on October 1, 1977, after six years as a Navy communications station. Now known as the “Footprint of Freedom,” it plays a primary role in support of US military units operating in the Indian Ocean and Arabian Gulf. The island’s only occupants are NSF personnel and tenants. The Air Force and Army also maintain support elements on the island. See http://www.globalsecurity.org/military/facility/diego-garcia.htm.

Congress to both critique the 1997 QDR and to provide an alternative strategic review.[177] The panel warned that future access to forward bases would be increasingly less assured over time, for two key reasons. First, absent a compelling, unifying threat like that of an expansionist Soviet Empire, political access would have to be negotiated instead of counted upon. Depending on the crisis, even reliable allies might balk at the prospect of US forces mounting combat operations from their soil. Second, the vulnerability of fixed forward bases to ballistic and cruise missiles armed with guided sub-munitions and possibly weapons of mass destruction (WMD) would likely increase over time.[178]

As a result, the Panel judged that forward access to bases would be far less certain during the new strategic era. At best, the NDP warned that US forces operating from forward bases could be subject to preemptive and/or incessant attack by guided weapons or WMD. At worst, the United States might lose access to forward land bases altogether. This general theme of uncertain, contested, or denied base access was echoed and reinforced by the 2001 QDR, which identified six critical operational goals that would guide future DoD transformation efforts. First among them was protecting critical bases of US operations (homeland, forces abroad, allies and friends) and defeating WMD and their means of delivery.[179]

The transition to the new strategic era and the gradual relocation of US combat forces to US-controlled territory occurred against the backdrop of a decade and a half of frenetic global military activity. Once again, this flurry of activity was not unlike that which marked the first several decades of the Expeditionary Era, at a time when US leaders were increasingly willing to step more boldly on the world stage. In this new era, freed from the requirement to be immediately ready for full-scale war against the Soviet Union, US leaders employed the military for a variety of tasks, and operational tempo for all of the armed forces climbed dramatically. In the narrow span of 16 years, the United States conducted two major wars, conducted armed interventions in Panama, Somalia, Bosnia, Kosovo, and Afghanistan, and committed armed forces in a number and variety of places and circumstances. During this period of high "operational tempo," the term *expeditionary* gradually infused the lexicon of all of the services, much to the chagrin of the Marine Corps, which felt in had cornered the (expeditionary) market during the Garrison Era.[180]

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[177] National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington, DC: December 1997). The Panel's final report can be found on the Defense Strategy Review Page online at http://www.comw.org/qdr/97qdr.html.

[178] National Defense Panel, *Transforming Defense: National Security in the 21st Century.*

[179] Office of the Secretary of Defense, *Quadrennial Review Report* (Washington, DC: Office of the Secretary of Defense, September 30, 2001), p. 30. The report can be found online at http://www.defenselink.mil/pubs/qdr2001.pdf. For a complete description of the threats to forward air bases, see Christopher J. Bowie, *The Anti-Access Threat and Theater Air Bases* (Washington, DC: Center for Strategic and Budgetary Assessments, 2002). See also Joel Wuthnow, *The Impact of Missile Threats on the Reliability of US Overseas Bases: A Framework for Analysis* (United States Army Strategic Studies Institute, January 2005).

[180] A good description of what US forces have been and are doing on the ground in post-ColdWar/Garrison Era can be found in Robert D. Kaplan, *Imperial Grunts: The American Military on the Ground* (New York, NY: Random House, 2005).

Despite the similarities between the current national security policy era and the first Expeditionary Era, there are also several striking differences. The first, most evident difference is that unlike during that earlier period, the United States is now the sole global "super power" rather than one of many major global actors. As such, even after the Soviet Union had imploded, it was evident that US global responsibilities would continue to require substantial military capability. The standing peacetime US armed forces are thus larger and much more capable than those in the Expeditionary Era.

A second difference: far from fighting it out for the number two spot in the global naval race, the current DoN Battle Force is the most capable naval power in the world—by a wide margin. Just how wide a margin will be discussed in the next chapter; for now, it is sufficient to say that the Battle Force now enjoys uncontested command of the high seas; it need no longer concern itself about fighting its way across any ocean.

A third difference is, unlike during the Expeditionary Era, the US armed forces now consist exclusively of volunteers. As was prefaced in the last chapter, the costs of maintaining an all-volunteer force steadily increased during the 1990s, and they continue to rise. Indeed, increasing manpower costs now influence the way the force is used, designed, and structured in ways unimaginable during the Expeditionary Era, when peacetime forces were small and poorly paid, and the majority of wartime forces consisted of conscripts.[181]

For example, DoD and service leaders are well aware of the stresses high tempo puts on the AVF. In an attempt to keep these stresses from impacting force retention, all of the services have either developed or are developing unit rotational bases to help manage the amount of time servicemen and women spend overseas. The DoN rotational base model, developed during the Garrison Era in order to continually man the forward "naval garrisons," proved well suited for the new era, and it was retained with little modification. A variation of the DoN model was adopted by the Air Force in the mid- to late-1990s for its Aerospace Expeditionary Force (AEF) concept. In the event, the Air Force organized ten AEFs, of which two are always ready for immediate deployment at any time.[182] The Army's ongoing modular brigade reorganization, occurring in the midst of an ongoing war in Iraq, will result in a rotational base consisting of 43 active brigades and 34 National Guard brigades capable of maintaining 20 brigades forward at any one time.[183]

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[181] For example, in 2004, eliminating a single Navy enlisted billet was expected to result in a average cost savings of $57,000 a year; eliminating an officer's billet saved an average of $115,000 a year. Jack Dorsey, "Carrier Crews to Shrink," *Norfolk Virginia Pilot*, October 29, 2004.

[182] See "Aerospace Expeditionary Force," at http://www.globalsecurity.org/military/agency/usaf/aef-intro.htm.

[183] Despite the best efforts of the Services to limit personnel "opstempo," the long occupations of Iraq and Afghanistan have begun to have an effect on both retention and recruitment, especially in the Army and Marines. Some service members are on their third combat tour since September 2001. For a quick summary of problems this is having on the AVF, see Don Edwards, "Ten-Hut! The Army's Bungling Recruitment," *The Washington Post*, June 12, 2005, p. B5.

As has been mentioned, the high costs of manpower are soaking up money that might otherwise be spent on procurement, increasingly driving platform designs, and affecting the way the force is employed. For example, automation is being far more aggressively pursued to reduce crew sizes on all manned platforms, and unmanned systems are being substituted for crewed platforms for the highest risk missions, such as suppression of enemy air defenses or mine sweeping.[184]

A fourth key difference between the current and Expeditionary Eras is that in the earlier period, warfighting strategies and operational art revolved around dominant industrial capacity and the massing of both firepower and forces. In contrast, current warfighting strategies and operational art revolve much more around "information superiority" and the discrete, precise application of firepower, forces, and effects.[185] This change in strategic and operational styles can be attributed to many factors, but perhaps none as important as the maturation of the Guided Weapons Warfare Regime and the resulting effect on US defense planning and warfighting effectiveness.

Although the exact timing can be debated, this report considers a third phase of the Guided Weapons Warfare Regime to have begun in 1991—the year that saw both Operation *Desert Storm* and the final disestablishment of the Soviet Union. Indeed, these two events are inextricably related. The second phase of the Guided Weapons Warfare Regime saw a hard-fought race between two strong competitors—the United States and the Soviet Union. The implosion of the Soviet Union left the United States alone in the race. And although guided weapons made up a relatively small percentage of the total number of munitions expended during Operation *Desert Storm*, their dramatic effect appeared to confirm the ongoing military technical upheaval posited by Soviet military theorists during the second phase of the competition.[186]

In any event, after the fall of the Soviet Union and the impressive victory in *Desert Storm*, more and more US military officers began to speak in terms of a broader "Revolution in Military Affairs" (RMA) based on guided weapons, better sensors, improved networking of forces, and better information.[187] Terms such as "precision" and "information superiority" began to infuse

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[184] For example, the US Navy's goal is to convert mine warfare almost completely into an unmanned operation so that the presence of Sailors is no longer required in a minefield. See "Mine Warfare," found online at http://www.chips.navy.mil/archives/03_winter/PDF/mine.pdf.

[185] There is a lively debate over the current emphasis on information superiority. For just one explanation of what it means, see "Information Superiority and Space," at http://www.defenselink.mil/execsec/adr1999/chap7.html. For a more thorough explanation, see Walter Perry, David Signori, and John Boon, *Information Superiority* (Washington, DC: Office of the Secretary of Defense, 2004), found complete online at http://www.rand.org/publications/MR/MR1467/MR1467.pdf. For a skeptical look at information superiority, see Timothy L. Thomas, "Kosovo and the Current Myth of Information Superiority," *Parameters,* Spring 2000, pp. 13-29.

[186] For a prescient assessment of this revolution, see Andrew F. Krepinevich, Jr., *The Military-Technical Revolution: A Preliminary Assessment* (Washington, DC: The Center for Strategic an Budgetary Assessments, 2002). The report can be found online at http://www.csbaonline.org/4Publications/Archive/R.20021002.MTR/R. 20021002.MTR.pdf.

[187] As described by the Office of Force Transformation, Office of the Secretary of Defense, a revolution in Military Affairs "is a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts fundamentally alters the character and conduct of military operations." See http://www.iwar.org.uk/rma. For a good discussion on RMAs, see James R. Fitzsimonds and Jan M. van Tol, *Revolutions in Military Affairs,* Joint Forces

US military thinking, and to mark US battlefield operations. As more and more US military officers embraced these concepts, and their benefits were demonstrated successfully on post-Garrison Era battlefields, the services began to more aggressively pursue the benefits of networked, guided weapons warfare. As a result, the 1990s saw an aggressive, monopolistic exploitation of the Guided Weapons Warfare Regime by the US armed services. In the process, the US armed forces began to rapidly break away from both allies and potential adversaries alike in terms of conventional military combat capacity and capability.[188]

The American RMA is often described in terms of new information technologies and *network centric warfare*.[189] Perhaps the most influential proponent of this line of thinking was retired Vice Admiral Arthur K. Cebrowski, former President of the Naval War College and Director of the Office of Force Transformation (OFT), who attributed the revolution in war to “fundamental changes in American society and business.”[190] However, the historiography clearly suggests that the revolution has been more than six decades in the making, and that the pursuit of guided weapons was as least as important as changes in American business in its ultimate manifestation. No matter: for all practical purposes—as was foreseen by Soviet military theorists—guided weapons warfare and network warfare are now inextricably linked.[191]

Guided weapons and networks were not the only contributing components of the American “revolution in war.” As decribed in the previous chapter, equally important were both the improving quality of the men and women in the US all-volunteer armed forces and the “Revolution in Joint Military Affairs” sparked by the Goldwater-Nichols Act. While one commentator goes so far as to say that “The most important transformation in the [US] Armed Forces since World War II was the change from a draft to an all-volunteer force,”[192] the rise of “Jointness” has had an equally profound effect, because it lessened, to a great degree, the power and independence of the individual services so evident during both the Expeditionary and

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Quarterly, Spring 2004, pp. 24-31. A thorough overview of the RMA debate can be found online at “The RMA Debate,” at http://www.comw.org/rma. For one of many other commentaries on the effect of *Desert Storm*, see “Hyperwar: The Legacy of *Desert Storm*,” found online at http://www.fas.org/spp/ aircraft/ part08.htm.

[188] The US dominance in the Guided Weapons Warfare Regime is well captured in “Weapons: From Smart to Brilliant,” *Businessweek.Com*, September 27, 2001.

[189] For a thorough explanation of network centric warfare, See “Network Centric Warfare: Department of Defense Report to Congress,” found at http://www.dod.mil/nii/NCW. See also Giles Ebbutt, “Expanding the Net,” *Jane’s Defence Weekly*, January 26, 2005, pp. 25-29.

[190] Vice Admiral Arthur K. Cebrowski, USN, and John J. Garstka, “Network-Centric Warfare: Its Origins and Future,” *Proceedings*, January 1998, found at http://www.usni.org/Proceedings/Articles03/PROmayo 02.htm.

[191] For the inseparable linkages between guided weapons and networks, see “Precision-Strike Limitations Lead Air Forces to Network Priorities,” *Jane’s International Defense Review*, July 2005, p. 4. For a description of how networks are changing military operations, see David Ronfeldt and John Arquilla, “Networks, Netwars, and the Fight for the Future,” *First Mind*, 2003.

[192] Stephen J. Cimbala, “Transformation in Concept and Policy,” *Joint Forces Quarterly*, 3d Quarter, 2005, p. 30.

Garrison Eras, blazed a new path toward increasing Joint battlefield cooperation and collaboration and spurred the continued integration of service-developed battle networks.

One cost-savings approach to meeting US global military responsibilities during the new strategic era would have been a return to the dominant service model evident in the Expeditionary, Continental and early Garrison Eras. Indeed, in the early 1990s, planners from each of the four armed services tried, with differing degrees of effort, to make the case that their service would make the most future national security contribution, and should therefore receive the lion's shares of the nation's resources. However, taking their cue from the Kennedy Administration's focus on "flexible response," guided by the intent of the Goldwater-Nichols Act, and impressed by the results during Operation *Desert Storm*, successive Republican and Democratic Administrations instead opted to maintain a powerful, balanced, multidimensional, *Joint* armed force, and to demand increasing Joint collaboration. The subsequent rise of Jointness meant that the chance that any single service is likely to grab a significant majority of the nation's resources was becoming increasingly unlikely [193]

The impact that *Desert Storm* had on this decision cannot be discounted. In addition to being the first major war of the new national security era, *Desert Storm* was the first war waged since the passage of the Goldwater-Nichols Act. While there were many reasons contributing to the decisive American victory in the war, its rapid and successful outcome was widely attributed by Congressional and political leaders to the increased power of the war's overall Joint commander, General Norman Schwarzkopf, and to the improved unified action of the armed forces that resulted from that power. As a result, the war's successful conclusion helped the idea of Jointness to flourish, and helped to drive the last nail in the coffin of service independence. The war prompted continual and ever-more insistent calls from Congress for the improvements in Joint equipment interoperability and operational cooperation necessary to unleash the Act's full warfighting potential. As expressed by Admiral Edmund Giambastiani, former Commander of US Joint Force Command and now Vice Chairman of the Joint Chiefs of Staff, Jointness has now "matured to the point where the 'joint horse' is getting in front of the 'service cart.'"[194]

The popular contemporary term network centric warfare thus obscures three of the central driving factors behind the American Revolution in Military Affairs: the equal importance that guided weapons play in emerging reconnaissance-strike complexes or battle networks; the transition to an all-volunteer force; and the dramatic improvement of US Joint battlefield performance. Indeed, it is the emergence of **Joint Multidimensional Battle Networks**[195] and

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[193] The current buzzword describing the close relationship of the armed forces is "Joint interdependence." See for example the comments made by General Fastaband, US Army, in USJFCOM and TRADOC Public Affairs, Army, "USJFCOM Working to Build Joint Expeditionary Capabilities," found online at http://www.jfcom.mil/newslink/storyarchive/2004/pa102904a.htm. See also Colonel Christopher R. Paparone, US Army, and James H. Crupi, Ph.D., "What is Joint Interdependence Anyway?" *Military Review*, July-August 2004, pp. 39-41.

[194] Statement of Admiral Edmund P. Giambastiani, Jr., Commander United States Joint Forces Command, before The House Armed Services Committee, United States House Of Representatives, March 12, 2003, found online at http://www.jfcom.mil/newslink/storyarchive/2003/pa031203.htm.

[195] Joint Multidimensional Battle Networks demand a degree of service cooperation and interoperability not seen in the Garrison Era. Among many examples: Sandra I. Erwin, "Navy, Air Force Team Up in 'Joint Fires Network',"

Joint expeditionary power-projection operations that give this new strategic era its proper name: **the *Joint* Expeditionary Era.**

The major combat phase of Operation *Iraqi Freedom* (OIF), conducted just 17 years after the passage of the Goldwater-Nichols Act and just 14 years after the transition to a new national security policy era, came as close as any operation to date of achieving the intent of the Act. Connected and linked US air, ground, sea, space, "cyberspace," and special operations forces operated in relatively smooth, synchronized fashion, and their actions were thoroughly integrated in a fast-moving, hard-hitting, multidimensional campaign built around the use of massed guided weapons fire:

> Under this construct, the emphasis is no longer just on numbers—which remain important—but rather on harnessing all the capabilities that our Services and Special Operations Forces bring to the battlespace in a coherently joint way. Advances in technologies, coupled with innovative warfighting concepts joined together by a new joint culture, are enabling a level of coherent military operations that we have never been able to achieve before. . . .The emphasis now is on the effectiveness of joint capabilities employed at times and places of our choosing to achieve strategic effects. General Franks later remarked on this level of jointness, saying "Operation IRAQI FREEDOM was the most joint and combined operation in American history."[196]

This is not to imply that there were not lingering problems between the services during OIF. However, it seems certain that the improvement in Joint information sharing, planning, and operations will only continue to improve. Why? Because after 2016, every member of the pre-Goldwater-Nichols generation of officers and servicemen and women will have left the AVF with the exception of a small number of generals and admirals, who could not hold their job without having served on a Joint staff. Every person in the US armed forces will have been "born Joint."[197] This natural aging and maturing of the Joint force will ensure, much more than further legislation, that the way in which the United States organizes, trains, and equips its armed forces will inevitably change. Future Joint Multidimensional Battle Networks will be more effective as a result.

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*National Defense*, March 2003, p. 22. This article talks about US Navy and Air Force efforts to develop a common fires network. John A. Tirpak, in his article "The New Way of Electron War," *Air Force Magazine*, December 2004, pp. 26-33, talks about how the Air Force and Navy will need to share the load in electronic warfare. Richard Mullen, in "'Result Fury' Successful, DoD Says," *Defense Today,* November 24, 2004, talks about a Joint Air Force and Navy experiment in which GPS guided weapons were directed against moving ships. However, not all examples on inter-service cooperation and integration are positive. For example, see Hunter C. Keeter, "Naval Air Refueling Needs Deferred in Air Force Tanker Plan," *Sea Power*, April 2004, pp. 16-18. However, a clear trend is that the Services are becoming more and more interoperable and cooperative across all Joint warfighting dimensions.

[196] Statement by Admiral Edmund P. Giambastiani, Jr., Commander, United States Joint Forces Command and Supreme Allied Commander Transformation (NATO) on Lessons Learned from Operation Iraqi Freedom before The House Armed Services Committee, United States House Of Representatives, October 2, 2003, found online at http://www.jfcom.mil/newslink/storyarchive/2003/pa100203.htm.

[197] Unless selected for flag rank, senior officers and staff non-commissioned officers normally retire after 30 years of service. 2016 will be the 30th anniversary of the Goldwater-Nichols Act.

## INITIAL DON COURSE CORRECTIONS IN THE JOINT EXPEDITIONARY ERA

Unlike after World War II, the DoN suffered little of the institutional disorientation that often results during the shift from one strategic era to another. With the Soviet Navy no longer a threat and with no navy to fight, DoN planners immediately shifted from their base course of *sea control* onto a new heading for *power-projection.* This shift was made easier because of the recent passage of the Goldwater-Nichols Act, which effectively muted calls for a return to a dominant service model and gave the Battle Force a ready Joint role.

Less than one year after the Soviet Union ceased to exist, then, DoN strategists had begun to think seriously about how the Battle Force needed to be resized and reshaped, as indicated in the 1992 DoN vision document entitled *…From the Sea*:

> With a far greater emphasis on joint and combined operations, our Navy and Marine Corps will provide unique capabilities of indispensable value in meeting our future security challenges…Our ability to command the seas in areas where we anticipate future operations allows us to resize our naval forces and to concentrate more on capabilities required in the complex operating environment of the "littoral" or coastlines of the earth…As a result, our national maritime policies can afford to de-emphasize efforts in some naval warfare areas. *But the challenge is much more complex than simply reducing our present naval forces. We must structure a fundamentally different naval force to respond to strategic demands, and that new force must be sufficiently flexible and powerful to satisfy enduring national security requirements* (emphasis added).[198]

In other words, DoN strategists anticipated that the locale for the future naval competition would shift from the high seas into the world's littorals,[199] and that the Battle Force needed to be resized and reshaped for a new mission: *delivering Joint goods and services ashore.*[200]

Initial DoN moves to resize and reshape the Navy satisfied almost no one. Proponents of the Navy fretted about the extent of the fleet's inevitable post-Cold War demobilization. .Between September 30, 1989, and September 30, 1997, the Navy fell from 592 to 365 ships, with additional cuts still planned.[201] That year, the Quadrennial Defense Review set the post-Garrison

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[198] Sean O'Keefe, Admiral Frank B. Kelso II, US Navy, General C.E. Mundy, …*From the Sea* (Washington, DC: Department of the Navy, September 1992), found at http://www.globalsecurity.org/ military/library/policy/navy/ fts.htm#INTRO.

[199] As described in …*From the Sea*, "as a general concept, the littoral comprises two segments of the maritime battlespace; seaward—the area from the open ocean to the shore which must be controlled to support operations ashore; and landward—the area inland from shore that can be supported and defended directly from the sea. O'Keefe, et al,…*From the Sea.* For a good discussion about the implications associated with operating in shallow, more crowded littoral waters, see Stephan Nitschke, "Littoral Warfare: A New Name for an Old Mission?" *Naval Forces,* No. III, 2005, pp. 16-27.

[200] Hughes, *Fleet Tactics and Coastal Combat,* p. 9.

[201] The *Total Ship Battle Force* represents the ships the DoN officially counts as its war fleet. However, the Navy operates many additional ships. Counting the TSBF will be discussed at length in the next chapter. The official

Era TSBF "floor" at approximately 305 ships. Although neither as steep nor as dramatic as the order of magnitude decrease seen in TSBF numbers after the end of the Second World War, this reduction represented a hefty 48 percent decrease in TSBF numbers in less than a single decade.[202] For naval proponents, the dismantling of the Cold War "600-ship Navy" was a mistake of monumental proportions, and they made constant disparaging comparisons between the size of the Joint Expeditionary Era's smaller fleet and the larger Cold War fleet.

Meanwhile, critics charged that this smaller Navy was not the "fundamentally different naval force" promised by DoN leaders. They pointed out that the QDR target Fleet—which included 12 aircraft carriers, 50 nuclear-powered attack submarines, and 116 surface combatants[203]—was merely a shrunken version of the Cold War force, and they argued that this fleet would be unsuited for the demands of the new national security era. Consistent with this line of thinking, some critics argued for a dramatic reduction in the size of the carrier fleet; others argued for a far larger submarine fleet; still others argued for a fleet made up of small, fast combatants. However, they all shared a common belief: that the Navy was in danger of becoming a relic of the Cold War.

The charge that the Battle Force was a turning into a Cold War relic was more of an indictment against post-Garrison Era defense planning than against the DoN *per se*. The aforementioned 1993 Bottom Up Review essentially "regionalized" the Garrison Era inner-German border defense problem by tasking the US armed services to be ready to conduct "rapid halts" of armor-heavy, cross-border invasions in two near-simultaneous "major regional contingencies," or MRCs—an operational problem which all services were generally familiar and comfortable with.[204] The goal of fighting two "major theater wars" was reaffirmed by the second Clinton Administration in the 1997 Quadrennial Defense Review, and again by a Republican Administration in the 2001 QDR. While this construct certainly helped to moderate the scope and extent of the post-Garrison Era demobilization, it also helped to dampen any need to change the Services dramatically. Indeed, the National Defense Panel worried that the two-military-theater of war construct "may have become a force-protection mechanism—a means of justifying the current force structure—especially for those searching for the certainties of the Cold War era."[205]

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TSBF numbers on these two dates were drawn from "US Navy Active Ship Force Levels," found at http://www.history.navy.mil/branches/org9-4.htm#1945.

[202] William S. Cohen, Secretary of Defense, *Report of the Quadrennial Defense Review* (Washington, DC: Office of the Secretary of Defense, May 1997), found online at http://www.comw.org/qdr/97qdr.html. The QDR did not explicitly say the TSBF target was 305 ships. This number came from the Review's supporting documentation.

[203] Cohen, Secretary of Defense, *Report of the Quadrennial Defense Review,* 1977, in Section V, "Forces and Manpower."

[204] Les Aspin, Secretary of Defense, *Report on the Bottom Up Review* (Washington, DC: Office of the Secretary of Defense, October 1993), found online at http://www.fas.org/man/docs/bur.

[205] National Defense Panel, *Transforming Defense: National Security in the 21st Century.*

Moreover, while the services might be justifiably charged with a conservative approach to change during the unsettled transition between the Garrison and Joint Expeditionary Eras, the charge that the "new" Battle Force was just a smaller version of the Garrison Era Battle Force was not entirely fair. Although the types of platforms in the late 1990s Battle Force looked familiar, they had been substantially modified in order to exploit guided weapons and slot into Joint Multidimensional Battle Networks. For example, US Carrier Battle Groups designed primarily for independent strikes in the Garrison Era, proved to be incapable of sharing data with the US Air Force during Operation *Desert Storm*. Improving carrier force connectivity within the evolving "Joint Fires Network" became a top DoN priority.[206] As a result, by the latter part of the decade, Joint carrier connectively had improved dramatically, especially between the Navy and the Air Force.[207]

As another example, increasing the number of carrier aircraft capable of dropping guided weapons and increasing the number of precision guided weapons in carrier magazines became an important DoN goal after *Desert Storm*. As this goal was achieved, fleet carriers gained vastly more powerful capabilities. Similarly, the rapid proliferation of modular, vertical launch missile systems in both US surface combatants and submarines during the 1990s transformed the Battle Force into a vast operationally mobile missile battery capable of projecting enormous offensive and defensive firepower in support of Joint forces. The fleet may have looked the same, but it was a far different, more capable one.[208]

In any event, the familiarity of systems in the early era architecture masked some important *relative* changes among the types of systems that made up the Battle Force. These changes were guided by the fundamental fact that:

> …with the demise of the Soviet Union, the free nations of the world claim preeminent control of the seas and ensure freedom of commercial maritime passage.[209]

With no open ocean competitor on the horizon, and with unimpeded and "preeminent control of the seas," Battle Force planners prudently decided to retain the unequaled strike power resident on the decks of its carrier force, and continued to build large missile combatants capable of projecting both offensive and defensive fires in support of Joint forces ashore. Because it expected to move into shallower littoral waters where mines were much more effective, the Battle Force retained all 26 ships in its Garrison Era mine warfare force—making it the only

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[206] An entire section in the January 1995 issue of *Proceedings* was entitled "Why Can't We Talk." See also Erwin, "Navy, Air Force Team Up in 'Joint Fires Network';" and Robert Wall, "Waging War," *Aviation Week and Space Technology*, March 17, 2003, pp. 44-46.

[207] Captain Jacob L. Shuford, USN, "Tomorrow's Sea Power Plays Today," *Proceedings*, January 2000, pp. 32-35. See also Major General John L. Barry, US Air Force and Jim Blaker, "After the Storm: the Growing Convergence Between the Air Force and the Navy," *Naval War College Review*, August 2001.

[208] The makeup of the US TSBF, and its relative standing among naval power, will be discussed in the next chapter.

[209] O'Keefe, Kelso, and Mundy, *…From the Sea.*

Battle Force component untouched during the post-Garrison Era drawdown.[210] Finally, given the absence of any open-ocean submarine or air threat to US or allied naval forces or shipping, Navy planners shed numerous attack submarines, much to the chagrin of the US submarine service; drastically cut its large Garrison Era open-ocean convoy escort force, much to the chagrin of the surface warfare community; and gradually began to disarm its combat logistics force ships and to transfer them to the Military Sealift Command.[211]

## DEAD IN THE WATER

These first changes to Battle Force course and speed were both logical and relatively easy to make. However, since these first course alterations, the DoN has been generally unsuccessful in harnessing the winds of change and making much more forward progress toward a "fundamentally different naval force." Despite numerous reports to Congress outlining *potential* changes to the design of the DoN Battle Force, the last approved change to the DoN's naval fleet platform architecture occurred during the 2001 QDR, and this change only involved adding five submarines to the 1997 Quadrennial Defense Review target of 50 attack boats.[212] As a result, the 2004 naval platform architecture looked very close to the one envisioned in 1997:

| | **2001 QDR TSBF Target** | **2004 TSBF[213]** |
|---|---|---|
| Strategic Ballistic Missile Subs | 14 | 14 |
| Attack Submarines | 55 | 53 |
| Cruise Missile Submarines | 0 | 4 |
| Aircraft Carriers | 12 | 12 |
| Surface Combatants | 116 | 101 |
| Amphibious Ships | 36 | 35 |
| Mine Warfare Ships | 16 | 17 |
| Combat Logistics Force/Support ships | 61 | 52 |
| **Total Ship Battle force** | **310** | **288** |

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210 However, the DoN continued to count only 16 of these ships in the TSBF count. Ten additional ships in "Mobilization Category B" did not count.

211 The requirement for nuclear-powered attack submarines was slashed from 100 to 50; the frigate force was reduced from 101 ships to 30. As will be explained later in the report, by converting CLF ships to civilian-crewed Military Sealift Command ships, the Battle Force got a much higher peacetime utilization rate out of the ships.

212 Statement of Ronal O'Rourke before the House Armed Service Committee, Subcommittee on Projection Forces, on Navy Force Structure and Ship Construction, March 30, 2004, found online at http://www.house.gov/hasc/openingstatementsandpressreleases/108thcongress/04-03-30orourke.pdf.

213 This was the size of the TSBF on December 31, 2004. The most up-to-date TSBF count can be found in the "Naval Vessel Register," found online at http://www.nvr.navy.mil.

To outside observers, particularly the Congress, the winds driving DoN transformation plans appear to have died, and the Battle Force appears to be dead in the water. Said another way, Congress appears to believe that the 1997 QDR force structure was nothing more than a first, minor modification to Battle Force course and speed, and far less than the new fleet platform architecture design needed to prepare the 21st century Battle Force for future competition. Thus, as previously discussed, it is becoming increasingly frustrated with the delay in receiving further changes to Battle Force strategies and architectural design.

What accounts for the apparent delay in Battle Force redesign efforts? The quick answer is that the DoN has yet to fully develop its forecasts for future racing conditions. In addition to some remaining uncertainties, the development of these forecasts were and continue to be complicated by two ongoing debates with the DoN. Until they are satisfactorily resolved, little future forward progress can, or will, be made.

## NEW BATTLE FORCE ERA?

As suggested by the previous review of the Ship's Log, a shift between Battle Force Eras can occur in three different ways. It may lag the shift between national security policy eras, as was the case between the Continental and Frigate Eras. A shift may happen simultaneously, as they did between the Continental/Frigate and Expeditionary/Battleship Eras. Or, a Battle Force inter-era shift may actually precede the shift between broader national security eras, as was the case between the Battleship and Carrier Eras, and the Expeditionary/Garrison Eras.

The shift to the next Battle Force Era is conforming to the first of these three types of models—that is, the Battle Force shift is still in its formative stages, and it is lagging the transition between national security policy eras. The lag can be attributed to a fierce intra-Navy debate over when the shift will occur, and over its ultimate impact on the size and character of the Battle Force. The "institutional Navy" has essentially taken the position that the precepts of the Carrier Era will continue to hold for many years, and that the impact of the next intra-era shift will not be as dramatic as past shifts. This position calls for a force structure not much different in size and shape than the one called for in the 1997 QDR Force, except with bigger, more capable, and more expensive warships like the CVN-21 aircraft carrier, the DD(X) land attack destroyer, and the *Virginia*-class nuclear-powered attack submarine.[214]

This view is vociferously opposed by a group of active and retired navy officers who argue that new "rule sets" and "decision rules" associated with the Information Age are ushering in a new Battle Force Era requiring a much different naval fleet platform architecture.[215] Proponents of this view argue that the future Battle Force should be designed with the primary goal of:

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[214] For a thorough overview of this debate, see Robert O. Work, *Naval Transformation and the Littoral Combat Ship* (Washington, DC: Center for Strategic and Budgetary Assessments, February, 2004).

[215] Work, *Naval Transformation and the Littoral Combat Ship*, and Office of Force Transformation (OFT), "US Military Transformation: Decision Rules," *Transformation Trends*, 25 April 2005, p. 1.

> …imposing overwhelming complexity on the opponent, a complexity that stems from the US military possessing more options to use destructive force effectively than any opponent and far more options than the opponent can encounter.[216]

In the view of this group of officers, this goal requires a new Battle Force architecture characterized by "smallness, numbers,…speed of the force,…and high information fractions."[217]

While it appeared for a time in 2001-2002 that the debate was nearly resolution, it now seems clear that the question over when the next shift in Battle Force eras will occur and what it portends for the naval platform architecture design still rages between these two groups. One has only to compare the naval fleet platform architecture favored by the "Extended Carrier Era School," as outlined in the DoN's recent 30-year shipbuilding report to Congress, and the architecture favored by the "Network Centric School," as outlined in the report developed by the Office of Force Transformation and presented to Congress in January 2005. The former calls for a relatively familiar TSBF numbering between 260 and 325 ships, including 10-12 aircraft carriers, and up to 101 large, multi-mission combatants, while the latter proposes a dramatically new fleet with between 700 and 1,000 ships, boats, and unmanned vehicles.[218] There should be little surprise that Congress is bewildered and frustrated by the wide disparity in these two future visions, and uncertain about how to resolve them.

## THE NAVY-MARINE CORPS TEAM: DEPARTMENTAL RECONCILIATION OR IRRECONCILABLE DIFFERENCES?

The second debate dampening the winds of change is an intra-Departmental one revolving around the future relationship between the Navy and the Marine Corps. In essence, this debate centers on the following question: should the new strategic era spur a reconciliation between the Navy and Marine Corps, or should it result in an irreconcilable separation of the two services?

Up until 2000, the evidence suggested the latter. Despite the fact that *Desert Storm* almost saw the first contested amphibious assault in over forty years, and despite the strong common service bonds articulated in Departmental vision statements in the early years of the Joint Expeditionary Era, during the 1990s the two naval services continued to drift apart.[219] Without question, this

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[216] OFT, "US Military Transformation: Decision Rules," p. 1.

[217] OFT, "US Military Transformation: Decision Rules," p. 1.

[218] The "Extended Carrier Era School" vision is outlined in the "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006," (Washington, DC: Department of the Navy, March, 2005). For good summaries of this report, see Christopher P. Cavas, "US Navy Sets 30-year Plan," *Defense News*, March 28, 2006; and David Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged," *Defense Today*, April 5, 2005. The "Network Centric School" vision is found in "Alternative Fleet Architecture Design," Office of the Secretary of Defense Report for Congressional Defense Committees, released by the Office of Force Transformation on January 31, 2005.

[219] During *Desert Storm*, a threatened two-brigade amphibious assault became a deception that tied down the Iraqi operational reserves. See Major Mark Johnson, USMC, and Major Jessica Meyeraan, USAF, "Deception: Hiding the Real—Showing the Fake," a paper prepared for the Joint Forces Staff College, Joint and Combined Warfighting

continued drift was helped in no small way by the signing of the Goldwater-Nichols Act, which emphasized separate *service* (as opposed to *Departmental*) contributions to Joint campaigns. On the one hand, the Navy embraced the tenets of Jointness, and envisioned a future in which its most important Joint contribution was offensive and defensive fires in support of Joint land forces, in which the Maries were just one of three Joint claimants for services. One the other, the Marines pushed hard to create separate Marine Joint "components," and their emphasis on Joint-linked "Marine Operating Forces" served to further obscure the DoN-linked Fleet Marine Forces role—a role already severely weakened by the end of the long Garrison Era. As a result, despite transitioning into an era in which "[m]aritime forces have qualities and attributes that make them particularly valuable in the conduct of expeditionary operations," [220] Navy and Marine leaders were unable to forge a common vision of the future maritime competitive environment.

This failure can be attributed in large part to an inability of the two services to resolve their views on the importance of sea-based maneuver. The Marines had begun rethinking their position on sea-based maneuver in the early 1990s, spurred by their near-requirement to conduct an amphibious assault in *Desert Storm*, their increasing concern over the potential lack of basing access in the Joint Expeditionary Era, and new thinking about over-the-horizon amphibious operations necessitated by the maturation of the Guided Weapons Warfare Regime. These musings culminated in the publishing of *Operational Maneuver From the Sea* (OMFTS) and *Ship-to-Objective Maneuver* (STOM) in 1996 and 1997, respectively. In essence, these concepts embraced the idea of landing where the enemy isn't, and moving quickly inland.[221] These two concepts were followed by the *Maritime Prepositioning Force 2010* concept, which argued for giving future prepositioning ships new operational capabilities that would reduce their dependence on foreign deep draft ports.[222] Because of the gulf that existed between the Navy and Marines in the 1990s, however, these concepts were developed independently, with little Navy involvement other than their incessant worries over the impact that Marine thinking might have on DoN resources.[223]

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School, March 7, 2003, found online at http://www.jfsc.ndu.edu/current_students/documents_policies/documents/jca_cca_awsp/deception.doc. Both …*From the Sea,* published in 1992, and *Forward…From the Sea,* published in 1994, promised a re-linking of Navy and Marine Corps operational visions. John H. Dalton, Admiral J.M. Boorda, USN, and General Charles E. Mundy, Jr., USMC, *Forward…From the Sea* (Washington, DC: Department of the Navy, 1994).

[220] Geoffrey Till, "Navies and the New World Order," p. 61.

[221] These two concept papers can be found online at the website for N75, Office of the Chief of Naval Operations for Expeditionary Warfare, found at http://www.exwar.org/Htm/ConceptDocs/NADPGR/ navyusmc.htm. For a good synopsis of how Marines now view amphibious operations, see Christian Lowe, "Beyond the Beach," *Armed Forces Journal,* January 2005, pp. 20-25.

[222] This concept can also be found at http://www.exwar.org/Htm/ConceptDocs/NADPGR/ navyusmc.htm. The MPF(F) concept will be discussed in detail in Chapter XII.

[223] I am indebted to Peter Swartz, analyst at the Center for Naval Analysis, for pointing out the Navy's constant concern over the impact of Marine thinking during the 1990s.

Things were not helped by the Marines, who routinely made equipment decisions more appropriate for sustained operations ashore rather than for operations from the sea. New equipment invariably exceeded the size and weight of the article it was designed to replace.[224] As a result, the amphibious lift footprint of Marine Expeditionary Brigades began to outpace the lift capacities of programmed ships—especially with regard to vehicle square footage. This convinced some Navy (and Marine) officers that the Marines were not as serious about sea-based maneuver operations as they were about sustained operations ashore, and that amphibious landing ships consumed more resources than they deserved.

Inevitably, then, intra-Departmental fights over "Blue-in-Support-of-Green" programs became even more poisonous and destructive during the 1990s. A revised Joint Expeditionary Era requirement for 3.0 MEB equivalents of amphibious lift—itself a reduction from the Garrison Era requirement to lift the assault echelons of a MEF and a MEB—was further "fiscally constrained" to 2.5 MEB lift.[225] At the same time, plans for naval surface fire support platforms and programs were continually revised and delayed.[226] Both moves caused the Marines to question Navy intentions to maintain a viable Battle Force forcible entry capability, and sparked sharp fights between planners in both services.

Consistent with the pattern observed in both the Expeditionary and Garrison Eras, nowhere were the fights more savage than over the proper resource allocations for Marine aviation. The Marines' dogged pursuit of the MV-22 tilt-rotor aircraft proved to be an especially thorny issue between Navy and Marine planners, especially after the aircraft was cancelled by DoD in 1989, but later reinstated by Congress in 1993 after intense Marine lobbying efforts.[227] The Marines' refusal to support the Navy's F/A-18 E/F program, and their rejection during the 1997 QDR of a DoD offer for newly built H-60 helicopters in lieu rebuilding Vietnam-era *Huey* utility helicopters and *Cobra* helicopter gunships, just added fuel to an already incendiary situation. Things reached a breaking point in 1998, when the Marines abruptly removed their last ship detachments from Battle Force aircraft carriers with little prior consultation with, or approval of,

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[224] For example, the diminutive M151 Jeep was replaced by the High Mobility Multi-Wheeled Vehicle (HMMWV) which weighs between 7,700 and 10,000 pounds, depending on the variant. It is also much wider and longer. The 60-ton M-60 tank was replaced by the 70-ton M1 tank. The Amphibious Assault Vehicle, which weight 46,314 pounds empty, is to be replaced by the 62,880-pound Expeditionary Fighting Vehicle. Similarly, the standard tactical truck is much bigger than the one it replaced.

[225] See "Amphibious Lift," at http://www.globalsecurity.org/military/systems/ship/scn-phib.htm.

[226] For example, during the 1990s, the Land Attack Standard Missile was canceled, the DD-21 Land Attack destroyer was delayed, and technical problems bedeviled the 5-inch (127mm) Enhanced Range Guided Munition (ERGM), a guided naval gunfire round (it has yet to enter service).

[227] For a good explanation of how the Marines settled on and fought to get the MV-22, see Lieutenant Colonel Carl J. Fosnaugh III, "How We Provide For the Common Defense: A Review of the Interactive Decision-Making Process of the V-22 Osprey Program From 1981-1992," found at http://www.ndu.edu/ library/n4/ n035603c.pdf.

Navy or DoN leadership. Navy leadership was incensed, and the level of trust and comity within the DoN perhaps reached its post-World War II low.[228]

Once it became apparent just how badly strained the Navy-Marine relationship had become, things began to change. The 71st Secretary of the Navy, Richard Danzig, made it a special point to recommend for appointment a Chief of Naval Operations, Admiral Vern Clark, and a Commandant of the Marine Corps (CMC), General James Jones, who shared his desire to repair relations between the two Services and to work to re-forge strong operational ties within the Department. This move paid dividends within the Department, with Admiral Clark and General Jones ultimately agreeing on a Navy-Marine Tactical Air Integration Plan, which consolidated the separate unaffordable requirements for future Navy and Marine Corps tactical aircraft into a single, more affordable (some might say less unaffordable), Departmental plan.[229] The "Tac-Air Integration Plan" marked an important step in repairing intra-DoN relationships between the Navy and Marine Corps, without question, however, the key event that rekindled moves to bring the two naval services closer together was the unexpected declaration of the "Global War on Terrorism."

The surprise attacks on the United States by radical Islamist extremists on September 11, 2001 triggered an immediate US Joint counter-offensive in Afghanistan in less than four weeks. During Operation *Enduring Freedom* (OEF), a Marine general officer commanded Task Force 58—two combined Amphibious Ready Groups with embarked Marine Expeditionary Units (Special Operations Capable)—marking the first time a Marine general had been in charge of a naval task force. From this "sea base," Marine combat forces were inserted into land-locked Afghanistan, where they were supported by both Navy and Joint forces.[230]

The impact of these first operational moves on both Navy and Marine Corps leaders was immediate. One year later, in October 2002, after ignoring Marine interest in new sea-based maneuver options for more than a decade, the Navy published its *Seapower 21* concept, which included Sea Basing as one of its three main pillars—along with Sea Strike, Sea Shield—enabled by ForceNet.[231] Released nearly simultaneously with *Seapower 21* was a proposed fleet

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[228] The author was a staff member at Headquarters, Marine Corps throughout the 1997 QDR and after, and had a ring-side seat of the debilitating fights between the Marine Corps and Navy staffs. If anything, the relationship between the two Services was much worse than this paragraph implies.

[229] The Tac-Air Aviation plan reduced the total number of aircraft the Navy and Marines planned to buy from 1,637 to 1,140 aircraft, saving an estimated $28 billion in procurement costs over the next 18 years. See Government Accountability Office, *Department of the Navy's Tactical Aviation Plan is Reasonable, But Some Factors Could Affect Implementation* (Washington, DC: GAO, 2004). As Lieutenant General Robert Magnus, USMC, the Deputy Commandant for Programs and Resources remarked, "The plan clearly recognized the fact that we couldn't afford to buy all of the things we wanted to buy." See Interview, LTGEN Robert Magnus, in *Jane's Defence Weekly*, May 22, 2002. See also Andrew Koch, "Cash-strapped USN, USMC Look to Integrate Aircraft," *Jane's Defence Weekly*, April 3, 2002, p. 3; and "US Scales Back JSF, Super Hornet Buys," *National Defense*, March 2003, p. 21.

[230] See "Task Force 58 Overview: Operation Enduring Freedom," at http://www.cpp.usmc.mil/press/kit/ OEF.asp.

[231] Admiral Vern Clark, US Navy, "SeaPower 21: Projecting Decisive Joint Capabilities."

architecture known as the Global ConOps (for Concept of Operations) Navy.[232] The Global ConOps Navy included 12 new "Expeditionary Strike Groups," or ESGs, which combined Amphibious Ready Groups, Marine Expeditionary Units (Special Operations Capable), surface combatants, submarines, and maritime patrol aircraft into a new type of standing naval fire and maneuver group.[233]

The development of ESGs and the evocative wording associated with Sea Basing in *Seapower 21* harkened back to the conditions of the (first) Expeditionary Era:

> Operational maneuver is now, and always has been, fundamental to military success. As we look to the future, the extended reach of networked weapons and sensors will tremendously increase the impact of naval forces in joint campaigns. We will do this by exploiting the largest maneuver area on the face of the earth: the sea.
>
> Sea Basing serves as the foundation from which offensive and defensive fires are projected—making Sea Strike and Sea Shield realities. *As enemy access to weapons of mass destruction grows, and the availability of overseas bases declines, it is compelling both militarily and politically to reduce the vulnerability of U.S. forces through expanded use of secure, mobile, networked sea bases.* Sea Basing capabilities will include providing Joint Force Commanders with global command and control and extending integrated logistical support to other Services. Afloat positioning of these capabilities strengthens force protection and frees airlift-sealift to support missions ashore (emphasis added).[234]

The stage seemed set for the re-forging of Navy and Marine operational ties that had grown progressively weaker over the previous six decades. However, overcoming 60 years of accumulated friction continues to prove difficult. To this day, Navy and Marine officers have yet to agree on a concept that would naturally bond them together. A careful reading of the above passage reveals the basic problem: although the Navy accepted the requirement to *maneuver future sea bases,* it made no explicit mention of the requirement for *maneuver from the sea bases*. By focusing on the sea base's "extended reach of networked weapons and sensors," the concept seemed to over-value naval strike rather than the employment of sea-based maneuver forces. This helped to prolong the long-running debate between Navy and Marine officers over the extent of resources to be devoted to sea-based maneuver platforms.[235]

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[232] Vice Admiral Mike Mullen, US Navy, "Global Concept of Operations," *Proceedings,* April 2003, pp. 66-69; see also Scott C. Truver, "Sea Change for the US Navy," *Jane's International Defense Review,* April 2003, pp. 24-27.

[233] Throughout the Garrison Era and through the first decade of the joint Expeditionary Era, amphibious ready groups operated without escort. The ESG rectified this situation, and in the process created 12 additional strike groups for the Global ConOps Navy. For an explanation of the Expeditionary Strike Group, see Captain Kendall King and Commander Tom Holmes, USN, "Expeditionary Strike Group!" *Proceedings,* March 2003, pp. 90-93; and "Expeditionary Strike Groups," at http://www.globalsecurity.org/ military/agency/navy/esg.htm.

[234] Admiral Vern Clark, US Navy, "SeaPower 21: Projecting Decisive Joint Capabilities."

[235] For a good indication of the difficulty in forging a common Navy-Marine Corps vision, see Rear Admiral William J. Holland, US Navy, ret., "The Navy is More Than Hauling Marines," *Proceedings,* May 2004, pp. 38-41.

As a result of the failure of senior Navy and Marine leadership to develop, institute, and enforce a common operational vision, questionable actions on both sides continue to take place. For example, the Marines appear to be walking away from the mission to secure and protect vessels during their nuclear refueling and coring. In an era when the possibility that a terrorist organization might get its hands on nuclear material is among the greatest nightmares of national leaders, such a move is hard to understand or justify.[236] Equally hard to understand is the recent Navy announcement that it would stand up a "Navy Expeditionary Combat Battalion" in FY 07.[237] As the President of the Naval War College responded in 1894 when asked about a plan to transfer the Marines to the Army and to stand an amphibious infantry organization manned by Sailors, "I do not doubt that those seamen, and the officers [who] command them, would evolve…into a new Corps, identical to the present Marines."[238]

## EXTERNAL WINDS OF CHANGE

As long as these two *internal* Departmental debates remain unresolved, DoN leaders will continue to find it difficult to harness the winds of change and to alter the Battle Force along a course for further, more dramatic transformation. However, strong *external* winds of change are gathering that may cause major Battle Force design alterations and course corrections whether DoN planners are ready for them or not.

These external winds blow from two different directions. The first comes from a gathering change in strategic direction and planning. In retrospect, defense planning in the period between 1989 and 2001 was relatively static and devoid of new thinking. The BUR's requirement for an ability to conduct "rapid halts" in two "major regional contingencies" gave way to the 1997 QDR's requirement to conduct "rapid halts" in two "major theater wars," which in turn gave way to the 2001 QDR's requirement to achieve "swift defeats" in two "major combat operations." By whatever name, the two major military operations were expected to come from a short list of familiar defense problems: a North Korean invasion of South Korea; a second Iraqi invasion of Saudi Arabia or Kuwait; an Iranian closure of the Straits of Hormuz; or a Chinese attack on Taiwan.

Thinking about two nearly simultaneous major military operations with clear links to the familiar Cold War inner-German border defense problem was a comfortable exercise for defense strategists and planners, with the possible exception of disagreements over the time delay between the two wars. The upside of this overlapping two-war challenge was that it provided an effective force sizing framework that satisfied, to varying degrees, each of the four armed services; it codified their existing and planned force structures. The downside was that it

[236] This move has not been officially announced. The possibility that it may occur is being actively discussed. From interviews conducted with senior Navy and Marine officers in preparation for this report.

[237] Director of the Navy Staff Memorandum, entitled "Implementation of Chief of Naval Operations (CNO) Guidance—Global War on Terrorism (GWOT) Capabilities," dated July 6, 2005.

[238] Murphy, *History of the US Marines,* p. 47.

inculcated a static operational model—to build-up; pound away with guided weapons; win quickly; and then either quickly come home or reset for another major confrontation—that clouded the military's concern for other gathering security challenges, including radical extremist threats against the American homeland. The emphasis on quick wins and "resetting the force" also helped in no small way to dampen Departmental enthusiasm for post-conflict planning and "nation-building."

The attacks of 9/11 challenged the basic assumptions of this comfortable two-war force planning construct. As was written in the new *National Security Strategy*, published one year after the attacks on September 11, 2001:

> America is now threatened less by conquering states than we are by failing ones. We are menaced less by fleets and armies than by catastrophic technologies in the hands of the embittered few.[239]

The implied de-emphasis on "conquering states" in the *National Security Strategy* was picked up and amplified in the subsequent *National Military Strategy of the United States of America*, published in 2004, and again in the new *National Defense Strategy of the United States*, published in 2005.[240] These new strategies implicitly accepted that US military capabilities—due primarily to the dominating American lead in the Guided Weapons Warfare Regime—had made *traditional* challenges "posed by states employing recognized military capabilities and forces in well understood forms of military competition and conflict" far less of a potential threat.[241] Indeed, the strategies argued, the crushing US advantage in guided weapons warfare and multidimensional planning and targeting networks had already prompted—and would continue to prompt—new and different types of "non-traditional" competitive responses that would stress the US military in new and different ways.

As specified in the terms of reference for the 2005 Quadrennial Defense Review—the first review guided by these new strategies—one observed response to US dominance in high-technology force-on-force warfare has been attempts to avoid it.[242] Some current and future challengers—especially non-state actors—are and will continue to decline to mass and directly challenge the US military. Instead, they will often opt to wage "irregular warfare," and employ

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[239] President George W. Bush, *The National Security Strategy of the United States of America* (Washington DC: The White House, September 17, 2002).

[240] General Richard B. Myers, USAF, Chairman of the Joint Chiefs of Staff, *National Military Strategy of the United States of America: A Strategy for Today, a Vision For Tomorrow* (Washington, DC: Joint Chiefs of Staff, 2004), found at http://www.globalsecurity.org/military/library/policy/dod/d20050318nms.pdf. Donald H. Rumsfeld, Secretary of Defense, *The National Defense Strategy of the United States of America* (Washington, DC: Office of the Secretary of Defense, March 2005), found at http://www.globalsecurity.org/military/library/policy/dod/nds-usa mar2005.htm.

[241] Myers, *National Military Strategy of the United States of America: A Strategy for Today, a Vision For Tomorrow*.

[242] For a good overview of the 2005 QDR terms of reference, see Ryan Henry, "Defense Transformation and the 2005 Quadrennial Defense Review," *Parameters*, Winter 2005-06, p. 13.

means like terrorism, guerilla warfare, or other means of indirect combat. Indeed, some commentators see the future as being characterized by a "Fourth Generation Warfare," in which:

> The distinction between war and peace will be blurred to the vanishing point. It will be nonlinear, possibly to the point of having no definable battlefields or fronts. The distinction between 'civilian' and 'military' may disappear.[243]

Future irregular adversaries will often fight in small, cellular-based tactical organizations, and their tactics often will favor close-in ambush tactics using small arms, improvised explosive devices, rocket-propelled grenades, shoulder-fired surface-to-air missiles, and suicide bombs. Their likely aim will be to achieve a political solution by frustrating the far stronger US military and exhausting American staying power by merely surviving and inflicting a "death from a thousand cuts."

A second observed response to US conventional military dominance has been attempts to outflank it by seeking weapons of mass destruction, particularly nuclear weapons. In 1975, US strategists and defense planners elevated "conventional weapons with near zero miss" to a national security policy objective so that US political leaders would not have to order the use of tactical nuclear weapons along the inner German border. Ironically, because of the very success of the US armed forces in pursuing this goal, the only way by which many future adversaries can ever hope to redress the huge US lead in conventional guided weapons is to seek nuclear weapons or other weapons of mass destruction in order to inflict "catastrophic" damage on US forces:

> Nuclear weapons are viewed as the ultimate "big stick" for intimidating enemies, guaranteeing security, and for potentially countering the United States…They confer upon the owner a strength that makes up for weaknesses in conventional military, political, or economic power. We are experiencing the rebirth of nuclear weapons as trump cards of choice.[244]

A third likely response by future "near peer competitors" might be to try to leap over US conventional dominance using a combination of "disruptive" strategies and technologies. The development of asymmetric multidimensional battle networks as powerful as our own or high-end counter-network weapons might represent one type of disruptive challenge.[245] Other types of disruptive challenges might include new forms of space warfare; low-cost, long-range, weapons that make extended-range barrage attacks against US forces feasible; or even new forms of robotic warfare.[246] New types of information war, biological warfare (bio-war), war using

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[243] See "Fourth Generation Warfare," found online at http://www.d-n-i.net/secondlevel/fourthgenerationwarfare.htm.

[244] National Security Watch, "The Return of Nuclear Weapons: Threats, Proliferation and the United States," (Arlington, VA: Institute of Land Warfare, July 29, 1999), p. 1.

[245] See for example Loren B. Thompson, Ph.D., "The Hidden Dangers of Networked Warfare," Lexington Institute Issue Brief, June 17, 2005.

[246] For one vision of unmanned robotic warfare, see Rowan Scarborough, *Washington Times,* May 8, 2005.

nanotechnology (nano-war), and the introduction of directed energy weapons (DEW) might also qualify as serious disruptive challenges. Any of these possibilities would create a very different warfighting regime in which the United States might no longer have a clear advantage.

As the 2005 Quadrennial Defense Review has progressed, the Secretary of Defense (SecDef) has made it increasingly clear that he is becoming far less concerned about defeating simultaneous, cross-border invasions or conventional opponents, and more concerned about the military's ability to confront these new irregular, catastrophic, and disruptive challenges and challengers.[247] To emphasize his concerns—and to help challenge the assumptions that shaped the previous three defense reviews conducted in 1993, 1997, and 2001—the Secretary of Defense has also signaled a willingness to take risks in traditional military challenges in order to free up resources to address and prepare for these three "non-traditional" future challenges.

The 2005 QDR thus promises to be the first defense review since 1989 that might actually begin to alter the familiar Garrison Era operational problems that dominated defense thinking in the first decade of the Joint Expeditionary Era.[248] What this might mean remains speculation at this point, but it seems a safe bet that the framework based on two near-simultaneous traditional wars that has guided defense planning since the start of the Joint Expeditionary Era will be replaced by some new, and different, operational and force sizing framework.

The Secretary's desire to free up resources in order to tackle potential non-traditional challenges will be complicated by countervailing winds caused by increasing budget challenges. The Fiscal Year 2005 defense budget was quite high by historical standards. Adjusted for inflation, and without the Defense Supplementals to pay for ongoing operations in Iraq and Afghanistan, the budget was 10 percent above the Garrison Era annual spending average; with the Supplementals, the budget was higher than the annual defense spending peaks during both the Vietnam War (1968) and the Reagan Administration defense build up during the 1980s (1985). In addition, the FY 05 budget represented the eighth straight year of real defense growth. The longest period of relatively steady increases in defense budgets spanned a period of ten years, between 1975 and 1985. This data suggests that the major defense buildup that pre-dated and surged after the declaration of the "Global War on Terrorism" may be nearing an end.[249]

This should be especially sobering prospect for DoD and DoN planners. Regardless of how long they last, most defense buildups are followed by substantial declines in defense spending. For

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[247] Jason Sherman, "Rumsfeld Officially Kicks Off 2005 Quadrennial Defense Review," *Inside the Pentagon,* March 10, 2005, pp. 15-16; and Gopal Ratnam, "QDR Process Expected to Be More Inclusive," *Defense News,* February 7, 2005.

[248] As Ryan Henry, Principal Deputy Undersecretary of Defense for Policy, recently explained, the United States is at a "strategic crossroads" and the 2005 QDR will be the most unique and important national defense review in decades. See "Henry: QDR to Reflect Uncertainties, Capabilities," *Aerospace Daily and Defense Report,* June 13, 2005. See also Jason Sherman, "Getting It Right," *Sea Power,* June 2005, pp. 14-16.

[249] By 2005, the US spent $200 billion more per year on defense that it did in 2000. Steven M. Kosiak, "Defense Affordability Will Require Improved Force and Cost Efficiencies," *Aviation Week and Space Technology,* February 28, 2005, p. 70.

example, between 1986 and 1998, the US defense budget was cut 35 percent in real terms; one-third of the total defense drawdown occurred *before* the end of the Garrison Era and the fall of the Soviet Union, driven in large part by Congressional deficit reduction efforts. This is significant, given that the Congressional Budget Office (CBO) forecasts that deficits over the next ten years will amount to some $855 billion. Other forecasts, such as those made by Goldman Sachs, project the budget deficits will reach $4-5 trillion over the same period. Moreover, regardless of who is making the forecast, the budget picture gets worse after 2015 due to demographic changes.[250] All the signs point to increasing downward pressure on defense spending.

Indeed, most experts consider Program Budget Decision 753 (PBD 753), promulgated on December 23, 2004, simply as a harbinger of things to come. PBD 753 cut more than $30 billion from the Pentagon's Future Year Defense Program (FYDP), resulting in the loss of several TFBN ships, including an aircraft carrier.[251] Experts believe that the real significance of PBD 753 to be that it signaled even more difficult cuts ahead.[252]

As a result, it seems increasingly likely that defense spending will soon level off or even see a real decline. Discussions with analysts in the Office of Management and Budget, the Congressional Budget Office, the Congressional Research Service, and the Center for Strategic

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[250] Kosiak, "Defense Affordability Will Require Improved Force and Cost Efficiencies," p. 70.

[251] Jason Sherman, "Pentagon Slashes $30 Billion From Major Navy, Air Force, Missile Defense Programs," *Inside the Navy*, January 2, 2005; and Eric Schmidt, "Pentagon Said to Offer Cuts in the Billions," *New York Times*, December 30, 2004, p. 1. The effects of the budget cuts outlined in these articles will be elaborated later in this report.

[252] For how budget pressures will increasingly dictate the pace of future change, see Amy Klamper, "Defense Funding Cuts May Just Be the Beginning," *Congress Daily*, February 7, 2005; Jonathan Karp and Andy Pasztor, "Pentagon Request May Set Off Turf Battles," *Wall Street Journal*, February 8, 2005; and Dave Ahearn, "Huge Budget Deficit to Curb Defense Outlay: Experts," *Defense Today*, February 3, 2005, p. 1.

and Budgetary Assessments suggest that DoN leaders and Battle Force planners would do well to make conservative fiscal forecasts for future defense budgets.[253]

Battle Force planners thus face a tricky challenge: dealing with the combination of a freshening breeze for change associated with new defense strategies and planning guidance, and the deadening effect of countervailing budget winds. This challenge would be difficult enough without the added problems of Congressional impatience internal Departmental discord. As a result, the time has come for DoN leaders to resolve any ongoing debates, and to begin to map out the fundamental changes needed to DoN Battle Force strategies, design, and course and speed for the Joint Expeditionary Era—before changes are mapped out for them.

[253] The 2005 QDR is preparing two plans, one that assumes no fiscal constraints, and another that does. DoD will decide what capabilities are most needed, and perform a risk assessment to trade off capabilities in a "resource constrained" topline. See "Henry: QDR to Reflect Uncertainties, Capabilities."

# IV. "NOON SHOT"

> …make no mistake: [the United States Navy] is a navy in crisis…The Reagan administration was the first since World War Two to acknowledge that a great nation needs a great navy. Navy Secretary John Lehman created a fleet of 600 ships and submarines…The 600-ship Navy has now shrunk to 288, and the number will continue to shrink as more of our ships become old and obsolete…[I]f we do not confront reality, we may be facing not just an Incredible Shrinking Navy, but shrinking American power around the world, as well.[254]
>
> Arthur Herman, 2003

Both the resolution of lingering debates and the development of potential changes to strategy and architecture design will require the Battle Force to make explicit racing forecasts and to develop new planning metrics. The forecasts should include potential racing challenges and challengers, racing conditions, and expected DoN fiscal resources. Based on these forecasts, DoN planners can then develop realistic force architecture design attributes, and begin to redesign the Battle Force in order to maintain US naval supremacy.

First, however, it is important that Battle Force planners have an accurate navigational fix on the Battle Force's exact position in the global naval competition. What is the distance between it and its nearest competitors? Is its lead shrinking, remaining constant, or widening? If the lead is shrinking, quick and more abrupt or dramatic changes in Battle Force racing strategy and design may be indicated. If the lead is remaining constant or widening, a more conservative strategy and approach can be followed.

This chapter aims to determine the Battle Force's relative position by taking a metaphorical "noon shoot"—a series of navigational "sightings" on known points.[255] These sightings will then be converted into a known position in the global naval race by means of a literary "sight reduction." The results are quite illuminating, and help to put the relative standing of the Battle Force into much clearer perspective.

## OF MARITIME SUPREMACY AND SHIP COUNTS

Recall that by December 2004, the number of ships in the DoN's "Total Ship Battle Force," or TSBF, had fallen to 288. In earlier times, when the naval competition was characterized by a

[254] Arthur Herman, "Our Incredible Shrinking Navy," *New York Post Online Edition*, June 9, 2005.

[255] A noon shot was a means of determining a ship's position in latitude during the age of sail. When taking a noon shot, an Elizabethan navigator would measure the solar declination angle with the sun at its zenith. By doing so, the navigator could calculate a ship's latitude. Sightings of the Pole Star (Polaris, the North Star) during any hour of darkness could also be used to calculate latitude. The ability to measure longitude practically and accurately at sea required the invention of the sea chronometer. See "Determination of Latitude by Sir Francis Drake on the Coast of California in 1579," found online at http://www.longcamp.com/nav.html.

number of great navies jostling for the lead in the global naval race, a key metric used for gauging the *relative* US position in the competition was to count the number of ships in the US battle fleet and to compare it with the number of ships in rival fleets. However, with no major naval powers to worry about, it is increasingly common to count the number of ships in the DoN's TSBF and to compare this number against the number of ships in the US TSBF at some point in the past. For example, as was recently written in one newspaper:

> The battle force—the Navy's fleet of front-line aircraft carriers, cruisers, destroyers, amphibious ships and selected support vessels—now numbers 296 ships…the smallest size since before World War I.[256]

As is evident by Arthur Herman's sentiments above, the unstated implication of these comparisons is that the current fleet has diminished in both size *and* capabilities in comparison with past US fleets. In other words, the number of ships in the TSBF is now being used as a measure of the Battle Force's *absolute* combat capability, and as an indirect measure of its standing in the global maritime competition. Is this wise?

Certainly, at some point, the total number of ships in the TSBF becomes operationally relevant, since a lack of overall numbers, or a deficiency in specific types of ships or platforms, will constrain a commander's options in developing plans and responses to contingencies. However, those who dwell solely on the number of ships in the TSBF and obsess with comparisons to past US fleets contribute to the perception that the US Navy has either already lost its lead in the global naval race, or is in the process of doing so. As one Senator recently exclaimed:

> Is word [about the Navy's decline] getting out? Not sufficiently. Armed Services Committee members know it. The people in the Navy and industry know it. But the general populace doesn't know it, and they don't care unless they're told, "*We don't have the ships* to go into harm's way to protect our national interest" (emphasis added).[257]

However, focusing solely on the number of ships in TSBFs present and past gives a misleading picture both about the strength of the Battle Force and the United States' relative standing in the global maritime competition. With regard to the former, TSBF counts do not include all ships operated by the DoN. A separate counting category called *Local Defense Forces and Miscellaneous Support Forces* includes well over 100 additional ships that would support US wartime operations. Among these ships are eight Coastal Patrol Ships that routinely forward deploy to fight the "global war on terrorism" and nine Coastal Minehunters that are every bit as

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[256] James W. Crawley, "Navy Has Fewest Ships Since Before World War I," *San Diego Union Tribune*, October 2, 2003. For another example, see Malina Brown, "Navy Falls Below 300-ship Threshold for First Time in Decades," *Inside the Navy*, August 25, 2003, p. 2.

[257] Senator Trent Lott (R, MS), as cited in Chuck McCutcheon, "The Navy Pushes for More," *Air Force Magazine Online*, at http://www.afa.org/ magazine/july2000/0700navy.asp.

capable as the those found in the TSBF.[258] These ships do not “count” as a Battle Force asset. Why not?

Moreover, the basic rules governing whether or not a ship is “counted” as part of the Battle Force change over time.[259] For example, today’s counting rules were established in the early 1980s by then-Secretary of the Navy John Lehman, who was leading the DoN during an intense open-ocean competition with the Soviet Navy, and before the signing of the Goldwater-Nichols Act. At the time, Secretary Lehman decided that the only ships that would “count” toward the TSBF were ships that contributed *immediate* combat capability *to the Navy*.[260] Therefore, aircraft carriers in long-term overhaul were not a part of the TSBF. Today they are. In any event, counting ships that contribute only to Navy combat capability appears to be increasingly outdated in a world in which support for Joint power-projection operations is DoN job number one. For example, DoN prepositioning ships and surge sealift shipping underwrite the US Joint global power-projection capability. Indeed, one noted naval analyst estimates that the DoN controls 95 percent of the world’s militarily useful sealift.[261] Yet these ships do not contribute to the TSBF count. Again, why not?

Finally, simply counting ships also obscures other important naval capabilities that help to set the **DoN Battle Force**—the combined platforms, capabilities, and men and women of the US Navy and the Marine Corps—apart from its global competitors. The United States operates the world’s largest maritime patrol aircraft fleet, which provides its fleet and Joint commanders with important intelligence, surveillance, and reconnaissance (ISR) information, as well as critical anti-submarine warfare (ASW) capabilities. However, as these are land-based patrol aircraft, they are not included in the TSBF. Likewise, the DoN Battle Force includes the US Marine Corps, by far the largest and most capable maritime maneuver force in the world. Yet this important naval capability is not captured in a simple focus on ship numbers. In other words, the Total Ship Battle Force is simply one component of the larger DoN Battle Force, and focusing solely on it gives a poor picture about the true extent of US combat power.

Making comparisons between the size of current and past TSBFs is even more problematic, on at least three further levels. First, such comparisons fail to account for the Battle Force’s changing role. As was described earlier, as national security policy eras change, so too does what the Battle Force is tasked and expected to do by the nation’s political leadership. A Battle Force that

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[258] For example, on April 13, 2005, the “official” TSBF count stood at 287 ships. An additional 135 ships listed under “Local Defense and Miscellaneous Support Forces” did not count. The official inventory of US naval ships and service craft can be found online at the Naval Vessel Register, at http://www.nvr.navy.mil.

[259] See how ship counts changed between the Carter and Reagan Administrations in Norman Polmar, *Ships and Aircraft of the US Fleet*, fourteenth edition (Annapolis, MD: Naval Institute Press, 1987), pp. 5-7.

[260] I would like to thank my friend Ronald O’Rourke, a respected analyst at the Congressional Research Service, for pointing out to me Secretary Lehman’s counting criteria.

[261] A.D. Baker III, “Sea Power 1999; Costly Fleets: Capability versus Affordability,” *The Year in Defense 2000* (Tampa, FL: Government Services Group), p. 108.

is expected to confront a naval peer in a global, ocean-spanning competition will be different in size and scale than a navy that just practices commerce raiding, or a navy that need not fight its way across an ocean to project combat power.

Second, comparisons between current and past fleets fail to highlight the impact that new technology and weapons have had on individual ship capabilities. For example, as was mentioned earlier, due to the DoN's aggressive pursuit of guided weapons over the past decade, one contemporary US carrier strike group can strike more targets in a single day than could four 1989 carrier strike groups.[262] Is it therefore reasonable to conclude that today's 12-carrier force is clearly inferior to the 1989 14-carrier force? No, it is not.

Third, as implied earlier, US naval forces form just one component of increasingly integrated and capable US Joint Multidimensional Battle Networks. When counting US TSBF numbers, how does one measure the contribution of a space-based reconnaissance system that guides a B-2 stealth bomber delivering 16, one-ton Joint Direct Attack Munitions (JDAMs) against 16 fast attack craft hidden along a coastline? The short answer is: one doesn't. Yet such attacks would likely occur long before a US Battle Force would venture into a defended littoral, and they would greatly reduce the operational problem faced by its commanders.[263]

However, the most damning problem associated with a focus on numbers in current and past TSBFs is that such comparisons give no inkling about the Battle Force's *relative* position in the global naval race. In this enduring race, the Battle Force is not competing against itself. As has always been the case, it is competing against a number of other naval powers or against continental powers that have moved their "battle lines" ashore. Whether or not today's Battle Force has fewer ships than the pre-World War I US TSBF or President Reagan's "600-ship Navy" therefore provides no relevant information whatsoever about how the Battle Force stacks up against its nearest contemporary competitors.

Therefore, as said before, before making any pronounced changes to Battle Force racing strategy, design, course, or speed, the DoN's first task is to determine objectively the Battle Force's current relative standing in the global naval race. The purpose of the following "noon shot" is to do just that.[264]

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[262] Sheila M. McNeill, "Sea Services Bring Forth a New Revolution in Aviation," *Seapower,* April 2005, p. 3.

[263] As Joint forces continue to cooperate in power projection operations, long-range bombers will likely provide increasing support to naval forces. See for example Michael Sirak, "USAF Wants Bombers to Provide Pacific Punch," *Jane's Defence Weekly*, November 12, 2004; Gregg K. Kakesako, "B-52s to Bomb Ship In Test Off Kauai," *Honolulu Star Bulletin*, November 14, 2004; and Jim Wolf, "US Bombers to Show Clout in Pacific Exercise," *Reuters.com*, November 17, 2004.

[264] The following comparison uses four primary sources. The information on foreign navies was drawn from Commodore Stephen Saunders, RN, ed., *Jane's' Fighting Ships, 2004-2005*, 107th edition, (Surry, England: Jane's Information Group, Ltd, 2004); and Eric Wertheim, ed., *Combat Fleets of the World 2005-2006* (Annapolis, MD: US Naval Institute Press, 2005), CD ROM version produced by ATLIS Systems, Inc., in Silver Spring, MD. The definitive reference book for DoN warships, submarines, sea-based maneuver platforms, combat logistics force ships, and aircraft is Norman Polmar, *Ships and Aircraft of the US Fleet*, as indicated earlier, the eighteenth version of this edition is the most recent (Annapolis, MD: Naval Institute Press, 2005), and is the primary source for US

## First Sighting: Aggregate Fleet Warship Tonnage

The first sighting involves calculating the aggregate fleet warship tonnage for the world's navies. As naval analyst Geoffrey Till explains, "[t]here is a rough correlation between the ambitions of a navy and the size and individual fighting capacity of its main units, provided they are properly maintained and manned."[265] Aggregate fleet warship tonnage is therefore used herein as a simple proxy for a navy's overall fighting capabilities, and to help identify the key competitors now in the global naval race.[266]

What alarmists over the size of the US TSBF fail to mention is that although the US TSBF is the smallest it has been in over 70 years, so too are the rest of the world's navies.[267] Indeed, other than the United States, only seven countries operate war fleets that displace more than 100,000 aggregate tons, and ten more operate fleets that displace between 50,000 and 100,000 tons. In other words, at this point in time, the US Navy faces 17 credible competitors in the global naval race. In order of aggregate tonnage, these competitors are: Russia; Japan; the United Kingdom; the People's Republic of China (PRC); India; France; Taiwan; Turkey; Brazil; Canada; Spain; Italy; Germany; Australia; South Korea; Greece; and the Netherlands. Together, the navies of these 17 countries account for 2.66 million tons of the entire rest of the world's (ROW) aggregate warship displacement of 3.03 million tons (88 percent).

In comparison, the DoN Battle Force alone operates a fleet of fighting warships with an aggregate displacement of 2.85 million tons. At the height of its naval dominance, the England strove to achieve at least a "two-navy standard." That is, British naval planners aimed to maintain a navy that was as large as the combined fleets of the closest two naval powers. In terms of aggregate warship tonnage, then, the United States enjoys a "17-navy standard." Indeed, at 94 percent of the total aggregate ROW tonnage, *the US war fleet displaces nearly as much as all other warships in the world's navies, combined*.

Moreover, a quick scan of the competitors reveals that 14 of the 17 are countries allied with or friendly to the United States, and the fifteenth is a country we now count as a "strategic partner" (India).[268] Only two of the 17 countries are considered *potential* naval competitors: Russia and

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platforms unless otherwise noted. Another key resource used was the US Naval Vessel Register (NVR), which can be found online at http://www.nvr.navy.mil.

[265] Geoffrey Till, "Can Small Navies Stay Afloat?" *Jane's Navy International,* May 1, 2003.

[266] For the purposes of this comparison, the following types of warships are included: aviation power-projection platforms (ships that can support either fixed-wing and/or vertical take-off and landing (VTOL) or short take-off and vertical landing (STOVL) tactical aircraft); surface combatants with a full load displacement (FLD) greater than 2,000 tons (considered capable of overseas deployment); and submarines with submerged displacements greater than 450 tons (i.e., a German *Type 205* coastal defense submarine equivalent).

[267] See for example, A.D. Baker III, "World Navies Are in Decline," *Proceedings,* March 2004, pp. 32-49.

[268] As former Secretary of State Henry Kissinger recently said, "Now India is, in effect, a strategic partner, not because of compatible domestic structures but because of parallel security interests in Southwest Asia and the Indian ocean, and vis-à-vis radical Islam." Henry A. Kissinger, "Implementing Bush's Vision," *The Washington Post,* May 16, 2005, p. A17. See also Michael Sirak, "US Signs Defense Pact With India," *Jane's Defence Weekly,* July 13,

the People's Republic of China. The Russian Navy—assuming all of its ships are 100 percent operationally capable (a highly questionable assumption)—comes in at 630,628 tons, while the Chinese People's Liberation Army Navy (PLAN) totals 263,064 tons. This means the DoN Battle Force out-displaces the combined fleets of its two biggest potential naval competitors by over three-to-one.

Simply put, regardless of how its current numbers compare in size *with past US fleets*, no contemporary naval competitor comes close to matching the aggregate capabilities of the current US Battle Force. This conclusion is merely reinforced by following Till's advice and making a closer examination of the "size and individual fighting capacity" of the "main naval units" in world navies: aviation power-projection platforms; surface combatants; and submarines.

## SECOND SIGHTING: AVIATION POWER-PROJECTION PLATFORMS

Since the end of World War II, the preferred way of sinking a ship has been by asymmetric attack, either by aircraft or by submarine. Ship-on-ship engagements are increasingly rare, except perhaps in engagements between small, adjacent, littoral navies.[269] Moreover, naval strikes against land targets are now almost exclusively done by air and missile attacks. As a result, the number of aviation power-projection platforms a navy operates is a key metric in determining its overall fighting power, and where it stands in the hierarchy of world navies.

Of the 15 aircraft carriers in the world capable of launching and landing heavy fixed-wing or short take-off and arrested landing (STOAL) aircraft, the United States operates 12 (80 percent ). The French, Brazilian, and Russian navies operate one each. The only nations other than the United States that are currently or contemplating building similar additional ships are US allies or strategic partners—Britain, France, and India.[270] The head of the Russian Navy announced in August 2003 that no new carrier construction for the Russian Navy is planned, and there are few signs that the PLAN is pursuing any type of aviation power- projection platforms.[271]

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2005, p. 15; and Michael Barone, "An Emerging Alliance With India," *Jewish World Review*, July 5, 2005, found at http://www.JewishWorldReview.com.

[269] Norman Friedman, James S. O'Brasky, and Sam J. Tangredi, "Globalization and Surface Warfare," in the excellent volume, Sam J. Tangredi, ed., *Globalization and Maritime Power* (Washington, DC: National Defense University Press, 2002), p.374.

[270] The British are planning to build two 60,000-ton CVFs designed to operate the STOVL variant of the Joint Strike Fighter. The French are planning to build a second conventionally-powered carrier to complement its current nuclear-powered carrier, *Charles de Gaulle*. The Indian Navy will eventually operate three carriers: one converted Russian carrier, and two locally built Air Defense Ships (ADSs). See A.D. Baker III, "World Navies Are in Decline," pp. 32-33; and AMI International, "Indian Navy Orders Three *Vikrant* Carriers," Seapower, July 2003, p. 43.

[271] Eric Wertheim, "A Year of Compromise," *Proceedings*, March 2005, p. 32. For a good overview of Chinese thinking on aircraft carriers, see You Ji, "The Debate Over China's Aircraft Carrier Program," *China Brief*, The Jamestown Foundation, February 15, 2005. Although there is little evidence that the PLAN is aggressively pursuing an indigenous carrier capability, they are doing yard work on a former Russian *Kuznetsov*-class carrier, leading

The United States' advantage in naval aviation goes beyond a simple count of aircraft carriers. As suggested by the first sighting on aggregate warship tonnage, US carriers are substantially larger than ROW carriers: the average US carrier displaces 97,605 tons at full load displacement; the comparative figure for a ROW carrier is 44,724 tons FLD.[272] Additionally, ten of the 12 US carriers have nuclear power plants, giving them essentially unlimited endurance and more magazine and aviation fuel capacity than conventionally-powered carriers. The only other nation besides the United States that now operates a nuclear carrier is France.[273]

The disparity in carrier size, in turn, is reflected in a disparity between the size and capabilities of US and foreign carrier air wings (CAWs). A typical US CAW includes more than 70 aircraft, including four or five airborne early warning and battle management aircraft like the E-2C *Hawkeye*; four or five electronic attack aircraft like the EA-6B *Prowler*; 40-50 "strike fighters" all equipped to employ guided weapons; ten anti-submarine and multi-purpose utility helicopters; and several special carrier onboard delivery aircraft. In the future, the wing may also include unmanned combat air vehicles.[274] A typical ROW carrier air wing contains no more than 35 aircraft, usually a mixed load of fixed and rotary-wing aircraft, and with far fewer and less capable specialized support aircraft like the aforementioned E-2C or EA-6B.[275]

Moreover, due to the US Navy's aggressive pursuit of guided air-to-ground weapons, the disparity between the striking power of US and ROW carrier air wings is even greater than that suggested by the difference in the numbers and types of aircraft in the wings. In 1989, only a fraction of the aircraft in a US CAW could carry guided weapons. Navy aviators thus practiced large, multi-plane strikes against a limited number of sea or shore targets. Assuming a 200-nautical mile (nm) range to target, a 1989 CAW could strike a maximum of 162 separate targets a day. In contrast, today's strike fighters are now all configured to employ guided weapons. As a result, a single modern US CAW can launch multiple smaller strikes, and hit nearly 700 targets

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some to speculate that the PLAN is indeed intent on building a carrier capability. See Yihong Chang, "Is China Building a Carrier?" *Jane's Defence Weekly* August 17, 2005, p. 7.

[272] US FLD figures come from the Naval Vessel Registry. Other sources suggest that the average US carrier FLD exceeds 100,000 tons. For example, see Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 106-25.

[273] The French nuclear-powered aircraft carrier *Charles de Gaulle*, operational since 2001, is the only non-US nuclear-powered carrier in the world. French authorities decided in early 2004 that the second French carrier would revert to conventional power. See Wertheim, "A Year of Compromise," p. 35.

[274] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 370.

[275] While the Russian carrier is designed to carry a maximum of 52 aircraft (18 Su-27K and 18 MiG-29K strike fighters, and 16 Ka-27 helicopters), it rarely carries this many aircraft. It more often carries just 22-24 Su-33 strike fighters and six helicopters. The Brazilian carrier, the former French carrier *Foch,* carries 15-18 A-4 *Skyhawks* and nine to 11 helicopters, for a total of 24-29 aircraft. See *Jane's Fighting Ships, 2004-2005,* and "Air and Sea-Supported Land Attack Operations," Supplement, *Armada,* Issue 1/2005. The French CAW normally includes eight *Rafale* F-1 air superiority fighters, 12 *Super Etendard* strike fighters, two E-2C radar aircraft, and five helicopters, for a total of 27 aircraft. See "*Charles de Gaulle* and the French Carrier Air Group," *International Airpower Review*, Vol. 15, 2005, pp. 26-33.

per day—more than four times the strike power of a 1989 US carrier.[276] It is highly unlikely that the combined ROW carrier fleet could sustain much more than half that number of attacks per day.[277]

The picture for aviation power-projection ships that operate only vertical take-off and landing (VTOL) and short take-off and vertical landing (STOVL) aircraft is only slightly less favorable for the United States. Of the 19 VTOL/STOVL-capable ships in the world, the United States operates 12 (63 percent). The remaining seven are relatively small CVVs operated exclusively by US allies/strategic partners: the Royal Navy operates three, while India, Spain, Italy, and Thailand operate one each.[278]

Vertically-launched and landed aircraft have less operating range, endurance, and payload carrying capacity than heavier, catapult-launched, fixed-wing aircraft. Therefore, VTOL/STOVL carrier air wings are generally less capable than air wings equipped with catapult-launched aircraft operating off the larger aircraft. In the future, newer aircraft such as the STOVL version of the multi-national Joint Strike Fighter (JSF) promise to narrow the capabilities gap between catapult-launched and non-catapult-launched naval aircraft. However, even older VTOL/STOVL aircraft provide naval task groups with important defensive and offensive capabilities, as was amply demonstrated by the relatively small British sea-based STOVL *Harrier* force during their 1982 Falklands campaign against Argentina.[279]

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[276] See Dave Ahearn, "Clark Says Each Carrier Can Take Out More Targets," *Defense Today*, March 31, 2005. The advertised increase in US CAW striking power is due to a combination of factors. Since 1989/90, the average number of strike aircraft in a typical CAW has increased from 36 to 46; the current air wing can generate more tactical air sorties per day (207 versus 162); and the F/A-18 strike fighter can strike four aimpoints per sortie compared to the one aimpoint per sortie attacked by 1989/90 aircraft such as the A-7 *Corsair II*. These improvements meant that by 2001, a US CAW could strike a maximum of 693 aimpoints per day. This compares to a maximum of 162 aimpoints per day in 1989/90. The maximum number of targets hit per day represent the number of strikes at maximum surge sortie rates in good weather, with short ranges to targets (200 nm), and no requirement to refuel. These figures are used only for analytical comparison. Lieutenant Commander Ed Langford, *CVW Strike Sortie/Aimpoint Improvement*, unclassified point paper (Washington, DC: DoN (N8QDR), January 18, 2001). Other reports suggest the maximum number of targets per day is 680. See Sheila M. McNeill, "Sea Services Bring Forth a New Revolution in Aviation."

[277] For example, on one recent deployment, the French Carrier Air Group onboard the *Charles de Gaulle* was able to sustain two multi-plane strikes per day, consisting of six *Rafales* in the air-to-air role; eight *Super Etendards* in the attack role; and one E-2C, on average. The most up-to-date version of the *Etendard* can carry two 250-kilogram laser guided bombs under each wing. Two strikes consisting of eight attack aircraft, each capable to hitting four targets per sortie, gives the French CAW the ability to strike 64 aimpoints a day. See "*Charles de Gaulle* and the French Carrier Air Group," pp. 27-33. The Russian carrier *Admiral Kuznetsov* normally carries 22-24 SU-33 Strike fighters, each capable of carrying six, 500-kilogram laser guided bombs. Assuming an availability rate of .85, and a daily sortie rate of two sorties per aircraft, the carrier might be able to hit approximately 250 aimpoints per day. See "Air and Sea-Supported Land Attack Operations," Supplement, *Armada.*

[278] CVV is the designator used by *Jane's Fighting Ships* to describe VTOL/STOVL carriers without a well deck. The largest of these ships is the Indian CVV *Viraat*, a converted British medium aircraft carrier, with a FLD of 28,700 tons. The smallest is the Thai CVV *Chakri Nareubet*, with a FLD of just 11,485 tons.

[279] See for example Max Hastings and Simon Jenkins, *The Battle for the Falklands* (London: WW Norton & Company, 1983). The performance of the *Harrier* is nicely summed up by a passage in "It Flies Like a Hummingbird," found at www.thehistorynet.com/ahi/blharrier/index3.html: "The best tribute to the *Harrier's* capability lies in the fact that during the entire Falklands campaign only nine *Harriers* were lost, five shot down by

US ships capable of operating STOVL and VTOL aircraft are all large "big-deck" amphibious assault ships known as LHAs or LHDs. These ships have expansive fight decks and hangers, well decks for carrying landing craft and vehicles, and commodious troop, vehicle, and cargo spaces. In addition to carrying both troop-lifting rotary-wing and fixed-wing aircraft, the ships can carry up to 1,700 Marines and a considerable amount of landing force equipment. As a result, US LHDs and LHAs are much larger than ROW CVVs: the average FLD for US ships is 40,325 tons, while the average FLD for ROW ships is only 18,672 tons. The large size of US ships allows them to carry a much larger and more diverse air wing than ROW CVVs. For example, a typical air wing embarked aboard a US amphibious assault ship might include 12 CH-46 medium lift helicopters; six CH-53 heavy lift helicopters; four to eight smaller utility helicopters and helicopter gunships; and six AV-8B *Harriers*.[280]

More to the point, the large size of US ships also allows them to carry a respectable tactical air wing in a dedicated VTOL/STOVL carrier role. For example, during Operation *Iraqi Freedom*, two US amphibious assault ships were used as "*Harrier* Carriers," with air wings consisting of 22-24 of these aircraft.[281] In comparison, ROW ships normally support an air wing of only six to 12 *Harriers*, although these numbers can be expanded in an emergency.[282]

In summary, of the 34 ships in the world that can support fixed-wing tactical aircraft, the United States operates 24 (70 percent). Said another way, the United States operates 2.4 times more aviation power-projection than the rest of the world's navies combined, and its aviation power-projection fleet is eight times the size of the nearest ROW fleet (operated by the British Royal Navy). Moreover, all but one of the ROW carriers and CVVs are operated by navies allied with or friendly to the United States. Indeed, the wide disparity between US and foreign naval aviation capabilities is causing DoN decision makers to consider reducing the number of carriers in its force structure.[283]

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ground fire and four due to accidents. None were shot down in air-to-air combat. Argentina, on the other hand, lost 31 aircraft to the *Harrier* in air combat with a further 30 destroyed on the ground by GR-3 [Royal Air Force *Harriers*]."

[280] See the entries on the *Wasp*-class LHD and *Tarawa*-class LHAs in Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 184-89.

[281] Lorenzo Cortes, "Amos: Marines Used '*Harrier* Carriers' During OIF, Sent Cobras Deep," *Defense Daily*, July 31, 2003.

[282] During Operation "Magic Carpet," the British carrier *Invincible* operated seven Royal Navy *Sea Harriers* and eight Royal Air Force *Harrier* GR.7As. See Richard Scott, "Invincible Steps Up to 'Magic Carpet'," *Jane's Navy International*, April 2005, p. 5. In other operations, British carriers have operated 16 *Harriers*. See James S. Bosbotinis, "UK Future Maritime Airpower," *Air Force Monthly,* June 2005, p. 40.

[283] In preparation for the 2005 Quadrennial Defense Review, the DoN announced its desire to reduce its large carrier fleet from 12 to 11 ships. The Congressional reaction to this announcement will be discussed later in the report. See Gordon I. Peterson, "A Victim of Its Own Success?" *Naval Forces*, No. III, 2005, pp. 9-15.

## THIRD SIGHTING: SURFACE COMBATANTS

On December 31, 2004, there were a total of 574 surface combatants in the world with FLDs greater than 2,000 tons. Of these, the United States operated 101. Of the remaining 473 ROW combatants, the top 17 naval competitors operated 366. The Japanese Navy operated the second largest surface combatant fleet with 51 ships. None of the other competitors operated more than 35 surface warships: the PLAN operated 35; the British Royal Navy, 31; the Russian Federation, 30; Taiwan, 29; France, 23; India, 22; and Turkey, 20. The remaining nine navies all operated 17 or fewer surface combatants.[284]

In pure numerical terms, then, the United States thus enjoys slightly more than a "two-navy standard" in major surface combatants. However, a closer examination reveals an even more impressive US edge, and highlights once again the perils of relying on simple number comparisons to measure relative fleet capabilities.

The ultimate purpose of a surface combatant is to put "ordnance on target."[285] Up until the Second World War, the primary target for a surface warship was another warship, and the primary instrument to put ordnance on target was the naval cannon or gun. Therefore, in the age of sail, a warship was judged first by the number of guns it carried; and in the age of the all-big gun battleship, by the number and size of guns in its main battery.[286] In both periods, weight of broadside was a key determinant in the outcome of naval battles.[287]

After the aircraft carrier supplanted the battleship as the primary "capital ship" in world navies, aircraft became the primary means for attacks against both ships and shore targets. Guns took on a fleet defensive role against attacking planes, and retained a supporting offensive role against land targets close to the coastline. However, as was discussed earlier, during the post-World War II global transition to jets, missiles, and nuclear attack submarines, ships' guns were gradually supplanted by guided weapons for both defensive and offensive roles, and guided missiles and rockets gradually replaced cannon shells and powder in warship magazines.[288] As one naval expert wrote:

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[284] Fleet counts for surface combatants are less solid that for aviation power projection platforms. Different sources reflect different counts. These numbers are drawn from *Jane's Fighting Ships, 2004-2005.*

[285] This was the favorite phrase of Admiral Joseph Metcalf III, USN, Deputy Chief of Naval Operations for Surface Warfare in the early 1980s. See Norman Friedman, *US Destroyers,* revised edition (Annapolis, MD: Naval Institute Press, 2005), p. 432.

[286] Size of the guns were usually expressed by muzzle diameter, in inches; e.g., a 16-inch gun.

[287] "Since the Spanish Armada, grappling and boarding ceased to play any significant part in battle plans. Victory now belonged to the side with the most firepower, meaning the one with the most ships—one reason the European navies would grow larger and larger—and the most guns…Hence the appeal of the broadside." Herman, *To Rule the Waves*, pp. 175-76.

[288] A great history of the US surface Navy's adjustment to the threats of jets, missiles, and nuclear attack submarines ac be found in Malcolm Muir, Jr., *Black Shoes and Blue Water: Surface Warfare in the United States Navy, 1945-1975* (Washington, DC: Naval Historical Center, 1996).

> In recent years, mines have been harmful, submarines influential, and both have constrained operations out of proportion to the numbers engaged and the damage achieved. We have even seen old-fashioned bombs dropped on ships. Nevertheless, the evidence is unassailable that missiles of all descriptions from land, air, sea, and beneath the sea…dominate modern warfare at sea. Even disregarding nuclear, chemical, and biological warheads, we are in the missile age.[289]

The broad shift in naval weapons from guns to guided missiles led to the emergence of an entirely new surface combatant design regime, characterized by hulls with closely coupled combat and missile systems.[290] Large "battle force capable" combatants carried main batteries consisting of large diameter missiles and rockets such as long-range area air defense surface-to-air missiles (SAMs) and long-range anti-ship cruise missiles (ASCMs), and secondary batteries of terminal defense SAMs and guns. Medium-range local air defense SAMs and anti-ship cruise missiles made up the main batteries on less capable "protection of shipping" combatants (e.g., convoy escorts), and terminal defense missiles and guns made up their secondary batteries. Even the smallest combatants often carried four to 16 ASCMs for their main batteries, and rapid-fire guns and terminal defense missiles for their secondary batteries.[291]

Up until 1980, nearly all missile-armed surface combatants were armed with above-deck, trainable "rail" launchers sitting atop below-deck rotary missile magazines. However, in that year, the Soviet Navy launched a ship equipped with a new type of missile launch system that combined the below-deck rotary magazine and launcher into a single integrated system. This system consisted of circular groupings of eight missiles in canisters nestled below deck, which rotated like the cylinders of a revolver. In action, the canisters would rotate and slot their missiles into a single vertical launch cell analogous to the chamber of the revolver. Upon firing, the launcher would eject the missile vertically from the launch tube, and the missile's rocket engine would ignite at low altitude, up and out of the ship's hull, sending the missile on its way. This "cold launch" technique kept the single launch cell from overheating. Once the missile was away, the cylinder would rotate and slot another missile into the firing chamber for launching.[292]

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[289] Captain Wayne P. Hughes, USN (ret), *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000), p. 4.

[290] "Closely-coupled" means that a ship's major combat systems are integrated closely into the hull design.

[291] For the purposes of this report, a area air defense SAM is a long-range missile with ranges greater than 48 kilometers, or 25 miles). A local air defense SAM is a medium range missile (16-48 kilometers, or 10-25 miles) that can engage crossing threats (i.e., a missile homing in on another ship). A terminal defense SAM is an agile, short-range missile with a range less than 16 kilometers (10 miles) that is generally incapable of engaging a crossing threat; that is, the missile is designed to engage a missile homing in on the host ship. However, the distinction between terminal defense and local air defense SAMs is blurring with the development of missiles like the US Evolved Sea Sparrow Missile (ESSM) and the European Aster-15. These missiles have the range and the agility—both are capable of pulling 50-60 *g*s—to perform both local air defense and terminal defense missions. For the ESSM, whether or not the missile performs a local defense or simply a terminal defense role depends entirely on the capability of the ship's combat system.

[292] The first Soviet ship with a vertical launch missile system was the nuclear-powered "battlecruiser" *Kirov*. Ships of this class carriy 96 SA-N-6 *Grumble* area air defence missiles in 12, 8-round, B-203 revolving vertical launchers.

Soon thereafter, in 1986, the US Navy improved upon the Soviet idea by introducing the Mk-41 vertical launch system (VLS).[293] Like the Soviet system, the Mk-41 VLS did away with the operational and maintenance problems associated with hydraulic feeding mechanisms that linked missiles in magazines to above-deck trainable launchers. However, the Mk-41 also did away with the hydraulics associated with revolver-launcher/magazines, introducing instead fixed "modules" of eight VLS cells which served as both magazine and launcher for their missiles. A ship's battery consisted of grouped multiples of modules. This arrangement meant that every missile carried aboard a VLS-equipped ship was in a "ready-to-fire" condition, needing only targeting data to send it on its way. A VLS-equipped combatant thus had a far less maintenance intensive and more reliable main battery—with much a higher rate of fire—than any other missile-armed combatant.[294]

Moreover, the Soviet revolver-VLS was a single-purpose launcher, designed to fire only long-range area air defense SAMs. In contrast, the US system—which came in three different cell lengths—was designed to flexibly store and fire any missile with a diameter up to 21 inches that was suitable for vertical launch.[295] This gave the US Mk-41 VLS the ability to store and fire long-range area air defense missiles from the Standard Missile (SM) SAM family; local air defense SAMs like the Evolved Sea Sparrow Missile (ESSM); terminal defense SAMs like the NATO Sea Sparrow Missile (NSSM); anti-submarine rockets (ASROCs); and *Tomahawk* anti-ship and land attack cruise missiles (LACMs).[296]

One immediate consequence of the move toward the Mk-41 VLS was a reduction in the number of special-purpose missile launchers required aboard US combatants, which further reduced the fleet's maintenance and logistics load. Moreover, the US VLS made very efficient use of space in a ship's hull, allowing a ship so equipped to carry over 40 percent more missiles than a legacy missile ship of equal size.[297] In today's lexicon, the VLS converted US surface combatants into

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[293] The first US warship to introduce the VLS into fleet service was a submarine, the USS *Providence*, commissioned in 1985. In 1986, the *USS Bunker Hill*, CG-52, was commissioned—the first new construction *Ticonderoga*-class guided missile cruiser to be armed with the VLS, and the first of 24 S*pruance*-class destroyers was modified to accept a VLS.

[294] See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 508-509.

[295] "Standard/Strike" cells are 7.7 meters high and can accommodate all missiles in the US inventory, including the *Tomahawk* land attack missile. "Tactical" cells are 6.76 meters high, and can accommodate all battle force missiles except the longer *Tomahawk* and ballistic missile interceptors. "Self-defense" cells accommodate smaller local air defense and terminal defense SAMs. See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 508.

[296] For descriptions of all of these weapons, see Chapter 30, "Weapon Systems," in Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition.

[297] A rail-armed *Ticonderoga*-class cruiser can carry 88 missiles in its below deck magazines; a VLS-armed *Ticonderoga*-class cruiser can carry 128 VLS cells in the same size hull. Originally, these ships were to have an ability to rearm their VLS cells at sea. A group of three cells in both the ships's forward and after VLS batteries formed a "strike down module" with a missile handling system, reducing the number of missiles actually carried to 122.

*mobile, densely packed, modular missile batteries* that could be easily scaled and tailored to accommodate any threat or mission.

The appearance of the VLS eventually upended the contemporary surface combatant design regime. However, its effects on the global naval competition were not immediately felt for several reasons. First, in 1986, there were only two competitors fighting it out for the number one spot in the global naval race—the United States and the Soviet Union. An important US competitive response to expected Soviet saturation missile raids against its carrier battle groups was a “system of systems” to provide the groups with accurate, high-volume, area air defense missile fire. In addition to VLS, this system of systems included the sophisticated AEGIS phased array radar and digital combat system, and long-range surface-to-air missiles with commandable auto-pilots—capabilities then beyond the reach of most other naval competitors.[298] Second, even if these capabilities were affordable, the VLS was generally unsuited to the needs of the many navies allied with the United States against the Soviets. These navies normally concentrated narrowly on the ASW and anti-surface warfare (ASuW) missions, where the advantages offered by VLS were far less pronounced. Third, once the Soviets dropped out of the race, most allied navies were left with fleets of relatively young pre-VLS combatants. In the years immediately following the collapse of the Soviet Union, few defense officials or politicians outside the United States supported calls for newer, more expensive, and more capable VLS-equipped warships.

As a result, the first phase of the ROW VLS transition, evident throughout the 1990s, generally involved the relatively inexpensive replacement of ships’ secondary surface-to-air missile batteries with new terminal defense VLS systems, where the system’s advantages in space efficiency, rapid reaction, and firepower were clearly worth pursuing.[299] Now, however, the second phase of the ROW VLS transition—involving the adoption of VLS main batteries—is picking up steam. This second phase coincides with the decommissioning of old Cold War combatants, as well as increased interest in navies allied with the United States in conducting “out of area” expeditionary operations.

Among the top 17 ROW naval competitors, Russia, Japan, Canada, Spain, Germany, South Korea, and the Netherlands now operate combatants with VLS main batteries capable of firing both large battle force missiles and local air defense missiles. Two additional navies—the Turkish and Australian—are adopting vertical launch systems armed with local air defense missiles for the main batteries on their “protection of shipping” combatants. Both are also

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[298] For a discussion of these systems, see Norman Friedman, *US Destroyers, revised edition*.

[299] The Soviet Navy adopted a VLS system for its SA-N-9 *Gauntlet* terminal SAM; the British converted to vertical launch canisters for their *Seawolf* terminal defense SAMs; the Israelis adopted VLS systems for their *Barak* missile; and three navies (Canadian, Greek, and Netherlands) converted trainable box launchers for their NSSMs to vertical launchers. Increasingly, terminal defense missiles, except those adapted from shoulder-fired SAMs or smaller air-to-air weapons (e.g., the Rolling Airframe Missile), are fired from vertical launchers.

planning to build new, more capable VLS-equipped combatants armed with larger battle force missiles.[300] All of these navies save Russia's have opted to pursue the proven US Mk-41 system.

Soon to join the VLS club will be the navies of England, France, Italy, and Greece. British, French, and Italian ships will be armed with the new, European-designed Sylver VLS system. Like the Mk-41, the Sylver VLS will come in three different lengths, and will be able to fire a variety of different missiles. It can be installed in modules of two, four, or eight cells.[301] In contrast, the Greek Navy intends to operate new VLS-equipped warships armed with the US Mk-41 system.[302]

Even small navies are also making the shift over to VLS. The New Zealand Navy operates two ships armed with Mk-41 cells; the Norwegian Navy will soon operate five; the Danish Navy plans to build three. Numerous other navies, including those of Saudi Arabia and Singapore, are also shifting to VLS combatants (both of these navies opted for the Sylver system). With the development of small, compact VLS launchers such as the Lockheed Martin Single-Cell Launcher (capable of storing and launching four Evolved Sea Sparrow Missiles), the Raytheon Dual-Pack ESSM Launching System, and modular, lightweight, four-cell Sylver VLS launchers, VLS will be found on even the smallest future combatants.[303]

While legacy combatants with rail missile systems will continue to serve in many world navies for years to come, only the Chinese and Indian navies continue to launch major combatants without VLS for their air defense batteries. Both are commissioning ships armed with Russian-built single-rail missile launchers serviced by below-deck rotary magazines.[304] However, the Indian Navy recently introduced vertically-launched anti-ship missile batteries, and the PLAN just launched two combatants with an indigenously-designed VLS for fleet air defense. This

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[300] The Turkish Navy is seeking six new "TF-2000" air defense frigates based on the MEKO 200 design, and armed with a vertical launch area air defense system. *Combat Fleets of the World 2005-2006.* The Australians have an offer for three "air warfare destroyers" armed with Mk-41 VLS cells. See Ian Bostock, "Progress on Australian Big Ship Projects," *Jane's Defence Weekly,* 27 October 2004, p. 16.

[301] The "short length" A43 VLS is designed for self-defense/local air defense missiles like the Aster-15. The "tactical length" A50 handles long-range SAMs like the Aster-30. The new "strike length" A70 will handle long-range land attack missiles like the SCALP. See "Sylver," a brochure on the Sylver modular VLS system, published by DCN, Paris France. See also "Launcher for Aster PAAMS Ship Defense System Successfully Tested by MBDA and DCN," at http://www.eurosam.com/room/communique11.htm.

[302] A Navy's selection between the US Mk-41 and the Aster Sylver VLS systems also reflects a choice between the Aster family of missiles, which employ active radar guidance, and the the Raytheon family of Standard missiles and ESSM, which employ semi-active radar homing guidance. See Joris Janssen Lok and Richard Scott, "Navies Face Choice Questions for Defense of Surface Combatants," *Jane's International Defense Review,* February 2005, pp. 32-41.

[303] "USN to Fit Vertical-Launch ESSM on Large-Deck Ships," *Jane's International Defense Review,* March 2003, p. 20; Richard R. Burgess, "Lockheed Martin, United Defense Developing Single-Cell Launcher," *Seapower,* May 2002, p. 19; and "Sylver," a brochure on the Sylver modular VLS system, published by DCN, Paris France.

[304] These single rail launchers are designed to fire either the SA-N-7 *Gadfly/Shtil* or SA-N-12 *Grizzly* local air defense SAMs. See the sections on the Chinese and Indian navies in *Jane's Fighting Ships, 2004-2005*.

latter system consists of circular modules of six individual launch cells, capable of firing only long-range area air defense SAMs. In contrast to the Mk-41 and Sylver systems that "hot launch" their missiles directly from their cells (requiring complex flame and gas ducting and exhaust systems), the Chinese system will evidently use the "cold-launch" technique introduced in the Soviet/Russian revolver-type VLS.[305] There are also reports that the Chinese will soon introduce a "Mk-41-like" VLS to replace its above-deck terminal defense missile launchers.[306] In any event, both the Indian and Chinese navies now also appear to be transitioning to VLS-armed surface combatants.

If true, then Taiwan and Brazil would be the only two navies among the top 17 that have yet to start the shift toward VLS-equipped ships. Since neither of these two nations export combatants, this will mean that all major future western combatants will be VLS-armed ships, with either the US or European designed systems. This will also be true for ships designed and built for foreign navies, ensuring that the global move toward VLS combatants will continue.

In 1906, the revolutionary all-big gun HMS *Dreadnought* incited a furious naval armaments race between Great Britain and Germany, and a global design and building competition in all-big gun battleships and battlecruisers. The British, German, American, Japanese, Italian, French, Russian, and Austro-Hungarian navies all moved quickly to copy the design features of the *Dreadnought*. Ten other countries attempted to build or acquire them, but only Argentina, Brazil, Chile, Spain, and Turkey were successful in their efforts. The *Dreadnought* changed the rules of the contemporary naval competition, and those countries in the race had to quickly change their naval platform architectures and building plans if they wanted to keep up.[307]

The introduction of VLS and sophisticated digital combat systems like the AEGIS sparked a similar "revolution" in the contemporary naval design competition.[308] However, because of different strategic circumstances, few nations other than the United States had the inclination or wherewithal to rapidly adapt to the new design rules. As a result, the United States now enjoys a commanding lead in the all-VLS competition. On December 31, 2004, of the 71 large, multi-mission "battle force combatants" in the US surface combatant fleet, only two retained legacy rail launchers. These two ships carried a combined total of 192 large diameter "battle force"

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[305] James C. Bussert, "China Debuts 'AEGIS' Destroyers," found online at http://www.afcea.org.signal.

[306] Captain Massimo Annati, Italian Navy, "China's PLA Navy: The (R)Evolution," *Naval Forces*, No. VI 2004, pp. 66-75.

[307] Robert Gardiner, ed., *Conway's History of the Ship: The Eclipse of the Big Gun, 1906-45* (London: Conway Maritime Press Ltd), pp. 14-24. For excellent histories of the *Dreadnought* revolution and the naval race between Great Britain and Germany, see Jon Tetsuro Sumida, *In Defense of Naval Supremacy* (Boston, MA: Unwin Hyman, 1989); Nicholas A. Lambert, *Sir John Fisher's Naval Revolution* (Columbia, SC: University of South Carolina Press, 1999); and Robert K. Massie, *Dreadnought: Britain, Germany, and the Coming of the Great War* (New York, NY: Ballantine Books, 1991).

[308] This was a favorite argument of the aforementioned Admiral Joseph Metcalf III. See Freidman, *US Destroyers*, revised edition, p. 432.

missiles.[309] The remaining 69 VLS-equipped ships carried among them 6,923 Mk-41 VLS cells (an average of just over 100 VLS cells per ship). Moreover, every cell came in the longest "standard/strike length" version—meaning every US cell was capable of storing either one area air defense SAM; one ballistic missile interceptor; one anti-submarine rocket; four local air defense missiles; or one land attack missile. These 69 ships also carried an additional 424 *Harpoon* anti-ship cruise missiles in above-deck canister launchers, giving the US fleet a combined missile capacity of 7,539 battle force missiles.

In contrast, on December 31, 2004, the eight western navies in the process of shifting over to VLS operated a combined fleet of 154 surface combatants. Forty of the ships (about one in four) were equipped with a total of 1,108 "tactical" Mk-41 VLS cells (an average of approximately 37 cells per ship) capable of carrying any US VLS-fired missile except *Tomahawks*. Ten more carried 112 "self defense" MK-41 cells capable of firing either local air defense or terminal defense SAMs (an average of approximately 11 cells per ship).[310] Four of Russia's 30 combatants carried 20 vertically-launched ASCMs and a total of 36 single-purpose revolver VLS launchers with eight cells each, capable of firing a total of 288 long-range area air defense SAMs. Three of India's 22 combatants carried an additional 24 single-purpose VLS cells for anti-ship cruise missiles. None of the 160 operational warships in the navies of Brazil, China, France, Italy, Greece, Italy, Taiwan, and the United Kingdom carried battle force missile VLS launchers. In other words, only 47 of the 366 surface combatants operated by the next largest 17 naval competitors had battle force missile VLS systems, and they carried among them only 1,552 VLS cells. The combined magazine capacity for the 366 ships, not counting terminal defense SAMs, was 5,262 battle force missiles and an additional 2,978 local air defense missiles.[311]

In summary, then, the US surface combatant fleet carries nearly one-and-a-half times the number of VLS-equipped warships than the next 17 navies combined, and it enjoys a greater than four-to-one advantage in battle force VLS cells. This gives the US surface fleet an enormous advantage in missile firepower. *Indeed, the 71 large US surface warships carry more battle force/local air defense missiles than the 366 ships in the 17 next largest navies, combined.*[312]

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[309] For the purpose of this report, *battle force missiles* are missiles that contribute to battle force missions such as area and local air defense, anti-surface warfare, and anti-submarine warfare. Terminal defense SAMs, which protect only the host ship, are not considered a battle force missile.

[310] Remember that the distinction between terminal defense and local air defense SAMs is blurring with the development of missiles like the US Evolved Sea Sparrow Missile and the European Aster 15. Although both are small enough to fit in shorter-length "self defense" VLS cells, both have the range to perform both local air defense and terminal defense missions. Whether or not the missile performs a local defense or simply a terminal defense role depends entirely on the capability of the ship's combat system.

[311] This comparison only considers missiles that can perform battle force missions such as protection of shipping, ASW, ASuW, etc. It does not include the additional 5,792 purely self-defense missiles carried by these ships.

[312] The US battle line could "quad-pack" 2,980 local air defense missiles in 780 VLS cells and carry an additional 6,143 large diameter battle force missiles in its remaining VLS cells. Together with the 192 battle force missiles carried on the two rail-armed ships and the 424 *Harpoons* carried on VLS-equipped combatants in above-deck canisters, the fleet would carry 6,759 battle force missiles. In other words, while carrying an equivalent load of local

## FOURTH SIGHTING: SUBMARINES

When comparing the current US submarine fleet with past US submarine fleets, the picture initially looks relatively gloomy. Since 1989, the year the Berlin Wall came down, the number of active US submarines has declined from 99 boats to its current level of 53 nuclear-powered attack submarines (SSNs)—a reduction of 46 percent.[313]

Once again, however, when comparing the US submarine fleet against the ROW fleets, the picture is much less distressing. As of December 31, 2004, the total number of "tactical" submarines in the world (SSNs, SSGNs, SSKs, SSGs, and SSs) stood at 368 boats of all types. This compares to 784 operating in the world as the Cold War came to an end in 1989. In other words, the smaller US submarine force today has about the same *relative* position that it did when it had nearly twice as many boats (53 of 368 total boats, or 14 per cent of the 2004 ROW tactical submarine inventory, compared to 99 of 784 boats, or 13 per cent of the 1989 ROW tactical submarine inventory).[314]

Indeed, the relative US position is likely now much better. Given the dramatic decline in the number of top-quality Russian submarines, the qualitative difference between the average US and average ROW boats has likely never been higher. The *Virginia*-class SSNs now in serial production are arguably the finest submarines in the world today. As one Admiral stated, "No [submarine] in the world can go toe-to-toe with a *Virginia* class."[315] With the *Virginias* and earlier *Seawolf*- and *Los Angeles*-class SSNs, US submariners enjoy great qualitative advantages over ROW submarines in terms of top speed, acoustic search speed, operating depth, undersea sensors, acoustic signal processing, and quieting. Moreover, the US submarine force enjoys a maintenance and training regime and real-world operational training and experience matched by few submarine fleets—and most of these are in allied navies.

Indeed, because US TSBF designers have so much faith in the qualitative edge enjoyed by US submarines, they have long been willing to accept a disparity in submarine force ratios. For example, in 1990, as the Cold War was coming to a close, the US submarine force believed it could take on and defeat a Soviet tactical submarine force of 72 guided missile submarines, 64 nuclear-attack submarines, and approximately 65 conventional submarines, for a combined

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air defense missiles, the US battle line can carry 28 percent more battle force missiles than the 366 major surface combatants in the next largest 17 navies.

[313] For the number of submarines in the US fleet, see "Ship Force Levels, 1886-present," at http://www.history.navy.mil/nhc3.htm. The submarine force reached a high of 102 boats in 1987. The US fleet also is converting four former *Ohio*-class strategic ballistic missile submarines into conventional guided missile and special operations transport submarines, or SSGNs. These boats will be able to carry up to 154 *Tomahawk* missiles, and up to 102 special operations force personnel. Although all four were counted as fleet assets the Naval Vessel Register on December 31, 2004, all remain in the yards. They are therefore not included in the numbers above.

[314] The 1989-90 ROW submarine inventory came from International Institute for Strategic Studies (IISS), *The Military Balance, 1989-1990* (London: Brassey's, 1989).

[315] Rear Admiral Joseph Walsh, USN, Director of Submarine Warfare, as cited in Dave Ahearn, "Submarine Builders Might Provide Boats For Lower Price," *Defense Today,* June 9, 2005, p. 2.

tactical submarine force of 201 total boats. With 93 US SSNs then in commission, this equated to a force ratio of one US boat for every 2.16 Soviet tactical submarines. In other words, the US attack submarine fleet confidently confronted a potential submarine adversary that operated over two times the number of tactical boats.[316]

The two largest contemporary submarine fleets that might reasonably be considered potential US adversaries are operated by the Chinese and Russian navies. Together, these fleets currently number 27 nuclear-powered SSGNs and SSNs, and 67 conventional boats, for a total of 94 boats.[317] In other words, the current US attack submarine fleet is outnumbered by a combined Russian/Chinese fleet by a ratio of 1.77 boats-to-one. This means that the contemporary comparative submarine force ratio for *two* potential adversaries is much better than the force ratio against just *one* adversary during the Cold War. And, of course, by concentrating its fleet against any single adversary, the US fleet would enjoy a comparative force ratio of close to one-to-one, or better.

The relative submarine threat has declined in kind as well as numbers. In 1990, of the 201 Soviet tactical submarines, 136 were nuclear-powered guided missile or attack boats.[318] The PLAN operated an additional four *Han*-class SSNs. All of these boats were theoretically capable of wide-ranging, high-speed, open-ocean attack operations against US naval task forces. Today, of the world's 368 total boats, only 97 are nuclear-powered. Of these, the United States operates 53, and its allies operate an additional 17. The remaining 27 nuclear boats are operated by the Russian Navy and the PLAN. In other words, since 1990, the number of foreign submarines that pose a genuine open-ocean threat to US naval forces has fallen from 140 boats to only 27, a decrease of over 80 percent. This comparison is in no way meant to downplay the risk of submarine attacks on contemporary US task forces transiting choke points or operating in littoral waters. Without question, however, the relative *open-ocean* submarine threat to US naval forces has declined dramatically, allowing the DoN, among other things, to halt production of ASW convoy escorts and to prudently reduce its own attack submarine fleet.

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[316] Russian fleet numbers are taken from "Russian Warships," found at http://www.globalsecurity.org/military/world/russia/ship.htm. US numbers are taken from "Ship Force Levels, 1886-present," at http://www.history.navy.mil/nhc3.htm.

[317] Current Russian submarine numbers are difficult to track, due to the general state of disrepair of the Russian fleet. *Jane's Fighting Ships, 2004-2005* counts eight SSGNs (seven *Oscars*, one *Yankee Notch*), 15 SSNs (eight *Akulas,* one *Sierra II*, one *Sierra I*, and five *Victor IIIs*), and 13 SSKs (*Kilo* class), for a total force structure of 23 nuclear boats and 13 conventional boats. *Combat Fleets of the World, 2005-2006,* counts nine SSGNs (eight *Oscars*, one *Yankee Notch*), 17 SSNs (ten *Akulas*, one *Sierra II*, one *Sierra I*, and five *Victor IIIs*), and seven SSKs (*Kilo* class), for a total of 26 nuclear boats and seven conventional boats. Global Security.Org counts seven SSGNs (six *Oscars*, one *Yankee Notch*), 15 SSNs (nine *Akulas,* three *Sierras,* one *Victor III*, and two *Yankee Is*), and 18 SSKs (*Kilos*), for a total of 22 nuclear boats and 18 conventional boats. The disparity in Chinese submarine numbers is not as striking. *Jane's* counts four *Han* SSNs, *Combat Fleets*, three. *Jane's* counts eight *Songs*, four *Kilos*, 20 *Mings*, 22 active *Romeos*, and ten reserve *Romeos*, for an active conventional fleet of 54 boats. *Combat Fleets* counts five *Songs*, five *Kilos*, 18 *Mings*, and "up to 32 *Romeos*," with some in reserve, for a maximum active conventional fleet of 60 boats. For consistency, this report uses the numbers found in *Jane's Fighting Ships*.

[318] "Russian Warships," found at http://www.globalsecurity.org/ military/world/russia/ship.htm.

Moreover, in 1990, the Soviet Union operated an additional 63 nuclear powered strategic ballistic missile submarines (SSBNs).[319] A key part of the DoN's Cold War naval strategy was to hold these submarines at risk of destruction. SSBNs were thus a high priority target for US SSNs, which diverted boats away from anti-submarine operations against the Soviet cruise missile and attack submarines that threatened US and allied task groups. When factoring these SSBNs into the comparative force equation, the 1990 ratio of US to Soviet boats was one-to-2.84. Today, the Russian Navy has only about 12 operational SSBNs, and the Chinese Navy, one. This makes the current overall ratio of US to Chinese/Russian boats one-to-2.02—a dramatic improvement over the 1990 ratio.

The decline in the open-ocean ASW threat has also changed the submarine force's contribution to US Battle Force operations. Beginning in 1985, the submarine fleet began adding VLS to its shipboard armament. In fact, the *USS Providence*, SSN 719, was the first US warship equipped with the VLS, carrying a 12-cell VLS battery nestled in its bow. All subsequent US attack boats (with the exception of the small, three-ship *Seawolf* class)—an additional 32 boats to date, and with more on the way—have a similar 12-cell VLS battery, giving the US SSN fleet a total of 384 VLS cells.[320] The incorporation of VLS cells in the attack submarine force and the development of encapsulated land attack missiles that can be fired from the submarine's torpedo tubes gives the US attack submarine fleet an impressive Battle Force land attack role in addition to, and without detracting from, its traditional ASW and ASuW roles.

This covert land attack punch will be dramatically increased after the arrival of four new conventional guided missile and special operations transport submarines. These four SSGNs, all former US strategic ballistic missile submarines, are in the yards undergoing conversion to their new role. As will be discussed in more detail later in this report, each SSGN will be able to carry up to 154 vertically-launched weapons in specially designed canisters, and be able to support up to 102 special operations personnel.[321] When operational, the four boats will add an additional 616 VLS cells to the 384 now found in the submarine fleet, for a total of 1,000 "stealth" VLS cells. The ability to deliver such a large number of guided land attack weapons covertly from an underwater sanctuary will provide the Battle Force with important early attack options against potential enemies armed with large numbers of land-based ASCMs or maritime aviation strike aircraft.

Despite their impressive new covert land attack capabilities, the primary future role of the submarine force will remain anti-submarine warfare. In this regard, much has been made of the development of diesel-electric attack submarines augmented with air-independent propulsion (AIP). These new submarines are typified by the German-designed Type 212A submarine, or its

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[319] "Russian Warships."

[320] On December 31, 2004, there were 31 *Los Angeles*-class SSNs and one *Virginia*-class SSN with 12-cell VLS batteries in fleet service. The 384 VLS cells they carry represent an equivalent missile load of four Flight IIA *Arleigh Burke* DDGs, equipped with 96 VLS cells apiece. However, SSN VLS cells now only carry and fire *Tomahawk* land attack missiles, not other battle force missiles.

[321] See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 72-74.

export version, the Type 214. These subs are equipped with a solid-polymer, metal-hydride fuel cell that allows them to sail to a patrol area under diesel power, and then revert to slow-speed patrol operations using the AIP fuel cell. While operating on the fuel cell at slow 3-4 knot patrol speeds, the Type 212A can remain submerged for 17 days without having to come up to use its snorkel.[322] This greatly reduces the submarine's "indiscretion" rate in its patrol area. Moreover, while operating in the AIP mode, the submarine is extremely quiet.[323] By virtue of its good underwater endurance and its quiet operation, a lurking AIP diesel submarine is very difficult to detect, even for the best US nuclear-powered boats.[324]

Fortunately, AIP technologies do not come cheap; a Type 214 export submarine comes in at nearly half-a-billion dollars. As a result, these submarines "are found in a handful of navies."[325] There are less than ten operational AIP diesel boats in the world today; by 2010, there will be approximately 40—all in navies either allied with, or friendly to, the United States.[326]

Moreover, for all their stealth while on patrol, AIP diesel subs still have the same disadvantages of a conventional diesel-electric boat when compared to a nuclear submarine. Their transoceanic speeds are less than half that of a nuclear boat's—a key operational disadvantage if rapid global transoceanic repositioning is a high priority requirement. More importantly, once discovered, an AIP sub has relatively limited high-speed underwater endurance, which limits its evasive tactics, especially against helicopters equipped with a dipping active sonar. Additionally, the magazine capacity of most AIP boats is relatively small. For example, the Type 212A carries only 12 torpedoes; the Type 214 carries 18. So while these boats are ideally suited for chokepoint patrols, persistent patrols near friendly coasts and bases, and intelligence gathering against Third World

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[322] A snorkel is a mast in the submarine's conning tower that can be extended above the water while the submarine is submerged. The mast has air intake and exhaust valves that allow the submarine to run its diesel engine while submerged. This, in turn, allows the submarine to charge its batteries without coming fully to the surface. See Martin Driver, "Holding Breath on AIP," *Jane's Navy International*, June 2005, p 22.

[323] The Type 212 submarine has been described as "the quietest submarine money can buy." See Charles A. Thibo, "U-Boat!" *Proceedings*, June 2005, p. 24.

[324] For more information on the German designed AIP boats, see "U212/U214 Attack Submarines, Germany," at http://www.naval-technology.com/projects/type_212/; and "The Gray Wolf: Deutsche Unterseeboot U212," at http://www.military.com/soldiertech.

[325] A.D. Baker III, "World Navies Are in Decline," p. 33.

[326] In 2010, the Germany Navy will operate a minimum of four AIP boats (they are seeking a second batch of Type 212Bs, with additional fuel cells and greater underwater endurance); the Swedish Navy will operate five indigenously produced boats with the Stirling AIP propulsion plant; the Greek Navy, eight (four German Type 214s and four converted boats); the Spanish Navy, four (*Scorpenes)*; the Royal Netherlands Navy, four (converted boats); the Italian and Portuguese Navy, two apiece (Type 214s; the South Korean Navy, nine (three Type 214s and six converted boats); and the Pakistani Navy, three (using the French MEMSA AIP plant). See Driver, "Holding Breath on AIP," pp. 20-25, and Dave Ahearn, "HDW Sees Rapid Sales of Super-Silent Fuel Cell Submarine," *Defense Today*, September 14, 2004, p. 1. According to *Jane's Fighting Ships*, one or two Japanese AIP boats may also now be in service.

nations, they are less suitable for the wide-ranging, six-month long patrols routinely conducted by larger US nuclear-powered boats.[327]

In sum, although today's US submarine fleet is smaller than at any time since 1934, it faces far less of a relative threat than did earlier fleets.[328] As A.D. Baker III, former editor of *Combat Fleets of the World*, observed:

> A great deal of misinformation has been published about the proliferation of submarines. In fact, submarine fleets are shrinking and will shrink further. As many countries are ceasing to operate them as are "joining the club."[329]

Therefore, despite unflattering comparisons with the size of past US submarine fleets, the current fleet of 53 US attack boats remains the most powerful in the world, and it appears to be in little immediate danger of losing its dominant lead.

## FIFTH SIGHTING: US FLEET STRIKING POWER

For those who despair over comparisons between the numbers of ships in the current TSBF compared with those in the past should be heartened by the overall increase in US fleet striking power. As a result of the Navy's aggressive pursuit of more guided weapon "shooters" for its Carrier Air Wings; its buying of more guided weapons to store in its large carrier magazines; its adoption of space-saving VLS for both its surface combatants and submarines; and its concentration on large surface combatants and submarines with large magazine capacities, the US TSBF has managed to maintain or increase its maximum fleet striking power even as its ship numbers have declined.

The numbers tell the story. In 1989, the US TSBF numbered 592 ships. This fleet included 14 aircraft carriers; 208 surface combatants—of which 108 were large "battle force capable" combatants capable of operating with fast carrier task forces; and 99 attack submarines.[330] On December 31, 2004, the TSBF numbered less than 300 ships, including 12 carriers; 101 surface warships, with 71 battle force capable combatants; and 53 SSNs. However, the overall reduction in ship numbers did not result in a diminution of fleet striking power:

- In 1989, the maximum theoretical daily strike capacity for the US fleet of 13 *deployable* carriers (with another in long-term overhaul) was 2,106 aimpoints. The comparative

[327] For these reasons, among others, the Defense Science Board's *Task Force on Submarines of the Future*, convened in 1998, concluded that SSNs remained the best alternative for the US submarine fleet. See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 71.

[328] "US Navy Active Ship Force Levels," at http://www.history.navy.mil/branches/org9-4.htm.

[329] A.D. Baker III, "World Navies Are in Decline," p. 33.

[330] "US Navy Active Ship Force Levels, 1986-1992," at http://www.history.navy.mil/branches/org9-4.htm.

figure for today's fleet of 11 *deployable* carriers (with another in long-term overhaul) is more than 7,600 aimpoints.[331]

- In 1989, 108 battle force capable combatants carried a total of 1,525 VLS cells and 7,133 battle force missiles among them.[332] The current surface combatant fleet of 71 battle force capable combatants, despite having 37 fewer ships, now carries 6,923 VLS cells and 7,539 battle force missiles.

- Of the 99 SSNs in the 1989 fleet, 89 boats were in the front-line fleet. These 89 front-line boats carried 132 VLS cells and 2,416 total torpedo tube- and VLS-launched weapons, in a force optimized for ASW and anti-surface warfare operations.[333] The current fleet of 53 SSNs carry among them 384 VLS cells and stowage space for 1,377 tube-launched weapons, for a total magazine capacity of 1,761 war shots , in a force optimized for ASW and land attack (strike) operations.

As can be seen, then, in terms of fleet striking power, the contemporary TSBF compares quite well to past TSBFs nearly twice its size.

## SIXTH SIGHTING: WAR PLANNING EXERCISES

Despite the impressive comparisons with past US fleets, DoN planners have traditionally preferred comparisons against potential naval rivals or groups of rivals to determine the likely outcome of potential naval confrontations. These comparisons have often taken the shape of war planning exercises. Perhaps the most famous of these were the "color plans" developed by the US Joint Army and Navy Board between 1904 and 1938. For example, War Plan Black considered operations against the German fleet (in the Caribbean!); War Plan Orange considered possible operations against the Imperial Japanese Navy; there were even color plans for possible operations against the Royal Navy (War Plan Red).[334] These plans were based on table top war games and analyses which helped both to test potential fleet strategies and operations, and to develop TSBF planning figures for different classes of ships.

Today, the table top exercises used to inform earlier plans for TSBF size and design have been replaced by sophisticated, computer-supported, naval campaign planning models. Such campaign

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[331] The calculations are as follows. 1989: 13 carriers x 162 aimpoints a day = 2,106 aimpoints; 2004: 11 carriers x 693 aimpoints a day = 7,623 aimpoints at day. Again, it is important to emphasize these are simply theoretical maximums used for comparative purposes only. The number of aimpoints hit per day in a real world operation, over long ranges, or in the face of credible air defense, would be much less. For a more sober view on the number of aimpoints that can be hit per day, see Lieutenant B.W. Stone, USN, "A Bridge Too Far," *Proceedings*, February 2005, pp. 31-35.

[332] See Colonel Robert O. Work, USMC (ret), *The Challenge of Maritime Transformation: Is Bigger Better?* (Washington, DC: Center for Strategic and Budgetary Assessments, 2002), p. 70.

[333] Work, *The Challenge of Maritime Transformation: Is Bigger Better?* pp. 73-74.

[334] Steven T. Ross, ed., *US Warplans, 1938-1945* (Boulder, CO: Lynne Rienner Publishers, 2002), p. 2.

planning is well beyond the purview of this report. But for those who insist that counting ships is indicative of a fleet's overall capabilities, a simple "color plan"-style correlation of forces is itself quite instructive.

As indicated earlier, the most stressful (although unlikely) modern "War Plan Red-Yellow" would involve a war against a hypothetical hostile naval coalition consisting of the Russian and Chinese navies. The fact that such a confrontation is unlikely does not mean that planning for it is any less useful. For example, one Joint Army and Navy Board planning excursion involved War Plan Red-Orange, a hypothetical (although unlikely) fight in multiple oceans against the next two largest naval powers—Britain and Japan.[335] The purpose of these exercises is simply to highlight the potential strategic, operational, and tactical problems of such a confrontation; to challenge planners to devise appropriate strategies; and to help determine final fleet numbers.

Today, when modeling this modern "War Plan Red-Yellow," the US Battle Force would be confronted by a combined hostile Russian-Chinese fleet of 160 warships displacing a combined total of 893,692 tons, including:

- One *Kuznetsov*-class aircraft carrier with a notional air wing consisting of 36 fixed-wing strike aircraft and 16 ASW helicopters;
- 94 tactical submarines, including 27 nuclear submarines (23 Russian and 4 Chinese), and 67 conventional submarines (54 Chinese, 13 Russian);[336] and
- 65 surface combatants with FLDs greater than 2,000 tons.

Against this force, the current US Battle Force could marshal 177 warships amassing a total of 2.85 million tons, including:

- 11 deployable CV/CVNs, each with air wings consisting of 70+ aircraft;
- 12 additional large "big-deck" amphibious assault ships capable of operating VTOL/STOVL and rotary-wing aircraft;
- 53 SSNs; and
- 101 surface combatants with FLDs greater than 4,000 tons.

Comparing these two fleets, the US Battle Force would slightly outnumber the combined Russian-Chinese fleet in terms of total warships (a "two-navy standard"), and out-displace the opposing coalition by greater than three-to-one. In terms of aviation power-projection platforms,

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[335] Ross, ed., *US Warplans, 1938-1945.*

[336] These numbers do not include an additional 13 Russian and Chinese SSBNs.

the United States would hold a 23-to-1 advantage. The United States would outnumber the Russian-Chinese fleet in surface combatants by 101 to 65 warships, and the overall submarine force ratio would be one US boat for every 1.77 Russian-Chinese boats. As has been discussed, this represents a favorable submarine force ratio from a historical perspective.

In terms of potential fleet striking power, the Russian-Chinese fleet has no appreciable aviation capability, while the 23 US aviation power-projection platforms are capable of carrying over 1,000 aircraft of all types that can strike over 7,600 targets per day. As far as the surface combatant firepower goes, the US war fleet of 71 large battle force capable combatants carries 6,923 VLS cells and has a maximum capacity of 7,539 battle force missiles. The combined Chinese-Russian fleet, consisting of smaller, less capable warships, carries only 288 VLS cells, and a combined missile capacity of 1,520 battle force missiles, including 652 ASCMs, 360 area air defense SAMs, 428 local air defense missiles, and 80 intermediate/long range ASW missiles. In addition to facing a five-to-one disadvantage in battle force missile capacity, as is evident by its aggregate magazine load, the Russian-Chinese surface fleet is optimized for anti-surface warfare, and has relatively weak fleet area air defenses. As a result, it would be highly vulnerable to asymmetric stand-off air and missile attack from US aircraft and submarines.

Obviously, the United States fleet's ability to defeat such a hypothetical coalition could not be answered simply by comparing the numbers of ships, submarines, and missiles in the respective fleets. However, this comparison does suggest that in the event of a naval confrontation, the US TSBF would be able to more than hold its own in terms of numbers and combat power.

## Converting Observed Sightings Into a Relative Position in the Global Naval Competition

These sightings lead to an inescapable conclusion: despite its relatively small size—*in comparison to some past US Battle Fleets*—the current US TSBF represents the world's greatest concentration of naval power by a commanding margin.

The only real debate is just how much of a relative lead the United States now enjoys in the global naval race. Geoffrey Till approaches this question by dividing the world's navies into a nine-level hierarchy[337]:

[337] Geoffrey Till, "Can Small Navies Stay Afloat?" *Jane's Navy International*, May 1, 2003.

| | |
|---|---|
| Rank 1 | Major Global Power-projection Navy (complete) |
| Rank 2 | Major Global Power-projection Navy (partial) |
| Rank 3 | Medium Global Power-projection Navy |
| Rank 4 | Medium Regional Power-projection Navy |
| Rank 5 | Adjacent Power-projection Navy |
| Rank 6 | Offshore Territorial Defense Navy |
| Rank 7 | Inshore Territorial Defense Navy |
| Rank 8 | Constabulary Navy |
| Rank 9 | Token Navy |

Till's placement of navies within this hierarchy is based on such judgments as a navy's geographic reach; function and capability; access to high-grade technology; and reputation. The great disparity between the size and capability of the US war fleet and those of the world's other navies' helps to explain why Till lists the US Navy as the only Rank 1 Major Global Power-projection navy in the world today. The Garrison Era Soviet Navy—now rusting pier side—was the last Rank 2 partial global power-projection navy in Till's hierarchy. Today, Till ranks the British Royal and French navies as Rank 3 Medium Global Power-projection navies; all others are Rank 4 navies, or lower.[338]

Other analysts are less structured in their arguments, but just as pointed in their assessments. For example, Norman Polmar, editor of *Ships and Aircraft of the US Fleet*, flatly states that "No one is going to challenge [the United States] at sea for the next 20 years." Polmar's view is shared by A.D. Baker III, long-time editor of *Combat Fleets of the World*, who wrote that:

> …the US Navy remains by a vast gap the world's most powerful, and…has been steadily increasing its margin of power over any possible protagonist—or even groups of protagonists…[T]he Navy's fleet is essentially unchallengeable, and its aircraft inventory is far larger than that of any foreign nation's air forces, land- or sea-based. From the standpoint of military technology, there is simply no other nation with the same naval capabilities, and it appears that no challenger will be likely to appear for two to three decades in the future.[339]

So, to those who fret constantly about the size of the TSBF: in the global naval competition, it is the *relative* numbers of ships that count and *relative* fleet capabilities that matter—not the

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[338] Till, "Can Small Navies Stay Afloat?"

[339] A.D. Baker III, *Combat Fleets of the World 1998-1997* (Annapolis, MD: Naval Institute Press, 1998), p. xiv.

*absolute* number of ships in the TSBF. Whether or not the US TSBF is smaller than before World War I is completely beside the point. As Admiral Vern Clark, former Chief of Naval Operations (CNO), recently said in a statement before the Senate Armed Service Committee:

> The number of ships in the fleet is important. But it is no longer the only, nor the most meaningful, measure of combat capability. Just as the number of people is no longer the primary yardstick by which we measure the strength or productivity of an organization, the number of ships is not the only way to gauge the Navy's health or combat capability...In fact, today's Navy can deliver more combat power than we could twenty years ago when we had twice as many ships and half again as many people.[340]

## TIME TO REEF SAILS?

The conclusion that the smaller US TSBF represents the most powerful naval force in the world by a wide (and growing) margin appears to be incontrovertible. Indeed, the sheer margin of US naval superiority is such that some might scoff at those who compare the current US TSBF with past US TSBFs, and try to make the case that the TSBF could be reduced further still with little additional risk to the nation—as was done after World War II, when the Battle Force enjoyed a similarly commanding lead in the global naval race. Or, alternatively, the Battle Force's great lead in the global naval race could be used to argue "if it ain't broke, don't fix it." In other words, with such a commanding lead, the nation should allocate no resources to fundamentally change Battle Force strategy or design. In the never-ending budget battles that go on inside the DoD and in Congress, the temptation to make such arguments will be especially strong among DoN competitors fighting for increased defense budget "market share," especially during the ongoing 2005 Quadrennial Defense Review.[341]

However, a credible first response to both of these arguments is that the foregoing metrics and fleet comparisons may no longer be determinative in the emerging naval competition. In the naval age of sail and during the age of the battleship, when naval battles were generally gun duels between the battle lines of opposing fleets, aggregate warship tonnage—tied as it was to the number and size of ships in a fleet and their total *gun-carrying capacity*—was a good comparative proxy measure for Battle Force capabilities. Today, in an era of asymmetric attacks on surface ships from aircraft, missiles, and submarines, a 100,000-ton Rank 6 Territorial Offshore Defense Navy, consisting of fifty, 2,000-ton diesel-electric submarines with air independent propulsion, would give even a 2.85 million-ton Major Global Power-projection Navy pause under certain circumstances.

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[340] Statement of Admiral Vern Clark, US Navy, Chief of Naval Operations, before the Senate Armed Services Committee, April 12, 2005, p. 4. Admiral Clark's testimony can be found at http://www.navy.mil/navydata/cno/testimony/clark050412.pdf.

[341] As General John Jumper, the Chief of Staff of the Air Force, recently remarked about the 2005 Quadrennial Defense Review (QDR): "The QDR tends to bring out the worst in all of us." See "Washington Report," *Seapower*, April 2005, p.8.

Similarly, in the age of sail and gun, a combatant rating system was a good measure of comparative surface combatant *tactical* capabilities, and a good predictor of the outcome of *ship-on-ship* combat, since the likelihood of a small vessel taking on a "first-rate" and winning was minimal. In the missile age, however, even a tiny fast patrol boat and take out a "first-rate" if it can get within missile range.[342]

In other words, metrics like aggregate warship tonnage, numbers of VLS cells, and submarine force ratios are certainly valid if the future global naval competition will involve head-to-head struggles between ocean-going, sea-control navies, and if battles between opposing fleets are common. However, they may not be nearly as useful in an alternative future where the DoN Battle Force will square off against "irregular" naval challengers who do not have proper navies, or against regional sea denial navies that have positioned the bulk of their battle lines ashore. In the case of the former, the Battle Force might have to disperse globally to confront terrorists and pirates; in the case of the latter, it might have to concentrate to project Joint power ashore, making itself more vulnerable to missile attack. Both cases might require a much different, and perhaps much larger, Battle Force.

This counter-argument is a compelling one. History has shown that the nature of the naval competition can change quite quickly. For example, Athens, one of the greatest naval powers in the ancient world, was defeated at sea by Sparta within three decades after the start of the Peloponnesian War. Between 1940 and 1942, the battleship was rapidly eclipsed by the aircraft carrier as the "capital ship" in the naval competition; a relative superiority in the number and quality of battleships was no longer determinative in ranking navies in the global naval race. Navies that had not anticipated this shift in the competitive environment, or had not been prepared to adjust to it, were rapidly left behind. And though the US Battle Force stood alone at the top of naval competitors as the Second World War came to a close, only thirty years later it was having a tough time holding off a serious challenge by the Soviet Navy.

Therefore, before any move is made to "reef sails" and to reduce the size of the Battle Force, DoN leadership must seek to answer several questions. What will the future DoN Battle Force be expected to do? What are its most likely future challenges? Who are its most likely potential racing challengers? What are the expected racing conditions?

Based on the answers to these initial questions, is the DoN's competition strategy the right one? If not, how must it be changed? Is the US competition "racer"— the DoN Battle Force—properly designed to support the strategy and to overcome potential challengers? Is the number of ships in the Battle Force too high, too low, or about right? Are the types of ships the right one for the expected competitive environment?

The remainder of this paper addresses these important questions. However, based on the foregoing analysis, it is unlikely that DoN Battle Force planners need make any hasty or radical

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[342] A great discussion on how even small combatants have great fighting power in the missile age can be found in Hughes, *Fleet Tactics and Coastal Combat.*

changes to Battle Force design or course and speed. Even if the Battle Force is not now correctly shaped for the future, its daunting lead in the global naval race should give DoN planners and naval platform architects ample time to make any needed adjustments. Indeed, as will be seen, the great US lead will enable a competition strategy that is at once both patient and bold, and designed to maintain enduring US naval supremacy even while operating within a tight budget.

# V. RACING FORECASTS FOR THE JOINT EXPEDITIONARY ERA

> The Greek way of expressing past and future differ[s] from ours. We say that the past is behind us and the future is in front of us. To the Greeks, however, the past was before them, because they could plainly see its finished form standing in front of them; it was territory they had passed through and whose terrain they had chartered. It was the future that was behind them, sneaking up like a thief in the night, full of dim imaginings and vast uncertainties. Nothing could penetrate the blackness of the unknown future except the rare flash of foresight the Greeks called sophos, or wisdom. Yet even these flashes of wisdom depended entirely on the capacity to remember…[343]
>
> Lee Harris, *Civilization and its Enemies*

Depending as it does on wisdom and foresight, the answer to whether the DoN Battle Force is correctly sized and shaped for the future is not nearly as clear cut as determining the Battle Force's relative position in the global naval race. However, by remembering the journey just reviewed and the relative position in the waters just charted, a framework for penetrating the blackness of the unknown future emerges.

## A NEW COMPETITIVE ARENA

As a starting point, the huge lead that the US now enjoys in the global maritime competition means that for the next several decades of the Joint Expeditionary Era, racing conditions will be defined primarily by the degree to which the DoN Battle Force will be able to exploit its command of the seas *at the end of an uncontested transoceanic voyage*. In other words, future racing conditions will primarily depend on the ease with which the Battle Force can operate "right up to within a few miles of the enemy's shores."[344]

Said another way, and as described as early as 1992 in the aforementioned DoN vision statement, …*From the Sea*, the competitive arena for the global naval race has shifted from the open ocean into the world's littorals. As described by the Royal Swedish Navy, masters of their own littoral environment, the littoral is:

> A coastal area, or a border sea that more resembles a bay than an ocean. Shallow waters with a difficult sub-surface environment characterize the sea area. During armed conflict the area is dominated by multiple threats in all dimensions of the battle space, especially in the subsurface environment. The threat level increases as one approaches the shoreline.

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[343] Lee Harris, *Civilization and its Enemies: The Next Stage of History* (New York, NY: The Free Press, 2004), p. xviii.

[344] Huntington, "National Policy and the Transoceanic Navy," p. 491.

> The battlespace, furthermore, allows for short reaction times for units engaged in war fighting in the areas….The unique conditions in this environment place special and high demands on equipment, tactics, and personnel.[345]

In this new arena, the ease and speed with which US naval power can be brought to bear will be determined largely by its degree of littoral access.[346] Littoral maritime access can be described by one of four general degrees:

- *Unimpeded access*, in which the enemy has no credible naval forces or land-based defenses that threaten the advance of the Battle Force into littoral waters. Under these conditions, the Battle Force can immediately establish itself in waters adjacent to the coast, and provide appropriate support to Joint expeditionary forces operating ashore—be it offensive fires, defensive fires, or logistics and medical support. While US naval forces might be subject to irregular surprise attacks using civilian sea or air craft, the threat of these attacks likely would have little impact on US Battle Force actions.

- *Guarded access* describes conditions in which the enemy has a Coast Guard or irregular navy whose primary function is to warn of an impending attack by a US naval task force, or has laid mines to guard the enemy's maritime approaches. Although US forces might be subject to attacks from irregular forces, minor naval combatants, or mines, these forces would not be able to deny US naval freedom of action.

- *Defended access* describes a situation in which an enemy can mount multidimensional attacks against naval Battle Forces; the enemy has credible sea- and land-based maritime defense capabilities designed to deter US intervention, or to prevent Battle Force freedom of action in regional waters. Only Battle Force assets designed to penetrate a defended battlespace would initially venture into the waters immediately adjacent to the enemy's coast. This would require that much of the Battle Force be assembled and held farther out to sea until enemy defenses could be reduced. Once reduced, the bulk of US naval power would move closer to the shore.

- *Contested access* describes the most severe racing condition, one in which the enemy has robust, redundant, and survivable naval anti-access/area-denial (A2/AD) network, capable of both conducting long-range over-the-horizon sensing and controlling intense sustained multidimensional guided weapons attacks to the limits of its sensor range. In these instances, US maritime access would be seriously contested, and Battle Force counter-network operations would take some time before they had an effect on enemy

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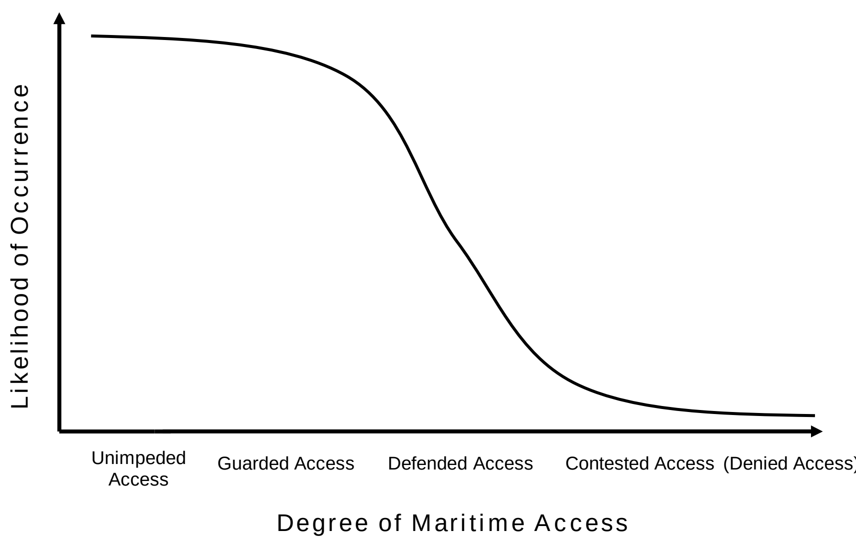
[345] "The Swedish Royal Navay, Today and Tomorrow," *Naval Forces,* Special Issue 2005, p. 17.

[346] For a good discussion of the requirement to operate and dominate in littoral waters, see Barry R. Posen, "Command of the Commons," *International Security*, Summer 2003, 28:1, pp. 5-46.

defenses. While these operations were going on, most US naval units would need to remain in a high seas sanctuary.[347]

Figure One depicts the relative degree of littoral maritime access that exists today in the form of a simple probability curve. It also suggests the time required for a US naval task force to achieve control of an operating area in littoral seas. That is, the "access curve" also implies an opposing, mirror-image curve which depicts the time required for the Battle Force to achieve freedom of action or to take down an adversary's A2/AD network. The amount of time required to open a defended littoral is the key determinant on the speed with which US Joint forces can be deployed and employed.

**Figure One: The "Access Curve"**




As suggested by Figure One, there are currently few nations capable of mounting a serious defense of their maritime approaches or contesting US littoral maritime supremacy is a small number. Indeed, naval analyst Norman Freidman, after reviewing world-wide defense expenditures, concluded that there is no compelling evidence to suggest that high-end maritime defenses or A2/AD networks are now being broadly pursued.[348] Given the increasing costs and

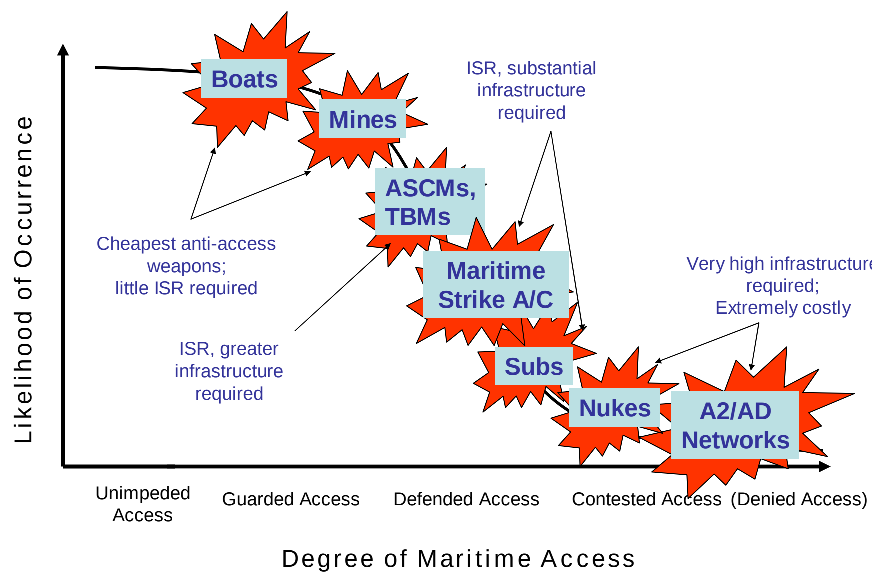
[347] Anti-access and area-denial threats include a number of actions that can be taken outside the environs of the littoral. For a good conceptual overview of A2/AD threats, see F.G. Hoffman, "Sailing in a Fog of Peace: Future Anti-Access Threats," a PowerPoint presentation given at the National Defense University, on July 9, 2002.

[348] Norman Freidman, "Globalization and Anti-Access Strategies?" Chapter 26, In *Globalization and Maritime Power*, Sam J. Tangredi, editor (Washington, DC: National Defense University Press, 2002), pp. 487-501.

difficulty in employing sophisticated weapons in a way that would seriously contest the Battle Force's ability establish itself in regional waters, uncontested and guarded access are thus the most common littoral access conditions. The bottom line, then, is at this point in time, few countries are able to deter an advancing US naval battle force, and fewer still are capable of seriously contesting its operations in close-in littoral seas.

A key unknown for Battle Force planners is how this littoral access curve will change over time. Given the increasing costs and sophistication of naval weapons, and the difficulty in employing them in such a way that would seriously threaten a US naval task force determined to establish itself in regional waters, it seems likely that this rough curve depicts the relative degree of maritime access for some time to come (see Figure Two).

**Figure Two: The 21st Century Access Curve**




Why this is so can be explained by overlaying the weapons associated with creating littoral defenses. The weapons most readily available to contest US Battle Force operations are converted suicide boats and mines. Both are relatively cheap, require little force training, and more importantly, require little technical intelligence, surveillance, and reconnaissance (ISR) support. Used alone and in small numbers, however, these threats would not likely be more than a nuisance to an alert US naval task group.

Moving onto more sophisticated maritime defense capabilities requires a dramatic step increase in both resources and effort. To be effective, anti-ship cruise missiles and tactical ballistic missiles (TBMs) would require a supporting ISR network that would be vulnerable to attack by US counter-network attack forces. Operating a well-maintained and trained force of maritime strike aircraft (a/c) or submarines requires not only substantial ISR and support infrastructure, but introduces knotty force management issues such as training, logistics, and development of junior, mid-grade, and senior leaders. Pursuing nuclear weapons or building a highly capable, hardened, and redundant A2/AD network would require enormous expenditures of money, time, and effort.

Faced with the prospect of confronting DoN Battle Forces—themselves just a part of a much larger and more powerful Joint Multidimensional Battle Network—and given the increasing costs associated with constructing credible littoral defenses, Figure Two thus seems to accurately describe likely relative littoral access conditions for some time. Whether this forecast turns out to be true will depend primarily on whether or not cheap, commercial technologies will allow credible maritime A2/AD networks to be assembled for an affordable price. Despite urgent warnings this may be the case, there is no compelling evidence to suggest it may happen over the next twenty years. In other words, contested access conditions likely will be relatively rare, while unimpeded and guarded access conditions likely will be relatively common. Cases of defended access will fall somewhere between.

The access curve describes the expected competitive arena in the Joint Expeditionary Era, general racing conditions, and the ease with which US naval power will likely be able to be brought to bear in the event of an armed confrontation. However, as the maritime component of a larger Joint Multidimensional Battle Network, the DoN Battle Force ultimately exists to provide Joint goods and services in support of Joint operations and campaigns. And in this regard, the access curve does not describe what the Battle Force is expected to accomplish once established in littoral waters, or how the Battle Force should or can exploit the littoral seas to support Joint campaign objectives. Therefore, DoN strategists and planners must also forecast the types of specific challenge or challengers the Battle Force will likely confront while operating in the world's littorals.

## POTENTIAL CHALLENGES AND CHALLENGERS

In this regard, the three "non-traditional"challenges highlighted in the 2005 Quadrennial Defense Review provide US defense strategists with a solid basis for forecasting the general range of future challenges. They also help DoN strategists and planners to forecast the specific types of *maritime* irregular, catastrophic, and disruptive challenges they will likely confront within the framework of future Joint operations. Importantly, planners need not worry about whether or not the forecasts are exactly right. These forecasts are made only to help identify the most likely range of operational capabilities needed by the DoN Battle Force to prevail in future naval competitions.[349]

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[349] "Henry: QDR to Reflect Uncertainties, Capabilities."

## Irregular/Catastrophic Maritime Challenges

> 'The largest unregulated area in the world' is how Admiral Madhvendra Singh, Chief of the Indian Naval Staff, described the world's oceans…on 12 November 2003…[T]he largely unregulated status of the seas…presents opportunities to terrorists who, as measures to combat them on land and in the air become more effective, may now be looking for other ways to conduct their deadly business.[350]
>
> *Jane's Fighting Ships,* 2004-2005

The United States is now engaged in a persistent, global, armed ideological struggle against an irregular adversary—radical Islamic extremists—who lack a traditional army, air force, or navy. For the DoN, blessed with uncontested command of the seas and faced with no major naval peer competitor, its most pressing operational challenge will be to confront and defeat the irregular maritime challenge posed by radical Islamic extremists and their closely related irregular allies—smugglers, pirates, and other maritime terrorists.[351]

The first key operational requirement in this deadly struggle is to defeat the unnerving combination of irregular enemies armed with catastrophic weapons—weapons of mass destruction:

> The worst potential WMD problem is nuclear terrorism, because it combines the unparalleled destructive power of nuclear weapons with the apocalyptic motivations of terrorists against which deterrence, let alone dissuasion or diplomacy, is likely to be ineffective.[352]

With respect to maritime forces, this means the first key irregular maritime challenge will be to thwart a seaborne WMD attack on the US homeland. This will require:

> …defense in depth—the ability to detect at a distance on the high seas a weapon of mass destruction, the ability to track [in] real time such threat platforms, [and] the ability to interdict, board, and conduct render-safe operations…[353]

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350 Executive Overview, *Jane's Fighting Ships 2004-2005*, p. 28.

351 Geoffrey Till, "Navies and the New World Order," p. 62. Piracy and armed robbery at sea continue to be a global problem, as indicated in Richard Scott, "Scourge of the Seas," *Jane's Defence Weekly,* May 11, 2005, pp. 20-23. The links between piracy and terrorism is increasingly evident. See "Terror Threat Swells at Sea," *WorldNetDaily,* June 8, 2004; and Lieutenant Commander Krzysztof Kubiak, Polish Navy, "Terrorism is the New Enemy at Sea," *Proceedings,* December 2003, pp. 68-71.

352 Ashton B. Carter, "How to Counter WMD," *Foreign Affairs,* September/October 2004, p. 76.

353 "Maritime NORAD is 'Defense in Depth'," *Aerospace Daily and Defense Report,* June 14, 2005.

Mounting a maritime defense in depth to confront and deflect this irregular/catastrophic maritime challenge is not the sole responsibility of the DoN Battle Force; it is a shared responsibility with the US Coast Guard, the "Fifth Service." In past times of war, the US Coast Guard often, but not always, fell under the operational control of the Navy.[354] It now seems clear that this will not happen; at least for the foreseeable future, the US Coast Guard will remain under the Department of Homeland Security.[355]

Linked by maritime tradition but separated by two governmental Departments, the generally accepted view of the shared responsibility for preventing an irregular catastrophic attack on the United States from the sea is that the Battle Force should concentrate on the "away game," supporting Joint counter-WMD raids overseas, and conducting distant maritime interdiction operations to intercept weapons that make it onto the high seas. Meanwhile, the Coast Guard concentrates on the "home game," guarding the direct maritime approaches to the United States and its littoral points of entry.[356]

In this neatly divided view of the world, the Navy and Coast Guard work to develop shared global "maritime domain awareness"—the current term for describing global naval ocean intelligence, surveillance, and reconnaissance—in order to identify potential maritime threats and to intercept them as far from a US coast as possible.[357] The "hand-off point" between the two sea Services for prosecuting threats is the 200-mile limit of the US Exclusive Economic Zone (EEZ), and both Services theoretically cooperate in handling threats that pass between this high seas boundary. A future agency along the lines of the North American Air Defense Command—a "Maritime NORAD"—perhaps might coordinate this cooperation.[358]

However, in practice, there is no neat dividing line between Coast Guard and Navy homeland defense responsibilities. For example, the Coast Guard is the lead maritime service in monitoring global port security in order to protect the United States from shipborne terrorist attacks involving commercial merchant vessels. Additionally, Coast Guard units routinely operate in forward theaters to help increase the maritime capacities of many smaller navies vital for fighting the irregular maritime foes that might seek to exploit the oceans for attacks on the United States.

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[354] The predecessor of the US Coast Guard, the Revenue Cutter Service, was established in 1790, eight years before the US Navy was officially reconstituted. Under Title 14, US Code, the Coast Guard is "a military service and branch of the armed forces of the United States," and must maintain a state of readiness to function as a specialized service in time of war." See Captain Bruce B. Stubbs, USCG (ret), "The Coast Guard-Navy Relationship Still Makes Sense," *Proceedings,* February 2005, p. 59.

[355] John Birkler, et al, *The US Coast Guard's Deepwater Force Modernization Plan* (Santa Monica, CA: RAND, 2004), p. 1.

[356] A good explanation of this separation of responsibilities is found in Joel J. Sokolsky, "Canada and North American Maritime Security: the Home and Away Game at Sea," *Policy Options,* May 2005, pp. 35-40.

[357] See Jason Sherman, "Domain Defense," and David W. Munns, "Vital Links," in *Seapower,* May 2005, pp. 20-24.

[358] See for example Aarti Shah, "Admiral: 'Maritime NORAD' Should be Multilateral, Interagency," *Inside the Navy,* February 14, 2005.

Indeed, many navies prefer to operate with Coast Guard vessels, because they approach terrorism (and piracy) more as a law enforcement problem than a military one.[359]

The dividing line in responsibilities breaks down further still within the broader context of confronting and defeating the global irregular maritime "coalition" that threatens the United States, its allies, and their global interests. Coast Guard assets routinely operate in distant littorals in support of Battle Force operations against irregular naval adversaries. For example, the Coast Guard sent several small combatants and Port Security Units to the Persian Gulf in support of Operation Iraqi Freedom.[360] Moreover, despite their preference and consistent emphasis on "the away game," the DoN Battle Force has always played an important homeland defense role. For example, immediately after the attacks of 9/11, US aircraft carriers and surface warships took up positions along both coasts of the United States.[361] As suggested by these actions, the Navy will always take the lead role in providing maritime air and missile defense for the nation. And, in the event of terrorist use of mines in US harbors, attacks against offshore energy infrastructure in the Gulf of Mexico, or attacks on the transoceanic undersea cables that connect the United States to the global information grid, the Navy would undoubtedly augment Coast Guard assets within the EEZ.

The demands of preventing a seaborne WMD attack on the United States and fighting a persistent global "war" against irregular naval adversaries thus seems likely to thrust the Navy and the Coast Guard closer and closer together. Two quick examples suffice: the Navy transferred five of its small coastal patrol craft to the Coast Guard (while continuing to pay for their operating costs), and US Coast Guardsmen were among those who died protecting oil platforms from suicide boat attacks off the coast of Iraq.[362] As one Admiral recently remarked when discussing the problem of maritime defense of the homeland, "It is not just an away game for the US Navy any longer, and it is not a home game, either. Rather, the roles are merging into one game."[363]

How best to integrate the combined maritime capabilities of the two sea services remains a key unresolved question. However, a good starting point is the mid-1990s Memorandum of Understanding signed by the Commandant of the Coast Guard and the Chief of Naval Operations, updated in 2002, that endorses the concept of a *National Fleet*, an integrated force of

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[359] Stubbs, "The Coast Guard-Navy Relationship Still Makes Sense;" Sokolsky, "Canada and North American Maritime Security: the Home and Away Game at Sea."

[360] Vice Admiral James Hull, Commander Cari Thomas, and Lieutenant Commander Joe DiRenzo III, "What Was the Coast Guard Doing in Iraq?" *Proceedings,* August 2003, pp. 38-40.

[361] See Swartz, *Sea Changes: Transforming US Navy Deployment Strategy, 1775-2002,* pp. 58-59. These pages describe immediate Navy deployments response to the attacks of September 11, 2001.

[362] Stubbs, "The Coast Guard-Navy Relationship Still Makes Sense."

[363] Admiral Joseph Sestak, as cited in Christopher P. Cavas, "New Missions Will Rely on Sea Basing," *Defense News,* January 17, 2005, p. 4.

“multi-mission assets, personnel resources and shore command and control nodes” to optimize the effectiveness of both services across “all naval and maritime missions.”[364] When fighting a persistent global war against irregular naval adversaries—and one that will challenge both the Navy and Coast Guard—steps toward making the concept of a National Fleet a concrete reality appears to be prudent and logical step.

Even with the support of the Coast Guard, fighting a global irregular maritime war will severely challenge the DoN Battle Force, first because of the sheer geographical expanse of the war’s central theater. Without question, the most dangerous adversaries in the irregular naval coalition are radical Islamic extremists. In a slim volume called *Civilization and its Enemies*, author Lee Harris explains that the United States is a prop in the fantasies of Islamic radicals, who hope to recreate the Islamic Caliphate. To defeat these enemies, the United States must deconstruct their fantasies.[365] The practical result: although irregular maritime confrontation is global in scope, the main theater of operations will be defined by the rough outlines of the Caliphate at its height (see Figure Three). It is here—in the “the Indian Ocean and its adjoining seas and gulfs”—that the Radical extremists’ fantasies must be deconstructed, and their forces defeated.[366] It is also here that many irregular enemies with close links to the radical Islamic cause—such as pirates and smugglers—will also be found.[367]

Like the Pacific Theater in World War II, the Indian Ocean and its adjoining seas and gulfs form one crucial, integrated strategic theater:

> The Indian Ocean theater contains the world’s largest democracy (India), the world’s most populous Muslim state (Indonesia), the greatest concentration of oil (on the Arabian Peninsula and in the Persian Gulf), the first Muslim nuclear power (Pakistan), the most progressive economies in Southeast Asia (Singapore, Malaysia, and Thailand) and the greatest concentration of terrorists in the world.
>
> This is where Islam must—and can—change; where nuclear weapons are likeliest to be used; where the future economic potential is vast; where the bulk of the world’s heroin is produced; and where the heroin of the world economy—oil—could be cut off with a handful of nuclear weapons (think Iran, the Suez Canal, and a few Arab ports).
>
> …our Navy remains the lead service for security affairs in the Indian Ocean. The Air Force will have a role in crises, while the Army and Marines will be needed to fight the region’s ground campaigns of

[364] Vernon E. Clark, Chief of Naval Operations, and Thomas H. Collins, Commandant of the Coast Guard, *National Fleet: a Joint Navy/Coast Guard Policy Statement* (Washington, DC: Department of the Navy and US Coast Guard, July 8, 2002).

[365] Harris, *Civilization and Its Enemies: The Next Stage of History*. For a concise description of what Harris refers to as “the fantasy ideology,” see pp. 4-19.

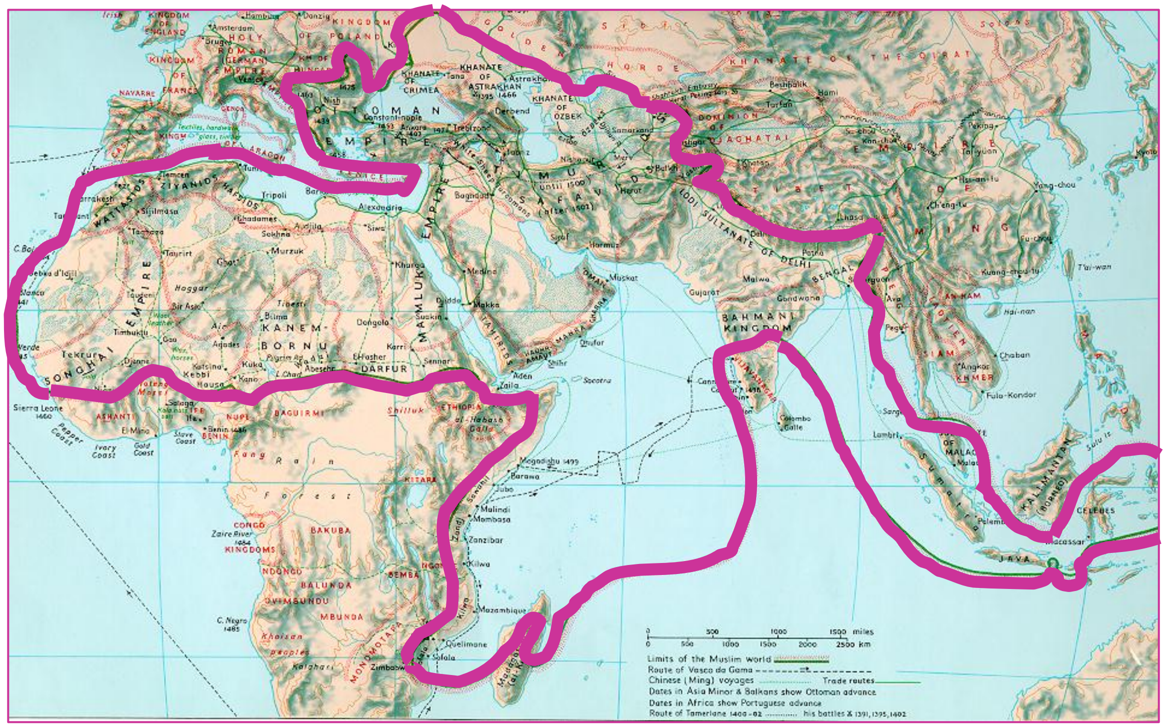
[366] Ralph Peters, “Tsunami Ripples,” *New York Post*, January 6, 2005.

[367] Compare Figure three with the map of world piracy found in Scott, “Scourge of the Seas,” pp. 20-21.

tomorrow (they're coming), but our naval presence is the indispensable military and strategic tool required by the Indian Ocean's strategic environment.[368]

Whether or not the Navy is the "lead service" for security affairs in this central theater of irregular wartime operations is open to debate. However, its great distance from the continental United States and the sheer extent of its maritime dimensions are not; these facts alone will call for the mobilization of all of the nation's maritime capabilities.

**Figure Three: The Central Theater of Operations for Persistent Irregular War**




The second challenge of the irregular war is related to the nature of the enemy threat. Although the irregular enemy does not have a navy, he has a clear naval strategy: *guerre de course*. Like the Continental Navy in the Revolutionary War, the enemy lacks the resources and skills to confront the largest naval power in the world in a head-to-head competition. Instead, operating under "letters of marque," (*fatwas*), the enemy has demonstrated the intent and ability to attack commercial vessels in a waterway, offshore oil energy platforms, and unwary combatants in

[368] Peters, "Tsunami Ripples."

port.[369] His allies—pirates and smugglers—also conduct increasingly bold attacks on vessels at sea and offshore oil platforms.[370]

The traditional way to defeat a strategy of *guerre de course* is to conduct a close blockade of the enemy's coastline, thereby preventing his small raiding or naval craft from getting to sea. Given the sheer geographical reach of the war's central theater and the enemy's global operations, however, such an approach is not feasible. An updated "distributed blockade" is called for—a combination of maritime patrolling, local sea control and sea denial operations, "maritime hot pursuit," and an ability to mount aggressive, broad-area maritime interdiction operations (MIO) in forward close-in littoral waters, on the high seas, and along the maritime approaches of the United States. How to conduct such a distributed blockade in such a vast maritime theater thus looks to be a defining maritime operational challenge in the Joint Expeditionary Era. Broad area surveillance, an ability to track vessels throughout the theater, and support from both the US Coast Guard and allied navies will be required to tackle this task.

In addition to increased cooperation between the Navy and its allies and the Coast Guard, the irregular maritime war will see the need for increased cooperation between the Navy and Marine Corps. Although the enemy does operate on the sea, his primary operating domain is found on land. In classic guerrilla fashion, the enemy's strength comes from many small cells distributed throughout the theater. These cells work loosely to attack US interests and to overthrow governments not committed to the establishment of the Caliphate. They thrive in ungoverned areas—areas where the power of a central state government cannot or will not reach—or in populous urban settings where they hide in plain sight in a sea of humanity. In either case, ground forces will be needed to hunt, locate, and kill or capture the insurgents, or to help build up the capacity of governments to accomplish these tasks on their own. In these circumstances, the *Navy's* reach:

> …tends to be ephemeral when compared to the long-term effects of boots on the ground. There are innumerable types of instability ashore that are better handled ashore.[371]

In other words, the Battle Force must be ready to shift its "priorities from the sea to the land, from power *at* sea to power *from* the sea," which suggests a renewed use of sea-based maneuver operations.[372] The usefulness of having a sea-based maneuver capability was amply demonstrated during Operation *Enduring Freedom,* the US campaign to oust the Taliban government and to deny radical Islamic extremists an operational sanctuary in Afghanistan. As mentioned earlier, during this operation the Battle Force was able to quickly concentrate two forward deployed Amphibious Ready Groups and their embarked Marine Expeditionary Units to

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[369] Executive Overview, *Jane's Fighting Ships, 2004-2005,* p. 28.

[370] See for example Gordon Corera, "Resurgence of Piracy on Tsunami-Hit Seas," *BBC News Online,* May 11, 2005.

[371] Till, "Navies and the New World Order," p. 62.

[372] Till, "Navies and the New World Order," p. 61.

form Task Force 58 (TF 58). Commanded by a Marine general officer, TF 58 was able to project Marine forces over 400 miles inland and to establish a forward operating base in southern Afghanistan. From this location, Marine forces conducted counter-sanctuary operations and hounded Taliban forces throughout the area.[373] Similarly, Marine forces recently formed the nucleus of a Joint Task Force operating in the Horn of Africa to deny extremists sanctuary in this ungoverned area.[374] Indeed, using sea-based maneuver forces to deny the enemy operating bases or sanctuary or to establish an enduring operating presence in territory claimed or used by the enemy has some loose parallels with the World War II Central Pacific drive. In any event, a Battle Force sea-based maneuver capability will be a useful tool in the irregular maritime war, especially in the austere, ungovernable areas to which the enemy is drawn.

### Traditional/Catastrophic Challenges

As suggested by the stunning swiftness of the major combat operations phase of Operation *Iraqi Freedom*, Joint Multidimensional Battle Networks employing large numbers of guided weapons have changed the calculus on the traditional battlefield. As suggested by the Joint Expeditionary Era's forecasting model, potential US adversaries have taken note, and many are pursuing nuclear weapons to deter US attacks.[375]

Should countries like North Korea and Iran acquire nuclear weapons and they are perceived to protect these countries from US interference, more countries may also opt to try to get them. Indeed, Paul Bracken argued in 2000 that the world was on the verge of a "second nuclear age" in which nuclear weapons are acquired by as many as ten Asian nations from Iran to North Korea with the aim of reversing the centuries of Western domination that began with Vasco da Gama's landing in India in 1498.[376] Another expert, Dr. Andrew F. Krepinevich, agrees, worrying that the US may soon face a 5,000-mile "Arc of Atomic Instability" stretching from the Persian Gulf to North Korea.[377]

The conventional wisdom is that no responsible or even irresponsible nation would actually employ these weapons. But in the words of strategist John Gaddis:

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[373] Once again, see "Task Force 58 Overview: Operation Enduring Freedom," at http://www.cpp.usmc.mil/ press/kit/ OEF.asp.

[374] Kathleen T. Rhem, "US Troops Fighting Terrorism in the Horn of Africa," found online at http://www. dod.mil/news/Jan2003/n01102003_200301105.html.

[375] "In Iran and North Korea…the invasion of Iraq appears to have convinced leaders in those countries that they must have a nuclear capability of their own. Far from deterring them, the United States may have pushed them into finding ways to deter it." In Gaddis, "Grand Strategy in the Second Term," p. 10.

[376] Paul Bracken, "The Second Nuclear Age," *Foreign Affairs*, January/February 2000, pp. 147-49.

[377] Dr. Andrew F. Krepinevich, Testimony before the House Armed Services Committee on the 2005 Quadrennial Defense Review," September 14, 2005, found online at https://ucso1.hq.navy.mil/n7/ webdoc01.nsf/ lookup/CC27A11FED910C2085257084004D1D9E/$file/Krepinevich9-14-05.pdf.

> States that have acquired nuclear weapons have so far handled them carefully. To take comfort in this pattern, however, is like trying to find reassurance in an extended game of Russian roulette: sooner or later the odds turn against you.[378]

Conventional wisdom also relies on the notion of nuclear retaliation to forestall attacks involving nuclear or other weapons of mass destruction. However, in the words of one expert:

> …it is entirely unlikely that Pyongyang's or Tehran's calculations, let alone al Qaeda's, hinge on whether the United States has 6,000, 3,500, or 2,200 deployed strategic weapons (the numbers permitted under the last three rounds of US-Russian nuclear arms agreements), retains tactical nuclear weapons deployed in Europe, forswears nuclear retaliation for chemical or biological weapons use, or develops new types of nuclear weapons.[379]

Indeed, analysts at the Army's Institute for Land Warfare have concluded that a future enemy might not believe that the United States would decimate an entire country in retaliation for a single nuclear strike, and thus would be *more* apt to attempt such a limited strike.[380] No wonder, then, that a group of RAND analysts recently wrote that:

> Following the end of the Cold War, the United States military placed emphasis on planning for wars against regional opponents who lacked nuclear weapons. A key assumption on the part of the United States was that middle-sized regional powers such as Iraq or North Korea would not have nuclear arms. However, the emergence of a nuclear-armed Korea has rendered this assumption obsolete…This will change how the United States plans and executes combat operations against such nations…*All the Services will need to come to grips with the realities of fighting in a military environment where there could be limited use of nuclear weapons.* The joint operational concept of any future large-scale forcible entry operation and the ensuing campaign of regime change will have to be redesigned to minimize the vulnerability of those forces to nuclear attack (emphasis added).[381]

This admonition is in line with current US Joint military doctrine, which says that:

> The threat of [weapons of mass destruction] extends across the range of military operations…In all cases, friendly forces should *be prepared to*

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[378] Gaddis, "Grand Strategy in the Second Term," p. 11.

[379] Carter, "How to Counter WMD," p. 81.

[380] "The Return of Nuclear Weapons: Threats, Proliferation and the United States," p. 3.

[381] F. Stephen Larrabee, John Gordon IV, and Peter A. Wilson, "The Right Stuff: Defense Planning Challenges for A New Century," *The National Interest*, Fall 2004, p. 52.

> *conduct and sustain operations* in such environments (emphasis added).[382]

Even setting aside a possible nuclear confrontation with a middle-sized regional power, the US might be forced to adopt a more aggressive counter-proliferation posture. As Henry Kissinger wrote in March 2005:

> . . . the spread of nuclear weapons, especially in regions of revolutionary upheaval, will produce a qualitatively different world whose perils will dwarf the worst nuclear nightmares of the Cold War. Such a world is all too likely to culminate in a cataclysm followed by *an imposed international regime for nuclear weapons* (emphasis added).[383]

An "imposed international regime" would likely include: threats or acts of intervention to prevent some regimes from acquiring nuclear weapons; threats or acts of intervention against nuclear-armed states suspected of selling nuclear weapons technologies to rogue states or extremists; and operations designed to seize or destroy nuclear weapons in a failed nuclear-armed state. Add to these threats or acts of intervention against a regional power using nuclear weapons to blackmail local powers. Any or all of these operations would likely be vigorously opposed by the respective regimes.[384]

US use of nuclear weapons or even a declared policy of potential "first use" of nuclear weapons in any of these circumstances would likely be counter-productive to its own interests. As explained by one expert:

> To the extent that international support for these US-led [counter-proliferation] efforts is influenced by nuclear policy…a growing reliance by Washington on nuclear weapons for its security would complicate its efforts to marshal international cooperation against WMD terrorism and overhaul nuclear arms control regimes….So Washington should carefully weigh the marginal benefits of new nuclear capabilities for deterrence and destruction against their diplomatic costs to the overall counter-proliferation effort….*The costs of crossing the nuclear threshold would be high [for the United States]*.
>
> *…DOD should seek to widen the already huge gap between its conventional military capabilities and those of other nations, develop better non-nuclear counters to WMD, and use transformational technology to narrow the range of circumstances in which the United*

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[382] Joint Publication 3-12-1, *Doctrine for Joint Theater Nuclear Operations* (Washington, DC: Joint Staff, 9 February 1996), p.III-8.

[383] Henry A. Kissinger, "Iran: A Nuclear Test Case," *The Washington Post*, March 8, 2005, p. A15.

[384] Regimes pursuing or that have acquired nuclear weapons are often supported by their populations, which consider nuclear weapons an important prerogative of national sovereignty. The issue of nuclear sovereignty is especially evident in Iran (a nation seeking nuclear weapons) and Pakistan (a nation that possesses them). For example, Munir Akram, Pakistani Ambassador to the UN, during debates over a UN Resolution to criminalize the proliferation of nuclear materials, stated in April 2004 that "Pakistan will not accept any demand for access, much less inspections, of our nuclear and strategic assets, materials and facilities."

> *States would resort to nuclear weapons.* With such an approach, nuclear weapons would play an enduring but background role as a deterrent of last resort (emphasis added). [385]

This entire discussion suggests that the US armed forces consider the tactics, techniques, and procedures necessary to project conventional power under the threat of nuclear attack. In this regard, the DoN Battle Force would likely be a critical part of any strategy that relied on conventional forces armed with guided weapons to take on nuclear-armed states or actors. Indeed, given the associated risks and dire consequences of such operations, the threat of nuclear attack seems to be one of the very few circumstances that might dissuade every country within a theater of operations from allowing US forces base access. The ability to project power from the sea in these instances will thus likely be a critical Joint capability. As a result, DoN planners would do well to pursue new capabilities and to change their operational and tactical approaches in order to be able to project maritime power into littoral waters defended by a relatively small number of nuclear warheads or other weapons of mass destruction.[386]

A key role in this regard will be sea-based missile defenses. The US Missile Defense Agency (MDA) considers sea-based ballistic missile defenses a key element of the overall US Ballistic Missile Defense System (BMDS). Provided the technical hurdles to shooting down ballistic missile can be overcome, the Battle Force should be able to provide rapidly deployable, highly mobile defensive firepower against short-to-intermediate range ballistic missiles carrying nuclear, chemical and biological warheads. By being able to operate close to potential enemy launch sites or along likely enemy missile trajectories, sea-based missile defense forces are expected to add "a significant layer to the BMDS' overall capability to defend the U.S. and its allies."[387]

Another key DoN role will be to launch operations from the sea aimed at destroying an enemy's ability to use nuclear weapons, defeating his conventional forces, and compelling a government to surrender their nuclear weapons. This would require sea-based strike and maneuver platforms that could venture into a littoral defended by nuclear weapons. Fortunately, the Battle Force has many of the tools necessary to venture into a littoral defended by nuclear weapons and to mount a forward sea-based missile defense. For example, the *Arleigh Burke* destroyer and the LPD-17 amphibious warship, both designed for possible nuclear warfare at sea against the Soviet Union—and both still in production—have chemical, biological, and radiological citadels that would help to protect their crews against radiation. And, as will be discussed, all 84 ships in the authorized AEGIS/VLS fleet are potential ballistic missile defenders. Indeed, it appears that many of the Battle Force platforms built during the Garrison Era for war at sea against the Soviet

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385 Carter, "How to Counter WMD," p. 82.

386 See "CBRN Defense—Still Required After the Demise of the East-West Confrontation?" *Naval Forces,* No. III, 2005, pp. 29-34.

387 Missile Defense Agency website, "Frequently Asked Questions," found at http://www.mda.mil/mdalink/html/faq.html#sm.

Navy are easily adaptable to this potential traditional/catastrophic regional power-projection challenge.

## Disruptive/Traditional or Disruptive/Catastrophic Challenges

The *National Military Strategy* associates future disruptive challenges primarily with new technologies. However, in the global naval competition, DoN planners can ill-afford to accept this limited definition. In the broadest strategic sense, a "disruptive" maritime challenge could include a direct traditional challenge against the sea as Joint base, or any moves made by a foreign nation or group of nations that might upend the current US lead in the naval competition.

In this light, although the 1890 decision by national and DoN leadership to change the US naval competition strategy and to become one of the top navies in the world can rightly be viewed as a symmetrical, traditional challenge to British naval supremacy, it was obviously viewed by the British Admiralty as a disruptive challenge because England would likely be unable to counter it. As Lord Lansdowne, then-First Lord of the British Admiralty, remarked in 1909:

> It has not dawned on our countrymen yet…that, if the Americans choose to pay for what they can easily afford, they can gradually build up a navy, fully as large and then larger than ours. And, I am not sure they will not do it.[388]

Similarly, one of the most disruptive US naval challenges in the 21st century would be the emergence of a new naval competitor, or group of competitors, bent on challenging US naval superiority—and backed by the economic, industrial, and technological resources to do so. The only country now on the horizon that appears to have both the means and inclination to mount such a challenge appears to be the People's Republic of China—most likely with technological assistance from Russia.[389]

China has periodically built strong navies during its 4,000 year history. The national navy built during the Song Dynasty (960-1279 A.D.) was the most powerful and technologically advanced in the world. The 15th century Chinese Navy—spurred by the desire to expand overseas trading opportunities—was also quite impressive. Admiral Zheng He led four large naval expeditions along the coast of Africa and throughout the Indian Ocean in vessels equal to, or better than, those being built in Europe at the time.[390] However, it has been quite some time since the Chinese government has devoted national resources to building a strong navy, certainly not since a US Battle Force has sailed the world's oceans.

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[388] Howarth, *To Shining Sea,* p. 288.

[389] The Chinese military, and especially the PLAN, have close ties with the Russian Navy. They will soon operate 12 Russian-built *Kilo*-class submarines and four *Sovremmeny*-class guided missile destroyers. They also operate Russian-built missile systems and pursue Russian naval technology.

[390] Bernard D. Cole, "Waterways and Strategy: China's Priorities," *China Brief: A Journal of News and Analysis,* The Jamestown Foundation, February 15, 2005.

However, with its rapidly expanding economy and its growing regional and global interests—driven in no small part by its rapidly expanding energy import needs[391]—it would be surprising if China did *not* once again seek a build a strong navy. And in this regard, even if China's intent was not to seek a direct naval competition with the United States, any decision to build a powerful navy would inevitably cause important changes to the naval competitive environment. As one historian puts it:

> The United States is presently in a position vis-à-vis China analogous to that of Great Britain in relation to America in 1900. If the US military is to have any peer competitor over the next generation, it will be China, and Chinese leaders can impose costs on the United States by simply doing what they are inclined to do anyway—which is what America did to European nations in the late 1890s and early 1900s when it built up its navy.[392]

This analogy is somewhat strained. The United States still boasts the world's largest Gross Domestic Product, and it could more easily respond to a direct Chinese naval challenge than could the increasingly cash-strapped British Empire at the turn of the last century. Moreover, as discussed in Chapter IV, the PLAN is now outclassed by the DoN Battle Force in every measure: it has no ocean-going naval aviation capability to speak of; a nearly non-existent fleet area air defense capability; and surface combatants and submarine fleets equipped with combat systems that lag significantly behind those of the United States. Still, the long-term competitive trends must be disturbing to DoN planners. Over the past two decades the Chinese have built a world-class ship-building infrastructure. In 1995, China became the third largest commercial shipbuilder in the world, and it has now set its sight on overtaking Japan and South Korea within the next decade.[393] Toward that end, it is currently building the largest shipyard in history in the Shanghai Estuary.[394] It also boasts the world's largest naval shipbuilding program, with at least eight different types of surface combatants and submarines either in production or under development.[395] For the first time since 1890, then, the United States is faced with a potential naval challenger with an industrial strength equal to, and perhaps bigger, than its own.

Despite its improved industrial capacity, most analysts continue to put Chinese naval combat systems at least one to two decades behind Western standards. However, increased cooperation with Russia and any relaxation of the European arms embargo might allow the Chinese to catch up in the field of combat systems more quickly than might otherwise be expected. Given the

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[391] See for example Mark Trumbull, "New Rules for Global Rivalry for Oil," *Christian Science Monitor*, August 4, 2005.

[392] Tom Hone, "Diving China's Course," *Proceedings*, June 2005, p. 55.

[393] Tai Ming Cheung, "Chinese Defense Industrial reform and the Navy," *China Brief: A Journal of News and Analysis*, The Jamestown Foundation, February 15, 2005.

[394] Cole, "Waterways and Strategy: China's Priorities."

[395] Tai Ming Cheung, "Chinese Defense Industrial Reform and the Navy."

combination of both a hot, capable industrial base and improved combat systems, the PLAN Battle Force might be able to start rapidly cutting into the US naval lead.[396]

Given the great lead that the United States enjoys in the maritime competition, China is also predisposed to pursue disruptive technologies that would help to offset its own tactical and operational weaknesses. Chinese leaders have urged the PLA military chiefs to catch up with the world's leading defense powers by 2020, signaling that they are willing to pursue a "high-risk, high reward development strategy." Similarly, Chinese military writers have argued that the military must "act with daring to skip certain stages" of the modernization process. In this regard, they are placing top priority on information and networking technologies.[397] More to the point, China has developed a "marine high technology plan" devoted to both military and economic ends.[398]

While it is by no means certain the Chinese intend or wish to confront the United States in a head-to-head, naval competition, DoN leadership would be foolish not to hedge against such a possibility. Given the DoN competition strategy aims for naval supremacy, one need only to reread Samuel Huntington's aforementioned *Proceedings* article to understand how important it is to hedge against a potential naval competitor. Written in 1954, a time when the Soviet Navy was not yet a credible threat and the DoN still enjoyed unquestioned naval superiority, the article urged DoN leadership to consider the "sea as base," and to concentrate its efforts on projecting power ashore. Less than 20 years later, after returning from its long power-projection operation off the coast of Vietnam, the Battle Force found itself confronted by a resurgent Soviet Navy capable of mounting a serious open-ocean challenge. The Battle Force was subsequently able to beat off this challenge, albeit with difficulty.

Other dominant naval powers have been less successful in defending a large naval lead. As mentioned earlier, at the start of the Peloponnesian War, the navies of the Athenian Empire were the world's finest, and their fleets outnumbered those of Sparta and the Peloponnesian League by over four-to-one. In less than three decades, however, the navies of the Athenian Empire lay in ruins, there was no money left in the Athenian treasury to rebuild the fleet, and the war was lost.[399] History suggests that the dominant naval power should never take its lead for granted, and that it should always watch the nearest naval competitors with a wary eye.[400]

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[396] For an interesting outside view on the PLAN's rapidly improving capabilities, see Nikita Petrov, "China Dents the Reputation of the Pentagon and CIA," *Pravda*, June 16, 2005. See also Stephen Glain, "China: Rethinking an Old Race," Periscope Item, *Newsweek*, May 16, 2005.

[397] Timothy Hu, "Ready, Steady, Go," *Jane's Defence Weekly*, April 13, 2005, p. 24.

[398] Cole, "Waterways and Strategy: China's Priorities."

[399] Donald Kagan, *The Peloponnesian War* (New York, NY: Viking Press, 2003).

[400] Indeed, the Pentagon is growing increasingly wary about China's improving military capabilities. See for example John M. Donnelly, "China on Course to be Pentagon's Next Worry," *CQ Weekly*, May 2, 2005.

Given the great disparity between the current capabilities of the US and Chinese fleets, such a disruptive/traditional naval challenge—if it materializes at all—will likely appear in several stages. The first stage might be for the PLAN to concentrate on erecting an anti-access/area denial network in order to establish control over its contiguous littoral seas, and to deny US naval forces freedom of action in the case of a serious regional confrontation. The second stage might involve building a fleet that could conduct power-projection operations in adjacent theaters. A third stage might involve the development of a true blue water navy capable of contesting the DoN Battle Force on the high seas.

It seems clear that the Chinese have at least decided to pursue the first stage of a naval competition with the United States. Determined to deter a US intervention in a crisis between the PRC and Taiwan, the PLAN is investing in an over-the-horizon ocean surveillance and targeting network including space-based assets; land-based maritime strike aircraft; long-range anti-ship cruise missiles; and diesel-powered submarines armed with anti-ship cruise missiles and torpedoes. Perhaps most troubling, the Chinese are pursing ballistic missiles with maneuverable reentry vehicles to provide a long-range anti-ship capability, targeted especially at US aircraft carriers.[401] These reentry vehicles could perhaps be armed with special-purpose warheads designed to send out high pulses of electro-magnetic radiation in order to disrupt or blind US sensors, or even employ nuclear warheads, much as the Soviets planned to do in the Garrison Era. All these efforts appear to be pointed toward constructing a formidable naval anti-access/area denial (A2/AD) network, designed to keep the Battle Force at bay until any potential crisis with Taiwan could be resolved in China's favor.[402]

Under any circumstances, then, given the US position that the Taiwanese issue should not be decided by force, the DoN Battle Force must begin to hedge against the possibility that it might have to penetrate a serious Chinese A2/AD network. Such a hedging strategy does not presuppose an actual confrontation with the PLAN; it is merely a prudent exercise in capability development based on a pacing naval threat. At the very least, a demonstrated ability to penetrate a high-end Chinese A2/AD network would likely dissuade smaller, less economically advantaged adversaries from constructing their own anti-access networks. It would also likely lead to the development of littoral penetration capabilities useful in any defended access scenario.

As to the question as to whether or not the PLAN intends to pursue the ever more disruptive second and third stages of a maritime competition with the United States is a matter of great conjecture and uncertainty. At this point, however, given the distance that the PLAN would have to make up, the United States would have plenty of time to respond to this more determined disruptive/traditional naval challenge.

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[401] Office of Naval Intelligence, *Worldwide Maritime Challenges 2004* (Washington, DC: Department of the Navy, 2005), p. 22.

[402] As just one example of Chinese thinking on confronting advancing US Naval Battle Forces, see Wang Zaigang, "The Nemesis of Super Aircraft Carrier Battle Groups," *Beijing Jainchuan Zhishi*, January 2005, pp. 24-27, translated by FBIS.

## THE FUTURE COMPETITIVE DOMAIN

The full range of littoral maritime access conditions as well as potential non-traditional challenges and challengers describe a future environment that will stress the Battle Force's ability "to take and keep the lead" in the global naval race. As Admiral Clark has concluded, the DoN Battle Force:

> …is not correctly optimized and balanced for the challenges of the future. The strategic landscape is changing in front of our eyes… challenging our thinking about irregular and catastrophic threats.… While we need to retain the ability to deal with traditional conflict, we need to *reshape our force structure* to meet the challenges of the 21st century (emphasis added).[403]

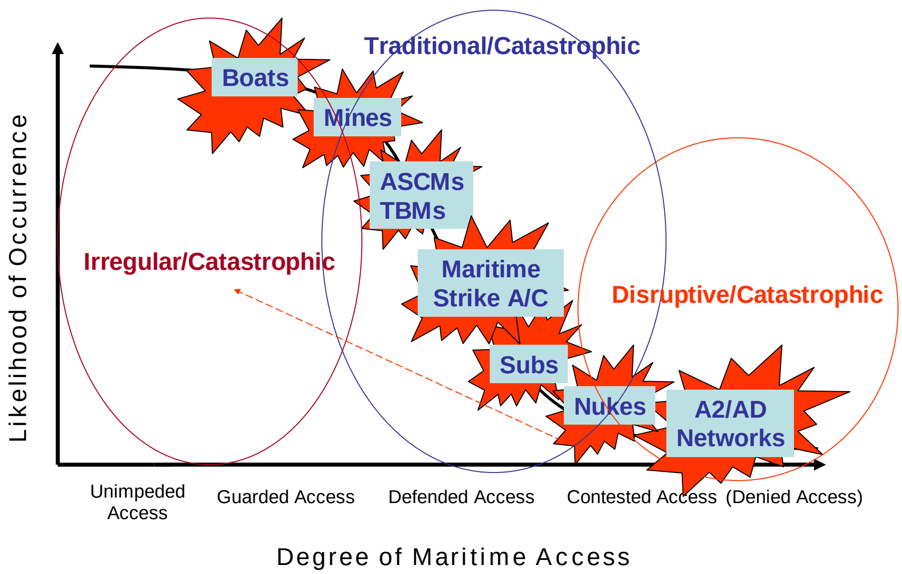
In other words, maintaining the lead in the naval competition in the Joint Expeditionary Era will require the artful preparation and reshaping of the Battle Force for a new maritime competitive domain. By overlaying the three non-traditional challenges on top of the littoral access curve, the full outline of this competitive domain begins to take shape. As can be seen in Figure Four, the three challenges generally line up with a specific part of the access curve.

Irregular challengers, lacking navies, air or land forces will generally not be able to interfere with the operations of a DoN Battle Force in littoral waters beyond launching boat attacks or laying mines. A traditional opponent with access to nuclear weapons can be expected to also have conventional naval, air, and land capabilities that could challenge the establishment of a Joint sea base. And to disrupt the current competitive environment, a naval challenger must, at a minimum, be able to establish an anti-access/area-denial network that will severely oppose Battle Force operations in his home waters.

Note that DoN planners would do well to anticipate the use of nuclear weapons at any point along the access curve, even if adversaries along the curve would have different reasons to use them, and would rely on different employment and delivery methods. Indeed, the consistent potential threat posed by nuclear weapons suggests an enduring need for a potent national nuclear deterrent force, even if the threat of nuclear retaliation may not work against all challengers.

[403] Cavas, "New Missions Will Rely on Sea Basing," p. 4.

**Figure Four: The Future Maritime Competitive Domain**




Moreover, recall that Figure Four assumes US command of the high seas and the lack of a challenge by a global naval peer. It is important that the Battle Force maintains its open-ocean dominance. As challenging as operations in defended or contested littorals may be, making preparations to fight across an open ocean would require an enormous increase in resources. Dissuading would-be naval peers is also an important objective in this competitive domain.

In summary, then, Figure Four provides a good general outline of the future naval competition domain. In essence, it portrays what the nation might expect the Battle Force to be able to do in the Joint Expeditionary Era, and highlights the racing conditions the Battle Force must be able to master in order to stay on top in the global naval race. It therefore provides a good basis for Battle Force plans and reshaping efforts.

## Expected Future Resources

Designing a Battle Force that is equally capable of preventing a seaborne catastrophic attack on the US homeland; contributing to the defeat of radical Islamic extremists and irregular enemies in a vast maritime theater; confronting a nuclear-armed regional competitor; protecting US forces, allies, and the US homeland against missiles armed with WMD warheads; and penetrating a high-end A2/AD network would be a challenging enough redesign problem under the best of circumstances. However, as was indicated earlier, limited fiscal resources are likely to make the task of Battle Force reshaping and redesign even more difficult and challenging.

It is important that strategies and plans for Battle Force change take the prospect of limited future resources seriously, and that changes to the associated naval fleet platform architecture be based on fiscally conservative budget estimates. In this regard, this report is based on the following fiscal assumptions:

- Between now and 2020, the DoD "topline" will flatten out and then decline back modestly to the FY 05 budget level (without Supplementals) of $401 billion (constant dollars).

- The costs of continuing military operations in Iraq and Afghanistan will continue to be covered by Supplemental appropriations.

- The 2005 QDR will not result in major shifts of defense allocations between the Services, and the DoN topline will remain at the FY 05 level of roughly $120 billion a year (constant dollars) for the next 15 years.

- Over this period, DoN procurement will average 25% of the DoN total budgetary authority—the average share of DoN topline over the past 20 years, which catches both the Reagan defense build up, and the 1990s Garrison Era demobilization—or approximately $30 billion a year (in FY 05 constant dollars).

- *At a minimum*, the total DoN shipbuilding account, including Navy shipbuilding and conversion (SCN) funding and the National Sealift Defense Fund (NSDF), will continue to be about one-third of the total DoN procurement budget—the average share of DoN procurement funding over the past 20 years—or approximately $10 billion a year (in FY 05 constant dollars).

- *At a maximum*, internal DoN budget reallocations will increase the total shipbuilding budget by as much as 20 percent, resulting in potential average shipbuilding budgets of no more than $12 billion a year (in FY 05 constant dollars).

While most budget analysts interviewed for this report believe these assumptions to be reasonable, they also believe that they represent the *best possible scenario*. Indeed, given the increasing budget pressure due to rising deficits, costs associated with the continued operations in Afghanistan and Iraq, and steadily increasing military manpower and health care costs, some analysts believe these forecasts to be overly-optimistic. A smaller group of analysts believe that intra-DoN resource reallocations, such as shifting money saved from crew reductions into shipbuilding, might allow the average shipbuilding account to rise modestly above the assumed level.

To accommodate this range of views, this report recommends that Battle Force designers base any plans for naval platform architecture change on a steady state shipbuilding budget of $10 billion a year, plus or minus 20 percent, ***or a budget of no more than $8 to $12 billion a year.***[404] In comparison, the average expenditure on shipbuilding between 2000 and 2005 was $10.4

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[404] The $8 to $12 billion range includes the total amount of money dedicated to shipbuilding, including monies appropriated for Shipbuilding and Conversion, Navy (SCN), the National Sealift Defense Fund (NSDF), nuclear carrier Refueling and Complex Overhauls (RCOHs), and nuclear submarine Engineering and Refueling Overhauls (EROs). Mid-life upgrades such as cruiser modernizations are normally paid for out of the Other Procurement, Navy (OPN) account.

billion a year.[405] For every billion dollars that exceeds the top end of this range, the fiscal risk associated with planned modifications to the naval fleet platform architecture increases rather quickly, and will likely make the plan unexecutable.[406]

This range is somewhat lower than the annual shipbuilding costs associated with current DoN plans, and considerably lower than outside estimates of the same. In March 2005, the DoN provided an "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006." The report outlined two different future fleets. A "325-ship plan," generally assumed one crew per ship; a "260-ship plan," which assumed multiple crews per ship, allowing the "sea swap" of crews in forward theaters and a reduction in the total number of ships in the Battle Force.[407] DoN leaders estimated the costs to build the 260-ship and the 325-ship plan to be $12 and $15 billion a year, steady state, respectively (FY 05 dollars). In contrast, an independent cost analysis of the two plans by the Congressional Budget Office estimated the annual shipbuilding costs associated with the two plans to be $15 billion and $18 billion, respectively.[408] In other words, both DoN plans assume a much rosier economic future than this report.

This suggests the great challenge in designing a robust naval platform architecture on an average expected shipbuilding budget of no more than $8 to $12 billion a year. This challenge is especially difficult given the high costs for modern naval vessels. The FY 05 shipbuilding budget authorized $11 billion for eight ships (average: $1.375 billion per ship). For planning purposes, then, the notional "average ship equivalent" (including combatants, submarines, amphibious warships, and combat logistics force ships, but not aircraft carriers or "big beck" amphibious ships) costs about $1.4 billion in FY 05 constant dollars.[409] This high "average ship equivalent," or ASE, is the result of decades of cost growth in the development, design, and production of ships.[410]

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[405] Of that amount, $9.5 billion was spent on ship construction, the remainder on nuclear refuelings. See Geoff Fein, "Cost of Future Navy Fleet Billions More Than Navy Estimates, Report Finds," *Defense Daily*, May 2, 2005.

[406] Admiral Vern Clark, CNO, has endorsed the idea of planning to a steady state shipbuilding budget. See Admiral Clark, USN, Statement before the Senate Armed Service Committee, April 12, 2005.

[407] "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006." As mentioned earlier, good descriptions of these plans are found in Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[408] Michael Bruno, "Navy Cost-Cutting Efforts Note Enough, CBO Says," *Aerospace Daily and Defense Report*, April 27, 2005; and Fein, "Cost of Future Navy Fleet Billions More Than Navy Estimates, Report Finds."

[409] The FY 06 budget authorized approximately $6 billion for four ships (average: $1.5 billion per ship). An ASE of $1.4 billion in FY05 dollars therefore appears to be a good planning figure.

[410] Clark, Statement before the Senate Armed Service Committee, April 12, 2005. For a good discussion on ship growth from the industrial sector's perspective, see Adam B. Siegel, "Gauging the True Growth in U.S. Ship Costs," *Defense News*, 16 May 2005, p. 29.

Shipbuilding budgets that range from $8 to $12 billion support only 5.7 to 8.6 ASEs. Given that a ship's average expected service life (ESL) is roughly 35 years, steady-state shipbuilding budgets of $8-12 billion would result in a DoN Battle Force of only 200-300 ASEs over time. However, for every ship built that costs more than one ASE, the Battle Force will have fewer than 200-300 *actual ships*. With the average cost of every *Virginia*-class nuclear attack submarine now hovering around $2.4 billion (1.7 ASEs), the average cost of new DD(X) destroyers expected to come in at $2.1 billion *or higher* (1.5 ASEs), and follow-on CVN-21 aircraft carriers expected to cost at least $8 billion apiece (5.7 ASEs), the Battle Force seems destined for a steep decline below its current level of 287 ships.

***Barring an increase in shipbuilding budgets above the projected $8 to $12 billion range, the only way to arrest this inevitable decline is to hold the average cost of a ship to an ASE of $1.4 billion, or to drive it lower.***

## A Future Battle Force Planning and Sizing Metric

Figure four and future constrained budget forecasts suggest the need for a new force planning and sizing metric to guide the development of future Battle Force capabilities. The old metric of being able to defeat two, nearly simultaneous, major combat operations appears to be out of synch with the future competitive domain just described, and the DoN will likely be forced to free up *internal* resources if it hopes to make the changes necessary to prepare the Battle Force for future competitions.

In an ideal world, the force planning and sizing metric would be well known, having been promulgated by OSD. However, any changes to DoD metrics will not be known until the completion of the 2005 QDR. Therefore, this report must use a straw man, with full recognition that future adjustments may be required. Accordingly, based on a review of the full range of aforementioned potential future naval challenges, this report adopts what might be called a "1+1+1+1" force planning and sizing metric. That is, the Battle Force and National Fleet must be sized:

- To protect the homeland against a WMD attack;
- To fight a persistent war against an irregular naval opponent pursuing a strategy of *guerre de course*, and to support Joint campaigns and operations associated with a persistent, global war against radical extremists, terrorists, and the states that harbor them;
- To mass and defeat a *single* traditional/catastrophic or disruptive/catastrophic challenger in defended or contested littorals; and
- To hedge against a broader disruptive traditional naval competition with China.

Armed with a good understanding of where the Battle Force has come from, where it now stands in the global naval race, and where it needs to go in the future, DoN strategists and naval architecture designers must start to make serious preparations for the future racing competition. These preparations include making needed adjustments to DoN racing strategy and needed changes to Battle Force design criteria, accounting for and reducing Battle Force friction, and plotting changes to Battle Force course and speed. These adjustments and changes are the subject of the next chapter.

# VI. Race Prep

> In the nineteenth century the Admiralty learned the fine art of staying on top while working within budget. Even with Liberal governments eager to cut "waste" from the naval estimates, Britons were able to enjoy their maritime supremacy at an annual cost of less than a pound a head. The Admiralty's own self confidence grew from the knowledge that even if some other Great Power made a bid for naval rivalry, Britain…could…overmaster them.[411]
>
> Arthur Herman, *To Rule the Waves*

## Exploiting the Lead

The starting point for these preparations is the dominating lead that the Battle Force now enjoys in the global naval race. Even when faced with the prospect of a broader, disruptive maritime competition, this lead means that DoN planners need not make any hasty decisions. It may be true that metrics like aggregate fleet tonnage, number of VLS cells, and surface combatant rating systems may be more suited for judging the Battle Force against other navies, and less suited for judging the Battle Force's readiness for a future competitive domain centered on the littorals, against regional powers that have nuclear weapons, or against a disruptive naval challenger erecting high-end A2/AD networks. However, the same is true of any focused naval metric. After all, in the expected conditions of the Joint Expeditionary Era:

> Land-sea missile attacks have added to the already prevalent strikes by aircraft to and from the sea to blur the distinction between sea and land combat….Perhaps the navies of the world should no longer think "naval" tactics at all. It is more reasonable to think in terms of littoral tactics that include warships.[412]

As these words imply, the DoN Battle Force is merely one component of the larger Joint Multidimensional Battle Network. As such, it will never venture into a littoral fully on its own. Therefore, when making operational comparisons between the United States and a potential competitor, the power of the Joint Battle Network that can be brought to bear to help solve a naval challenge must also be factored in—and this additional shared power makes the great lead enjoyed by the DoN Battle Force to appear all the more daunting.[413] Moreover, as discussed in the previous chapter, many of the Garrison Era platforms so often disparaged as relics of the Cold War with the Soviet Union appear to be well suited for both future traditional/catastrophic

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[411] Herman, *To Rule the Waves*, pp. 449-50.

[412] Hughes, *Fleet Tactics and Coastal Combat*, p. 3.

[413] As one example, an Air Force JSTARS aircraft with an Affordable Moving Surface Target Engagement (AMSTE) capability can terminally guide seven J-series weapons (e.g., JDAMs) onto seven moving targets such as ships at sea. See Major General Dave Deptula, *Resultant Fury Post Mission Initial Debrief*, Pacific Air Forces, November 23, 2004.

maritime challenges as well as potential disruptive naval competitions. These platforms provide a strong core around which to structure the future Battle Force.

This does not mean that DoN planners can be overconfident. If history has proved anything, it is that in running the naval race, wariness is a great virtue. However, exploiting the Battle Force's great lead should be an integral part of their developing racing strategy. This is particularly important given the relatively modest shipbuilding budgets expected over the near- to mid-term.

A strategy that both exploits the DoN naval lead and accounts for limited future resource stream must be, by necessity, a relatively conservative, resource-conserving strategy—and one far different than the strategy for the Continental Era, when the Battle Force was disinclined to compete against the top naval powers; or the strategy for the First Expeditionary Era, when the Battle Force was stalking the naval leaders from behind, with every intention of taking the lead; or the strategy for the Garrison Era, when it aimed to maintain the lead even though pressed hard by a late challenger. The new strategy will require smart planning, patience, fiscal discipline, and continuous preparation for change—and preparedness to make bold moves *only when pressed or required to do so*. In other words, DoN planners should consciously seek to avoid changes to strategy or platform designs that prematurely alter the dynamics of the global naval race for no clear competitive gain.

## A Strategy of the Second Move

One likely response to the suggestion that the DoN adopt a more patient racing strategy is that it is too reactive, raises the likelihood of surprise, and risks the US naval lead, over time. However, when Britian was faced with a situation quite similar to the one faced by the United States today, the 19th century Royal Navy gradually developed a similar strategy that allowed it to "stay on top" for over 100 years while "working within budget." It did so by husbanding its strength for as long as possible, and patiently planning and executing a series of bold, competitive moves specifically designed to completely disorient and demoralize its competitors. How they went about doing this is quite instructive, and it informs the competition strategy and design changes recommended hereafter.

In 1815, England and its allies defeated Napoleon and Revolutionary France. In the process, the Royal Navy destroyed the fleet of France, its biggest naval rival, as well as those of its two next biggest naval competitors, Spain and Holland. Such was the level of English naval superiority that it could achieve its long-pursued "two-navy standard" with less than a dozen ships of the line anchored in home waters, and an additional nine battleships scattered around the globe. As a result, the mighty Royal Navy shrank precipitously. Between 1815 and 1817, the number of ships of the line in commission shrank from 99 to 13. Many of the decommissioned ships were laid up in reserve, while many others were decommissioned and stricken.[414]

[414] Herman, *To Rule the Waves*, p. 424.

England's decisive victory, much like the US Garrison Era/Cold War "victory" over the Soviet Empire and its global navy, triggered a shift to a new British national security policy era—now referred to as the *Pax Britannia*. With no credible naval challenger or group of challengers on the horizon, and with the "sea as Empire base," England and the Royal Navy changed their basic naval competition strategy. This strategy was not completely thought out in 1815, nor made explicit in any "vision document." However, with the benefit of hindsight, the practical result of British actions was a "Strategy of the Second Move."[415]

The Strategy of the Second Move rested on five pillars: keeping ships that were "good enough" for as long as possible; keeping a wary eye on the most dangerous potential naval competitors—initially France, the United States, and Russia, and later Japan—to warn Royal Navy strategists of any emerging, determined challenge to their naval supremacy; incorporating new advances in naval technology that threatened the Royal Navy's tactical dominance only when necessary; exploiting naval alliances to offset potential competition costs; and preparing plans to quash any resurgence in the naval competition by instigating *advantageous disruptive change*.

The strategy required equal parts patience and aggressiveness. For example, it was not until 1824 that another navy—in this case, the French Navy—started to experiment with explosive shells. However, once they did, the Royal Navy quickly followed suit, making them the standard ordnance in all their battleships by 1838. Similarly, in 1840, although there were 720 seagoing steam-powered ships in the British merchant fleet, the British line of battle and its large reserve fleet had not a single one. The battle line consisted primarily of sail-powered, 74-gun battleships, based on a basic design adopted in 1760. It was not until both the French and American navies appeared ready to shift to steam-powered ships that the Royal Navy made a move toward steam-powered ships. But when it did, it moved decisively. It commissioned its first steam-powered battleship in 1845. Four years after that, it commissioned its first steam-powered, screw propeller battleship. By the time of the Crimean War in 1856, all of its best ships were powered by steam and were equipped with screw propellers.[416]

Although not an explicit part of the Strategy of the Second Move, a key decision made by the British Crown was to have an important supporting effect on the strategy. Soon after France's defeat, England turned its attention to the confronting the greatest transnational threat of the day: human slave trading. In effect, England declared "a global war on slavery," and particularly the slavers and the states that harbored them. This irregular war turned into a generational commitment for the Royal Navy:

> …at any given point for the next forty years, some twenty or so Royal Navy vessels would be on patrol along the Atlantic coast of Africa, trying to stop the trade in human cargo…on which the Atlantic economies had been built. Ending the trade would be the first real test of

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[415] The term "Strategy of the Second Move" was coined by Dr. Andrew F. Krepinevich, the Executive Director of the Center for Strategic and Budgetary Assessments. A noted expert on defense transformation, he developed this term after an intensive study of the "*Dreadnought* Revolution."

[416] Herman, *To Rule the Waves,* p. 428.

> the Royal Navy in the new world order, the first test of its transition from the world's dominant military force to world policeman.[417]

Importantly, however, this irregular wartime patrol function required a much different type of ship than the ponderous first- and second-rates that populated the line of battle for fleet-on-fleet combat. The "war on slavery" demanded that the Royal Navy build smaller, cheaper ships. The building of these small combatants allowed the Royal Navy to maintain their naval design expertise without breaking the budget or disrupting the Strategy of the Second Move. Moreover, these more numerous smaller ships, operating independently for long periods of time against a wily, cunning adversary, provided the practical school that taught an entire generation of naval officers invaluable tactical decision-making skills.[418]

This complementary national security and naval competition strategy proved to be both thrifty and successful for four decades. The fleet displayed at the 1856 St George's Day naval review had no equal in the global naval competition, despite relatively modest national expenditures over the previous four decades. However, what made the strategy even more effective was the willingness of the Royal Navy to make a bold "big move" when necessary, and the economic strength to bankroll it.

In the estimation of Royal Navy planners, the first time to do so was after the Crimean War, when the confluence of many new naval technologies—long range guns with explosive shells, steam propulsion plants, screw propellers, and finally, iron clad *wooden ships*—threatened to disrupt the global competition and the Royal Navy's tactical dominance. Thus, in 1860, the Royal Navy stunned the growing field of naval powers by introducing the HMS *Warrior.* The *Warrior* upended the combatant design regime and rendered all previous ships obsolete. She was the world's first iron-hulled warship; with a displacement of over 9,000 tons, she was armed with 44 big guns, could steam at 14.5 knots (making her the fastest warship in the world), and was impervious to the exploding shells then in service.[419] No combination of wooden sailing ships could hope to defeat her. As a result, building plans in foreign navies were thrown into chaos as their designers struggled to adjust to the *Warrior's* new design.

However, adjust they did: the appearance of the *Warrior* sparked a period of rapid change in ship designs as a result of competitive move and countermove among a number of naval powers jostling for position behind the Royal Navy—including the United States, Germany, Japan, France, and Russia. As a result, the next four decades of the competition required that the Royal Navy be even more nimble. It began to build large numbers of ship *classes* composed of relatively small numbers of ships. Using the terminology of today, these small classes represented the "spiral development" of surface combatants, and each introduced new hull and combat system "baselines" in the fleet. Then, at the point it became clear that the resulting large

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[417] Herman, *To Rule the Waves,* p. 419.

[418] Herman, *To Rule the Waves*, p. 420.

[419] Herman, *To Rule the Waves*, pp. 452-53.

number of ship classes was imposing too high a cost in terms of fleet "operations and support costs," and that the Royal Navy could not hope to outbuild all of its potential opponents, it set out to fundamentally alter the nature of the competition once again.

First, England lowered the competition bar by entering into alliances with potential naval rivals. The first alliance came in 1902, when Britain and Japan agreed to a naval alliance that obligated the nations to remain neutral if one of them went to war. More importantly, the alliance also stipulated that if a second power, or several others, united in warfare against any one of them, the other was obligated to come to its aid, engage in war, and make peace in total agreement with the other.[420] Then, in 1904, it signed the Entente Cordiale with France, ending an adversarial confrontation that extended back centuries, and simultaneously negating Russia—an ally of France—as a serious threat.[421] Finally, England ceded Western Hemispheric hegemony to the United States, and the Royal Navy moved, however reluctantly, to increase naval cooperation and collaboration with the US Navy.[422]

Second, the Royal Navy commissioned the design regime-disrupting HMS *Dreadnought,* and quickly followed it with an entirely new class of battle cruisers. It also introduced the idea of defending the British Isles with flotillas of destroyers and submarines. While these moves did not stop its rivals from once again shifting gears and moving to keep up, they imposed high strategic costs on all of England's naval competitors.[423] The combination of lowering the competition bar through naval alliances and the introduction of these regime disruptive designs allowed England to concentrate its efforts on forestalling the challenge by a single competitor—Imperial Germany—and to maintain its lead over that nation in the global naval race.

Whether enjoying the luxury of a competitive lull or forced to respond more quickly to technical competitive change, by shrewdly biding its time before making a big move, the Royal Navy was able to retain the initiative in the global naval race, to trigger disruptions in the competition to its own advantage, and to "stay on top" while working within budget. Far from being "reactive," the British approach is much better described as being "anticipatory," and using well–timed disruptive change as an integral part of its naval competition strategy.

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[420] See "Britain and Japan Conclude a Naval Alliance, 1902," at http://campus.northpark.edu/history/ WebChron/ World/BritainJapan.CP.html.

[421] Of course, the destruction of the Russian Fleet in the Russo-Sino War of 1904-05 removed the Russian Navy as a threat for the next several decades.

[422] Herman, *To Rule the Waves,* pp. 481-491.

[423] Hone, "Divining China's Course," pp. 54-55.

## A STRATEGY OF THE SECOND MOVE FOR THE JOINT EXPEDITIONARY ERA

The strategic conditions that spurred the British to adopt a Strategy of the Second Move appear roughly similar to expected racing conditions in the early decades of the Joint Expeditionary Era. In this era, DoN Battle Force planners, like those in the British Admiralty before them, believe that they have a duty to take and keep the lead in the global maritime competition. They, too, enjoy an unprecedented lead in the global naval competition, allowing them to consider the "sea as Joint base," and giving Joint and DoN Battle Forces a tremendous advantage in maneuver at the strategic, operational, and tactical levels of war. They, too, are faced with three plausible future naval competitors, with a resurgent Russia replacing England's France; India—a rising democracy—replacing England's America; and China, a rising world power, replacing England's Germany.[424] Finally, like the 19th century Royal Navy, the National/DoN Battle Force is faced with the prospect of fighting a "generational war" against a transnational irregular maritime threat while hedging against future nation state competitors.

As in the 19th century, two key factors also suggest the need for a conservative, resource-preserving, hedging naval competition strategy—one positive, one not so positive. On the positive side, the Battle Force counts many ships that are more than "good enough" for any near- to mid-term challenge—its aircraft carriers, submarines, and surface combatants are the best of their types in the world. On the not so positive side, expected naval budgets will constrain the flexibility of planners and architecture designers. A contemporary Strategy of the Second Move thus appears to have some merit.

A contemporary Strategy of the Second Move would similarly develop a larger, relatively inexpensive fleet of small combatants and other platforms necessary to fight the global war against irregular maritime competitors; retain a core battle fleet with ships that are good enough for dissuading some would-be adversaries and decisively defeating traditional adversaries—even those armed with WMD; work to quickly incorporate advances in naval technology that threaten the Battle Force's tactical dominance; and, to hedge against any potential disruptive naval challenges, patiently prepare to introduce disruptive change of its own, at a time to gain maximum competitive impact.

However, a contemporary Strategy of the Second Move would be marked by at least three important differences. First, the range of potential littoral access conditions is far broader and more stressing than those faced by the 19th century Royal Navy. Guided missiles change the calculus of operations in the narrow seas, by vastly extending the range over which a coastal power can influence naval operations. Moreover, having to account for weapons of mass destruction was not a threat that troubled the Royal Navy. A Strategy of the Second Move in the Joint Expeditionary Era would require that its associated platform architecture be designed to

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[424] As indicated, this is an imperfect analogy, intended only to portray the full range of potential contemporary naval challengers to the US. It is by no means certain that a rising China will be as aggressive as was a rising Germany, or if it will mount a symmetrical challenge to US naval supremacy.

adjust rapidly to changing littoral access conditions, and to the broader variety of threats found therein.

Second, during the intense naval technical competition in the latter part of the 19th century, rapid changes in weaponry, hull forms, means of propulsion, and even types of fuel meant that ship classes were often obsolete as soon as they were launched. As a result, constant ship redesigns were required, and new classes of ships appeared frequently. Now, the key naval technical competition is in information systems, combat systems, and guided weapons. Given the expected resource constraints and the new nature of the naval technical competition, a contemporary Strategy of the Second Move will require an associated Battle Force architecture that is able to adapt new weapons and sensors more rapidly than its potential adversaries—*without needing to design entire new classes of ships*.

Finally, the contemporary strategy has to account for a key handicap not faced by the Royal Navy. Unlike 19th century England, the United States does not have the largest merchant and commercial shipbuilding industry in the world. Indeed, it is generally non-competitive in commercial shipbuilding. Today, the construction of US warships is a specialized business focused on one customer: the US Navy. Therefore, the United States does not have the option to stop building complex warships for a decade of two, secure in the knowledge that in the face of a concerted naval challenge that it could quickly shift merchant production over to warships. Any moves that depress warship construction and shed shipbuilding capacity will have far more consequential effects on the DoN's future ability to respond to a concerted naval challenge.

As a result, maintaining a competitive ship design and industrial base issue will be much more taxing problem for DoN strategists than it was for 19th century Admiralty planners. It will likely require the DoN to expend some of its limited resources on the maintenance of a viable design and production base with an immediate surge capacity, even if the fleet need not be immediately expanded in numbers. In other words, even though the United States does not now need a much larger fleet, it needs to continue building warships in order to retain a competitive industrial base.

In combination, these three differences illustrate the key link between competition strategy and the naval fleet platform architecture; one does not make sense without the other. Therefore, should DoN planners adopt a Strategy of the Second Move, one would expect to see important changes in Battle Force design philosophy and attributes, training, and operational style.

# A NAVAL PLATFORM ARCHITECTURE BUILT FOR RAPID ADAPTABILITY

> We have learned to our regret, that while you are certainly the better for preparing, the war you prepare for is rarely the war you get…Try as hard as you can to be ready for it but be willing to adapt and improvise when it turns out to be a different battle than the one you expected, because adaptability is where victory will be found.[425]
>
> Lieutenant General Victor H. Krulak, USMC

A strategy of anticipatory, advantageous, disruptive change will require a Battle Force that can constantly adapt to the evolving competition—one that can stay on top for as long as possible before forcing DoN planners to "order flank speed." Adopting a Strategy of the Second Move in the Joint Expeditionary Era will therefore require a Battle Force architecture specifically designed for *adaptability*—one able to rapidly adjust to different racing conditions and confidently confront a wide range of maritime challengers. It will also require an adaptable and efficient industrial base capable of immediate surge in the face of an unexpected threat. Indeed, the two requirements are inextricably linked. If faced with an *unexpected* concerted naval challenge, a Battle Force architecture capable of adapting to new racing conditions and different naval challengers would help the DoN to operate effectively during the time necessary to make a needed expansion to the naval industrial base.

The problem, of course, is that the range of required capabilities needed to respond to all potential operational challenges will severely stress any single Battle Force design, no matter how adaptable it might be. Consider Figure Five, which superimposes Battle Force required capabilities for each of the three challenge and access combinations that best describe the future maritime competitive domain. Battle Force operations against irregular/catastrophic challengers in unimpeded and guarded access scenarios will see an asymmetrical competition that pits Battle Force and Joint Multidimensional Battle Networks against distributed, cellular, and primarily land-based irregular networks. The competition will be global in scope, requiring an architecture with persistent and widely distributed ISR and forward forces capable of attacking fleeting targets. Hot pursuit of irregular/catastrophic adversaries will require man-hunting, discrete attacks with minimal collateral damage, counter-sanctuary and counter-WMD operations in difficult terrain and urban areas, and determined work to build up partner nation capacities on both land and sea. Given the human dimensions of this conflict, these operations will rely on manned systems and units, backed up by unmanned systems. These manned systems and units will include both Joint special operations and conventional combined arms forces.

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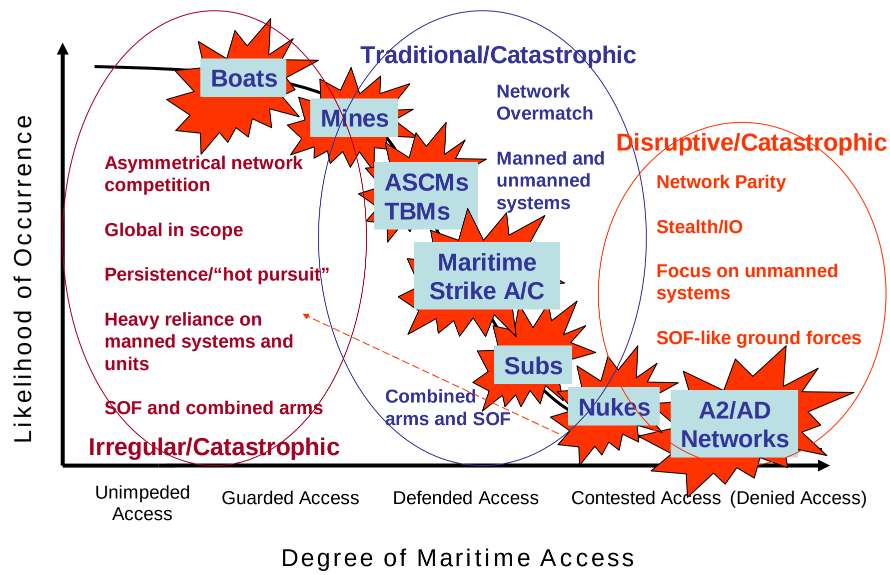
[425] Lieutenant General Victor H. Krulak, USMC, as cited in Captain Tim Feist, USMC, "Transformation Has Limits," *Proceedings*, April 2005, p. 68.

**Figure Five: Challenge/Access Requirements**




In contrast, operations against a traditional adversary in littorals defended by nuclear weapons will likely involve Battle Force surge and concentration operations, and can likely count on a continued network overmatch in the conventional Guided Weapons Warfare Regime. These operations will require forces designed to overcome conventional maritime defenses with a variety of manned and unmanned systems, supported by both Joint combined arms and special operations forces. However, due to the presence of nuclear weapons, Battle Force operations will by necessity be more dispersed, and rely on special tactics and operational approaches.

Operations against an opponent with a hardened, redundant, maritime anti-access/area denial network, and who enjoys rough parity with the United States in terms of ISR, guided weapons, and multidimensional effects, will require concerted Battle Force counter-network operations and suppression of enemy littoral defenses. These counter-network operations will likely rely heavily on information operations (IO); stealthy, extended range systems; and large numbers of unmanned systems. During these early counter-network operations, the only ground forces involved would likely be Joint SOF forces and "SOF-like" conventional forces capable of executing stealthy and/or widely distributed operations.

Figure Five also explicitly and implicitly suggests some additional required capabilities. Note that the potential for WMD use in any of the three basic challenger/access scenarios calls for credible nuclear deterrent or response capabilities designed to deter regional powers from using nuclear weapons. Moreover, the above depiction deals only with naval challenges in the littorals. This implies that the Battle Force must also retain capabilities to dissuade any new challenge on the open oceans.

As this discussion suggests, designing any single platform architecture equally capable in all required missions or scenarios will be a tall order. One way to approach the problem would be to design distinctly different component "fleets," each optimized for a specific challenger/access combination or operational purpose. This approach might suggest the development of a naval platform architecture composed of four component fleets:

- A *Strategic Deterrent/Dissuasion Fleet*, designed to deter state-sponsored WMD attacks against US and allied territory or against Joint and combined forces operating overseas, and to dissuade a would-be disruptive maritime adversary from mounting an open-ocean challenge against the DoN Battle Force;

- A *National Global Patrol/Irregular Warfare/Homeland Defense Fleet* focused on confronting and defeating irregular and irregular/catastrophic maritime opponents (i.e., irregular opponents with access to nuclear weapons) in unimpeded and guarded access scenarios;

- A *"Sea as Base" Power-Projection Fleet*, focused on overcoming nuclear-armed regional adversaries in defended access conditions;[426] and

- A *Counter-A2/AD Fleet*, designed to overcome disruptive naval competitors capable of contesting US Battle Force operations in regional waters under conditions of battle network parity.

While designing four different component fleets might lead to improved Battle Force adaptability, because of the obvious duplications and inefficiencies, it is unlikely DoN force designers would pursue this option even in an unconstrained budget environment. On a budget of $8 to $12 billion a year, this approach is completely off the table. Therefore, DoN planners need to think about how to design a single integrated naval platform architecture adaptable enough to accomplish all missions associated with these four of different component fleets.

One of the most important characteristics for future Battle Force components will therefore be *operational fungibility*. That is to say, the most attractive network platforms will be those capable of performing important functions associated with each component fleet, and under all access conditions. While some Battle Force missions undoubtedly will continue to call for special-purpose platforms, fungible Battle Force platforms—useful across many different fleet missions—should dominate the DoN's 21st century naval platform architecture. Some platforms will be inherently fungible by virtue of their *multi-mission* designs. A nuclear-powered attack submarine comes immediately to mind. However, other platforms can be made more fungible by designing in different degrees of *platform reconfigurability*.

Individually reconfigurable and fungible Battle Force components will help make the future naval fleet platform architecture rapidly adaptable. This is a necessary first step, but not the only

[426] Conceiving of the "sea as base" is a conceptual distinction fully explored in this report's later chapters.

one. Together, the components must be able to mesh together and to operate as a cohesive system, sharing and exchanging information, and coordinating their operations. Moreover, in order to leverage fully Joint capabilities and effects and to contribute fully to Joint power-projection operations, these integrated Battle Force systems must be able to slot seamlessly into Joint Multidimensional Battle Networks. In other words, the future Battle Force architecture must itself be designed from the ground up to form Jointly interoperable, "effects-based" ***Naval Battle Networks***.

## BATTLE NETWORK DESIGN IMPERATIVES

The move toward adaptable, Jointly interoperable, and effects-based Naval Battle Networks should have a profound effect on the DoN Battle Force design and operations:

> The shift toward effects-based operations is both facilitated by and predicated on network-enabled [Joint] capabilities that challenge traditional naval ways of doing things and some ancient naval expectations about operational independence and freedom of maneuver.[427]

Indeed, a naval fleet platform architecture designed to form Jointly interoperable Naval Battle Networks should have far different design imperatives than those associated with the platform-based architectures characteristic of the Frigate, Battleship, and Carrier Eras These battle network design imperatives can be described as:[428]

***Get Connected, Jointly.*** This is design goal one in the Joint Expeditionary Era: to link overlapping sensor grids, command and control grids, engagement grids, and maneuver units through numerous man-to-machine and machine-to-machine links and interfaces to form a single warfighting entity—a "ForceNet," or Naval Battle Network.[429] The Naval Battle Networks, in turn, must be interoperable and compatible with larger Joint Multidimensional Battle Networks.[430] Platforms that are not connected to the network, that cannot share their own data, and that are unaware of data from the network will not be able to adapt easily to unfolding situations.[431] The intent of connecting every platform and forming Jointly interoperable Battle

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[427] Till, "Navies and the New World Order," p. 62.

[428] These design characteristics are informed and derived by those developed and articulated by the US submarine community in the late 1990s.

[429] See Zelbor, US Navy, 'FORCEnet' is Navy's Future;" and Vice Admirals Richard W. Mayo and John Nathman, USN, "ForceNet: Turning Information Into Power," *Proceedings*, February 2003, found at http://www.usni.org/ Proceedings/Articles03/ PROmayo02.

[430] Peter A Buxbaum, "Making C2 Work as One," *Armed Force Journal*, August 2005, pp. 36-38; Vice Admiral Richard W. Mayo, USN, "Spinning the Web," *Seapower*, April 2003, pp. 61-63; and Rear Admiral Charles L. Munns, USN, "The Big Network Could Save Your Life," *Proceedings*, September 2004, pp. 56-58.

[431] For the importance of networked operations in naval warfare, see Norman Friedman, "They Link it Together," *Naval Forces*, No. III, 2005, pp. 42.

Networks is to make every component—and the aggregate network—both “smarter” and “quicker” (as will be discussed in more detail shortly), and to allow them to “self synchronize.”[432]

***Get Modular.*** In the expected budget climate, the only possible way for future Naval Battle Networks to adapt rapidly to all potential challenges and access conditions is if they emphasize modular network components: modular platforms, modular weapon systems, modular systems, modular open system architectures, and modular maneuver units. Accordingly, the “thinking behind the reliance on modular design extends to the Navy’s highest-profile surface warfare and undersea system programs.”[433] Modularity will be the key to both component fungibility and network adaptability, which will allow future naval commanders to readily reconfigure future Naval Battle Networks based on the challenge (threat and mission) and access conditions.

***Get Off-board.*** Getting more and more sensors and systems off-board Battle Network platforms is an extension of “getting modular.” Modular, off-board systems and payloads expand the sensing and engagement envelopes around each individual network component, making them individually more effective, and in the process extending the total sensor volume and engagement range of Naval Battle Networks under all access and threat conditions. Increasing reliance on off-board systems will also help to decouple to the greatest degree possible combat systems and payloads from individual Battle Network platforms.

***Get Unmanned***. The ever-increasing costs of the all volunteer force will require that Battle Network planners reduce platform crew and unit size whenever possible, and exploit unmanned systems in the air, on and under the ocean’s surface, and on the ground whenever appropriate. As a result, Future Naval Battle Networks will be made up of heterogeneous combinations of crewed platforms and unmanned systems. As unmanned systems grow in capability and autonomy, the ratio of unmanned to manned battle network components is likely to rise, which should allow Battle Network designers to increase continually and affordably the number of network “nodes.” Although unmanned systems will play important roles under all access conditions, they will be especially vital during well-defended or contested access race conditions.[434]

***Get Payload***. Payload has always been an important design criterion in building naval fleet platform architectures, and it will be no different for one constructed to form modular Naval Battle Networks. However, in the new Battle Force Era, getting payload has implications for

[432] “Self-synchronization” is an important part of thinking about networked warfare. See Cebrowski and Garstka, “Network-Centric Warfare: Its Origin and Future.” The idea of thoroughly linking the Battle Force within Joint architectures is now an accepted goal of all DoN communities. See for example Sandra I. Erwin, “Naval Aviation: Lessons From the War,” *National Defense,* June 2002, p. 16.

[433] Ed Walsh, “Modular Design Guides Work on New Surface Systems,” *Proceedings,* April 2004, p. 89.

[434] See for example Michael Fabey and Martin Aguera, “UAVs are the Future of Warfare, Say Execs,” *Defense News,* June 20, 2005, p. 16; Richard Scott, “Nobody at the Helm,” *Jane’s Defence Weekly*, August 4, 2004, pp. 26-29; and Glen W. Goodman Jr., “Undersea War-fighting Drones,” *Defense News*, May 30, 2005, p. 22.

both the aggregate network as well as its individual components. At the aggregate level, increasing network payload indicates increasing combat power. It is measured by such metrics as the number of targets that can be hit per day; total number of VLS cells; total number of unmanned systems carried; and other observable metrics. At the component level, the design criteria of getting modular, getting offboard, and getting unmanned means that the best network platforms will likely resemble pick-up trucks, with great volume and great carrying capacity. And like pick-up trucks, platforms will deliver different value by hauling different payloads, depending on the mission. The ability of network components to change payloads quickly will depend on common chassis-payload interfaces and interface standards.

## BATTLE NETWORK OPERATIONAL IMPERATIVES

The five foregoing design imperatives apply mainly to Battle Network *architectures*. They need to be accompanied by at least five additional and complementary operational imperatives: thoroughly integrating the nation's complete set of maritime capabilities; changing Battle Network training to reflect the new architectural and operational styles; exploiting the new Battle Network architecture by practicing more aggressive distributed operations; working to tap into potential allied maritime capabilities; and configuring the nation's R&D and industrial base to support a Strategy of the Second Move. Pursuing the TFBN's five network architecture design imperatives without pursuing these operational requirements will result in sub-optimal Battle Network performance in the near-term, and frustrate Battle Force transformation plans over the longer term.

The following sections dicuss these five operational imperatives in greater detail.

### Get Integrated

In the Joint Expeditionary Era, TFBN planners must aim to get the best out of all the nation's maritime services. Given the expected budget climate as well as the wide range of expected challenges, the only reasonable approach is to develop a ***National Fleet Battle Network*** that thoroughly integrates Navy, Marine Corps, and Coast Guard capabilities.

The design imperative to *Get Integrated* is not a trivial one. As has been discussed, the operational ties between the Navy and Marine Corps grew progressively weaker over the Garrison Era, ending with an institutional divorce. Since the start of the Joint Expeditionary Era, the two services have started to move together in fits and starts, but their continued inability to form a common view of the future remains one of the greatest sources of Battle Force friction. Indeed, there are some that believe the world views of the services are permanently irreconcilable, and that the two—and the nation—would be better served by their pursuing separate futures. This might take the form of the Marine Corps becoming more closely aligned with the US Special Operations Command, and its units more "SOF-like" in their capabilities;[435] or the Navy developing more "Naval Expeditionary Combat Battalions."

A different, better approach therefore would be for Navy and Marine Corps leaders to recognize that many of the reasons that led to differences between the two services in the Garrison Era no longer pertain. Given the expected challenges ahead, there seems little doubt that the Joint Expeditionary Era will see a resurgence in the requirement for sea-based fire *and* maneuver. As a result, Navy and Marine leaders would do well to build upon initiatives like the aforementioned Tac-Air Integration Plan and the formation of integrated Expeditionary Strike Groups to return to the operational excellence that marked DoN Battle Force operations in the Continental and First Expeditionary Eras. *Battle Force* support of the special operations forces is well within the capabilities of a reinvigorated and integrated Navy-Marine Corps team, and support of all naval infantry requirements is well with the capabilities of the Marine Corps.

Similarly, building a true National Fleet Battle Network will require DoN planners to leverage and incorporate, to the greatest degree possible, the maritime contributions of the "Fifth Service," the US Coast Guard. As explained by Colin S. Gray:

> The national-defense mission of the US Coast Guard is not a bonus, or an add-on, to an essentially civilian character. The Coast Guard is, and has always been, a military service.[436]

Indeed, the Coast Guard is the tenth largest naval force in the world, by tonnage.[437] The DoN can afford neither to ignore nor to duplicate Coast Guard capabilities.[438]

There are two evident implications of increased Navy and Coast Guard collaboration and integration. The first is the requirement to develop consistent, compatible, and interoperable National Fleet Battle Network standards, modular payloads, and payload interfaces. A second is that the current TSBF platform counting convention—an artifact of a bygone national security policy era and a different naval competitive environment—should be changed. Future Battle Network ship counting metrics must include in some way both US Navy *and* US Coast Guard assets.

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[435] Bradley Graham, "Larger Special Operations Role Being Urged on Marines," *The Washington Post*, May 8, 2005, p. A7; and John G. Roos, "2,500 Marines to SOCOM," *Armed Forces Journal*, July 2005, p. 4. The Secretary of Defense recently approved the assignment of 2,500 Marines to the Special Operations Command.

[436] Colin S. Gray, "A Coast Guard for the Future: American's Maritime Guardian," *Comparative Strategy* 18, no. 2, April-June 1999.

[437] Stubbs, "The Coast Guard-Navy Relationship Still Makes Sense," p. 61.

[438] This type of thinking is implicit in Bruce B. Stubbs, "Smarter Security from Smaller Budgets: Shaping Tomorrow's Navy and Coast Guard Maritime Security Capabilities," Heritage Foundation Lecture, April 27, 2005.

## Get Quick

It is increasingly taken as a matter of faith that Integrated Battle Networks built to the five design criteria outlined above will be able to easily defeat a non-networked force. The thinking is that because all network components will have the ability to share data quickly and pass decisions, a networked *force* should enjoy better shared sensing and battlespace awareness, better collaborative planning, and a better understanding of a commander's intent than a non-networked force.[439] Such advantages should give a networked force a relative advantage in its "ability to pick and choose engagements opportunities," in its "transient performance in operations and tactical encounters," or in its ability to change plans, directions, focus of effort, maneuver, speed, altitude, or position faster than an enemy.[440] Whether described as having higher "speeds of command," or operating at a "faster tempo" or "battle rhythm" than an enemy, networked forces are assumed capable of consistently gaining informational, temporal, and positional advantages over a non-networked enemy.[441]

In this view of the world, the ideas of "speed of command" and platform speed are often conflated, leading some to argue for increased platform speeds for speed's sake. However, simply forming networks, having modular, reconfigurable network components, and having fast platforms will not, in and of themselves, ensure that future Naval Battle Networks will prevail against all possible opponents.[442] Far more important will be men and women who are part of, operate, guide, and fight the Battle Networks in head-to-head competition. To get the most out of future adaptable and "reconfigurable" Naval Battle Networks, the DoN will need to select and train men and women who are "quick" in mind and action.

All too often, the importance of Battle Network *quickness*, and its critical human dimension, is obscured by references to new "rule sets" and technical emphasis on network or platform speeds. However, training a force to be quick is far different and more important than simply buying platforms with high speed, although they may indirectly contribute to force quickness.[443] As explained by German General Gunther Blumentritt, the intent of being quick is to dominate the dimension of time—to operate one step ahead of one's adversary. In his words, "The entire operational and tactical…method hinged upon…*rapid,* concise assessment of situations…*quick*

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[439] See for example Norman Polmar, "Composing Command and Control," *Proceedings,* February 2005, p. 89.

[440] Grant T. Hammond, *The Mind of War: John Boyd and American Security* (Washington, DC: Smithsonian Books, 2001), p. 128.

[441] "Speed of command" is most often associated with network centric warfare theorists. See for example Cebrowski and Garstka, "Network-Centric Warfare: Its Origins and Future." Operating at a faster tempo than the enemy is the term favored by maneuver warfare theory. See for example the comments made by William S. Lind, *Maneuver Warfare Handbook*, as cited in Hammond, *The Mind of War: John Boyd and American Security,* p. 136.

[442] See for example Dr. Milan Vego, "Net-Centric is Not Decisive," *Proceedings*, January 2003, pp. 52-57.

[443] See Captain James Patton, "Speed is Not Necessarily Transformational," *Proceedings,* January 2005, p. 74.

decisions and *quick* execution, on the principle: each minute ahead of the enemy is an advantage" (emphasis in the original).[444]

Note that in General Blumentritt view two of the three requirements to achieve force quickness—rapid assessments of the situation and quick decisions—reside in the human and not the technical domain of a platform, force, or network. Quick assessments depend as much on a commander's skill in *understanding* the meaning of sometimes imperfect or incomplete information as they do on the level of shared awareness or collaborative planning. In other words, understanding is far more important than the sheer rapidity of the decision cycle, since solving the wrong problem more quickly will seldom be helpful. Similarly, the willingness of a commander to make quick decisions in the midst of rapidly unfolding events is often more important than quickly executing what was collaboratively planned and decided upon.[445]

In other words, to paraphrase a favorite Marine saying, Battle Force planners must plan to "network the man," not "man the network." Because of the differences in cognitive processing among servicemembers, and because of the differences in their willingness and ability to make decisions under stress, there will always be different interpretations of data and different decision timelines throughout all levels of any given military force—networked or not. Failing to identify those capable of making rapid, accurate assessments and decisions under conditions of great uncertainty, and failing to reward individual initiative and action even in the absence of orders, will undermine the great potential power of any warfighting force. Said another way, no matter how networked a force, if it is operated by timid or cautious commanders, it can be beaten by a non-networked force populated with bold and capable commanders.

So, while improving platform or data transfer speeds is certainly important, having capable men and women trained to operate under conditions of stress and uncertainty will be the key to ensuring that future Naval Battle Networks will have the agility to respond quickly to unfolding events, and to "turn inside" their opponent.[446] Indeed, distributed, persistent, quick-scanning sensors would appear to be a far more important network requirement than platform speed, since they would likely facilitate better scouting, lead to more rapid perceptions of change, and more rapid and accurate assessments of the situation. In other words, pursuing higher platform speeds for speed's sake at the expense of improving sensors and training for rapid assessments, decision making, and action is a bad institutional strategy.

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[444] General Gunther Blumentritt, German Army, as cited in Hammond, *The Mind of War: John Boyd and American Security*, p. 142.

[445] This point was repeatedly underscored by military strategist John Boyd, who believed that the technological aspects of "speed of command" were far less important than the human dimension. See Hammond, *The Mind of War: John Boyd and American Security*, Chapters 8 and 9.

[446] Patton, "Speed is Not Necessarily Transformational."

## Get Distributed

Men and women that can quickly assess and adapt to changing situations, operating scalable, tightly connected, modular, and integrated Maritime Battle Networks with reconfigurable payloads including manned and unmanned systems, will facilitate the Battle Force racing "style" called for in the Joint Expeditionary Era. This operational style can be characterized by a consistent requirement for *distributed operations.*

Distributed operations are by no means unique to the Joint Expeditionary Era. Recall that distributed squadron operations was the preferred operational pattern during the Continental/Frigate Era, when the Battle Force distributed its units among forward stations to provide the greatest global coverage with the smallest number of ships. Similarly, distributed "combat credible forces" were the hallmark of the Garrison/Carrier Era. Indeed, in hindsight, the concentrated operations that characterized the Expeditionary/Battleship Era were a striking anomaly; distributed operations have marked the preferred Battle Force racing style for over 200 years.

While not unique to the Joint Expeditionary Era, however, the ability to conduct distributed operations will be required for all expected future Battle Force and national Fleet challenges. For example, for many irregular challenges and challengers, the Battle Force will be compelled to distribute for *offensive purposes.* As explained by B.H. Liddell Hart:

> Guerrilla war, too, inverts one of the main principles of orthodox war, the principle of concentration—and on both sides. Dispersion is an essential condition of survival and success on the guerrilla side, which must never present a target and thus can operate only in minute particles, though these may momentarily coagulate like globules of quicksilver to overwhelm some weakly guarded objective…*Dispersion is also a necessity on the side opposed to the guerrillas since there is no value in a narrow concentration of force against such elusive forces, nimble as mosquitoes* (emphasis added).[447]

Liddell Hart also explains the requirement for distributed operations for *defensive purposes* when operating against potential nuclear-armed regional adversaries:

> For guerrillas the principle of concentration has to be replaced by that of 'fluidity of force,' which will also have to be adopted and modified by regular forces when operating under a liability of bombardment by nuclear weapons.[448]

Finally, when faced by a disruptive challenger, distributed operations will be required for both offensive *and* defensive operations. Under conditions of battle force or network "parity," the requirement that a force be able to disperse, mass, and disperse has been long recognized by naval strategists both old and new. In the words of Sir Julian Corbett:

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[447] B.H. Liddell Hart, *Strategy* (New York, NY: Meridan, 1991), second revised edition, pp. 365-366.

[448] Liddell Hart, *Strategy*, p. 365.

> When once the mass is formed, concealment and flexibility are at an end. The less we are committed to any particular mass, and the less we indicate what and where our mass is to be, the more formidable our concentration. To concentration, therefore, the idea of a division is as essential as the idea of connection.[449]

Both the Navy and Marines Corps are beginning to emphasize distributed operations. The Global ConOps Navy embodied the notion of distributing US naval firepower globally by operating greater numbers of smaller, independent strike groups.[450] However, echoing Sir Julian Corbett, CNO Admiral Vern Clark explicitly outlined a broader goal for a distributed Navy, when he said:

> We have to be able to rapidly reposition and maneuver in a distributed force concept. That will make it very difficult for an…enemy to get the information needed to strike us or to be able to afford the technology to counter us…It is absolutely foolish for us to put our assets together in large force sets that make it easy for an enemy to take us on.[451]

Similarly, the Marines are also pursuing more distributed operations, which they define as "netted units physically dispersed and operating over an extended battle space."[452] Like Admiral Clark, the Marines see distributed operations as:

> …characterized by decentralization, multi-dimensionality, simultaneity, and continuous pressure over an adversary's entire system to preclude his ability to reconstitute or adjust….This concept is consistent with current trends in conflict and enduring aspects of the operational art.[453]

Distributed, integrated Naval Battle Networks will make dispersed Navy and Marine Corps operations both more possible and more powerful. Modern man-to-man, man-to-machine, and machine-to-machine interfaces can more tightly link dispersed force than ever before, even over vast geographic areas such as the central theater for irregular operations. Indeed, distributed, integrated Naval Battle Networks will increasingly change the idea of concentration of force to concentration of effects. As Mahan said, "Such is concentration reasonably understood, not huddled together like a drove of sheep, but distributed with a common purpose, and linked

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[449] Sir Julian Corbett, *Some Principles of Maritime Strategy* (London, UK: Longmans, 1911), p. 131.

[450] The Global ConOps Navy expanded the number of independent strike groups from 19 to 37. See Mullen, "Global Concept of Operations."

[451] Admiral Vern Clark, comments made at the 2005 Current Strategy Forum, Naval War College, June 2005.

[452] Brigadier General Robert E. Schmidle, USMC, and Lieutenant Colonel Frank G. Hoffman, USMCR, ret., "Commanding the Contested Zones," *Proceedings*, September 2004.

[453] Schmidle and Hoffman, "Commanding the Contested Zones." For more on Marine Corps thinking on distributed operations, see Major Douglas J. MacIntyre, "More on Distributed Operations," *Marine Corps Gazette*, July 2005, pp. 41-43; Gordon Lubold, "Smaller *is* Better," *Armed Forces Journal*, July 2004, p. 22; and Sue A. Lackey, "Initial Look at Distributed Operations Reveals Potential and Problems," *Seapower*, December 2004, pp. 34-35.

together by the effectual energy of a single will."[454] CNO Vern Clark expressed a similar view, when he said:

> I believe in the power of a dispersed force that is completely and totally integrated and has the right kind of information at the human being level so that it can take on the challenges. That's the most empowered force we can get.[455]

## Get Combined

A key aspect of the Royal Navy's Strategy of the Second Move was exploiting naval alliances for competitive gain. The same should be true today: of the 17 navies that operate war fleets that displace 50,000 tons or greater, 15 are either allied to, friendly with, or strategic partners of the United States. Alterations to Battle Force design that further widen the gap between the US and allied naval capabilities may actually work against the United States in the long-run, by placing an ever-increasing unilateral burden on the DoN Battle Force. As Geoffrey Till explains:

> Because for the United States, and certainly for everyone else, pressure of budgets, the growing expense of naval weaponry, and the political costs of unilateralism means there is a growing gap between maritime assets and their potential commitments, and increasing incentive for navies to operate together against common threats, hence the importance of coalition building and the need for navies to develop ways to work together.[456]

It is thus in the DoN's interest to think carefully about nurturing *coalition network capabilities*. During the Garrison Era, the gap between capabilities found in the "blue-water" sea control DoN Battle Force and in the littoral sea control and ocean escort navies of our allies was quite wide. However, as more and more allied navies shift their focus toward "out of area" expeditionary operations, they are building new platforms that are individually more capable and powerful, and with improved abilities to slot into future Naval Battle Networks. The Joint Expeditionary Era and the persistent irregular naval war against terrorists and their allies should thus spur the DoN to spend more time and effort establishing, nurturing, and leading a Global Maritime Coalition of like-minded navies, and to build a full range of US-allied Battle Network interfaces.[457]

The DoN started to work toward this goal soon after the 9/11 attacks. At the 16th International Seapower Symposium, held at the Naval War College in October 2003, the Secretary of the

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[454] Alfred Thayer Mahan, *Seapower in its Relations to the War of 1812* (Boston, MA: Little, Brown, 1905), p. 316.

[455] Aarti Shah, "Clark: Idea for Smaller Ships Raises Questions That Must Be Resolved," *Inside the Navy*, February 7, 2005.

[456] Till, "Navies and the New World Order," p. 62.

[457] As one Admiral quipped, "The US Navy can access 1,000 ships among coalition partners." See Dave Ahearn, "Navy May Need to Develop Small Ship," *Defense Today*, June 16, 2005. The navies of the world are providing a great deal of support against maritime terrorism and piracy. See "The Commander's Respond," in *Proceedings*, March 2004, pp. 53-63.

Navy and the Chief of Naval Operations spoke to representatives of 75 nations—including 60 chiefs or commanders of navies and coast guards. In their talks, they outlined a vision in which navies gathered and shared intelligence about terrorist threats and coordinated their resources to attack them. In the words of then-CNO Admiral Vern Clark, "We have an opportunity of historic proportions—to assemble a maritime partnership the likes of which has never been seen before…a global force, operating as one to defeat terrorism wherever it may fester, the greatest maritime force ever to set sail."[458]

Exploiting potential allied contributions is now a key theme in the 2005 QDR. Based on experiences since the 9/11 attacks, DoD planners well recognize the vital contributions US allies can make. As one top DoD official explains:

> There is always a role for partners…Many times partners are going to be able to do [things] cheaper than we can, and they'll be able to relieve stress on our force…and many times they'll be able to do it better…As we go forward in the QDR, the participation, the role of partners, will be something significant.[459]

Three examples highlight the payoffs of garnering increased integration of allied capabilities in the Maritime Battle Network. In March 2003, NATO decided to mount regular terrorist sea denial operations in the Straits of Gibraltar. These actions were taken to protect the 300 or so vessels that traverse the Straits each day from terrorist attacks. Norwegian, Danish, and German Fast Patrol Boats (FPBs) took up this mission, operating under the command of an Italian admiral.[460] Similarly, Operation *Sea Cutlass* involved the warships of five countries to disrupt terrorist operations off the coast of Africa. This force was commanded by German and French admirals.[461] Finally, countries in the Southeast Asian littoral are cooperating to provide better security in the Straits of Malacca.[462] All three of these allied initiatives relieve US Battle Network assets to concentrate in other areas and on other missions.

An added benefit of allied navies taking up important naval missions in the global irregular naval war is that these missions often encourage the navies involved to replace their smaller Garrison Era boats and vessels with more capable, ocean-going ships that are even more capable and useful. For example, the German Navy is replacing five of its Fast Patrol Boats with five, far more capable, K130 corvettes. These 1,600-ton ships "will have the required capability to deploy

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[458] Robert A. Hamilton, "Navy's Top Officer Calls for a Global Naval Force," *New London (CT) Day*, October 28, 2003. See also Joe Baker, "Naval Leader Urges Team Effort," *Newport (RI) Daily News*, October 29, 2003.

[459] "Henry: QDR to Reflect Uncertainties, Capabilities."

[460] Commander Axel Deertz, German Navy, "Fast Patrol Boats in Escort Operations," *Naval Forces*, No. VI, 2004, pp. 7-11; and Hamilton, "Navy's Top Officer Calls for a Global Naval Force."

[461] Hamilton, "Navy's Top Officer Calls for a Global Naval Force."

[462] Dr. Sam Bateman, "Search for Stability," *Jane's Defence Weekly*, May 11, 2005, pp. 24-28.

with sufficient endurance in order to *project power*…into the littorals (emphasis added).[463] These ships will be armed with a 76mm automatic cannon; up to 12 surface-to-surface missiles; two, 21-round RAM launchers; two drone surveillance helicopters; and a landing pad for medium helicopters—very useful capabilities for power-projection operations in guarded and lightly defended littorals.[464]

At the other end of the naval combat spectrum, recall that allied navies will soon operate over 50 combatants that carry among them over 2,000 Mk41 VLS cells. This is the equivalent firepower of over 16 additional US guided missile cruisers or 21 guided missile destroyers. In the Pacific alone, the three key US allies—Australian, Japan, and South Korea—are expected to operate 12 AEGIS/VLS guided missile destroyers with over 800 VLS cells.[465] Working with allies to enable them to slot these capable units into future Naval Battle Networks should be a key DoN strategic objective.

DoN leaders should not expect to get these new capabilities for free, however. Calling for a Global Maritime Coalition is one thing; taking the concrete steps to make the coalition a "maritime partnership the likes of which has never been seen before" is another. For example, these steps may require that the DoN devote some of its own resources for maritime interoperability capabilities, such as data transfer units that allow allied combatants to "plug into" US naval battle networks. Or perhaps the DoN will need to invest in multi-level security devices that allow navies from many countries to share intelligence data easily. The point here is that if the United States expects to lead a global maritime coalition, it must develop the capabilities to do so.

### Get Properly Configured, Industrially

Finally, a key pillar of a contemporary Strategy of the Second Move will be a vibrant shipbuilding industry. This will require a serious naval research and development effort; a strong design capability; and an efficient industrial base with sufficient capacity to respond to naval challengers. However, all three of these components currently face grave troubles.

Research and development is the less visible of the three industrial components, but by no means the least important. However, as budgets begin to level off or decline, R&D often suffers the most painful hit:

> US warships are acknowledged to be the best in the world. Construction of these ships has advanced naval technology…A key reason for US

[463] Deertz, "Fast Patrol Boats in Escort Operations," p. 11.

[464] See "Type 130 New Construction, Frigates, Germany," in *Combat Fleets of the World, 2005-2006.*

[465] The Japanese Maritime Defense Force will soon operate a minimum of six AEGIS/VLS combatants with over 550 VLS cells among them. The South Korean Navy will have a minimum of three KDX-III guided missile destroyers with 216 VLS cells. Australia has selected the AEGIS/VLS as the system for three new "air warfare destroyers" still in design competition.

> warship superiority has been the shipbuilding research and development (R&D) expertise that currently resides across the Enterprise, which is the term applied to the Navy's laboratories, acquisition commands, and certain shipbuilders and universities…With reduced research and development budgets, some of that capability is becoming fragmented.[466]

The reduction in DoN R&D funding is becomingly increasingly acute. R&D funding is scheduled to fall from $17.3 billion in FY 06 to $12.6 billion in FY 10, in constant FY 06 dollars—a real decline of 27 percent.[467] According to top DoN officials, the decline is tied to a shift from R&D expenditures to procurement. Indeed, the Chief of Naval Operations is explicitly calling for a diversion of funds from R&D to ship procurement, pointing out that the R&D budget is nearly $9 billion higher than when he took office in 2000.[468] However, a draw down in R&D spending is inconsistent with a Strategy of the Second Move; while the balance between research and development and acquisition is always a delicate one, given the range of potential disruptive and contested access challenges over the next decade and a half, reducing R&D expenditures appears to be high-risk strategy at this time.

Also threatening to a Strategy of the Second Move is a decline in US ship design expertise. There are currently very few US ships or submarines in detailed design. The happy news associated with this circumstance is there is a lull in the global design competition, caused, in no small part, by the huge lead the United States enjoys in the overall naval race. The bad news is that the absence of a competitive driver presents a serious challenge to the US design base. For example, this is the first time in over 50 years that there has not been an ongoing submarine design effort. Without initiating any new submarine designs, there is a real danger that the US submarine design knowledge base might gradually whither and die, putting the TFBN's long-term prospects for maintaining undersea superiority in grave doubt.[469]

The British nuclear submarine industry faced a similar problem as the size of their submarine fleet was reduced after the end of the Cold War. The industry did not maintain an adequate design capability during the submarine force drawdown. As a result, once it began to design the new *Astute*-class submarine—the replacement for Cold War designs—it no longer had the indigenous capability to do so. As a result, British submarine builders had to turn to US submarine designers for help.[470]

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[466] Executive Summary, *National Security Assessment of the US Shipbuilding and Repair Industry*, found at http://www.bxa.doc.gov/DefenseIndustrialBasePrograms/OSIES/DefMarketResearchRpt/shipbuildingandrepair.pdf.

[467] Under Secretary of Defense, Comptroller, *National Defense Budget Estimates for Fiscal Year 2006*, "the Green Book," April 2005.

[468] Christopher P. Cavas, "US CNO: Find Ship Funds in R&D," *Defense News*, July 11, 2005, p. 24.

[469] Jesse Leavenworth, "Panel Hears Navy Chiefs," *Hartford Courant*, June 14, 2005.

[470] Richard Scott, "UK Faces Decisions on Submarine Design Base," *Jane's Defence Weekly*, March 9, 2005, p. 30.

The British experience with the *Astute* emphasizes how important it will be for the United States to maintain its design experience in all types of submarines and combatants—especially when pursuing a Strategy of the Second Move. The British found making trade-offs between retaining industrial capacity and design expertise was a difficult one. In the end, however, top British officials concluded that:

> We must not become fully pre-occupied by the industrial base at the expense of our intellectual capital in submarine design. One only has to look at the UK's automotive and aerospace industries to see that it is the high-value design and intellectual capabilities that have been retained while most manufacture has gone overseas. And while the UK is likely to want to retain an indigenous submarine manufacture capability, *we must protect the design resource that ultimately underpins the industrial activity* (emphasis added).[471]

The shipbuilding component of the US naval industrial base also is facing tough times. There are approximately 250 companies in the US shipbuilding and repair industry. However, most of the work is accomplished in the six largest "Tier I" shipyards, often referred to as the "Big Six." They represent two-thirds of the overall shipbuilding/repair business and 90 percent of the defense work.[472] The "Big Six" are now owned by two large defense companies, General Dynamics and Northrop Grumman:

- General Dynamics owns, manages, and operates Bath Iron Works (BIW), located in Maine, which builds surface combatants; Electric Boat (EB), located in Connecticut and Rhode Island, which builds submarines; and the National Steel and Shipbuilding Company (NASSCO), located in California, which builds large fleet auxiliaries and sealift ships; and

- Northrop Grumman owns, manages, and operates Ingalls, located in Mississippi, which builds surface combatants, amphibious ships, and USCG cutters; Avondale, located in Louisiana, which builds amphibious ships, auxiliaries, and sea lift ships; and Newport News, located in Virginia, which builds submarines and aircraft carriers.

According to one recent study:

> The "Big Six" shipyards collectively have up to 40 percent excess capacity. This capacity is expensive, and its associated maintenance costs are being absorbed by existing ship construction contracts…Maintenance of that over-capacity has been accomplished through increased overhead charges from each of the major shipbuilders. The policy of competition for the purchase of naval vessels is no longer viable. The existing bilateral monopoly must be recognized for what it is and steps must be taken to achieve cost savings through reduction of excess capacity. The

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[471] Scott, "UK Faces Decisions on Submarine Design Base," p. 30.

[472] Industrial College of the Armed Forces Staff, "Shipbuilding Sector Remains Uncompetitive," *National Defense*, March 2002, found at http://www.nationaldefensemagazine.org/issues/2002/Mar/Shipbuilding.htm.

> government should give shipbuilders incentives to eliminate unnecessary redundancy and achieve greater efficiencies in construction and design.[473]

One result of the industry's over-capacity in the shipbuilding industry has been increased unit costs in ship construction, which has led to DoN efforts to further consolidate the industry.[474] However, industry experts point out that the DoN itself is largely to blame for the over-capacity, because of its consistent tendency to portray overly optimistic ship production increases in the budget "out-years." For example, the FY 05 budget submission indicated the DoN intended to buy 17 ships in FY 09: two SSNs; three DD(X)s; one amphibious ship; six small littoral combat ship; two combat logistics force ships; and three large prepositioning ships. One year later, the FY 06 budget submission indicated the DoN intended to buy only nine ships in FY 09: one SSN; one DD(X); no amphibious ships; five small littoral combat ships; one combat logistics force ships; and one large prepositioning ship. Given such wide yearly fluctuations in Navy plans, industry experts argue, the DoN can hardly lay all of the blame on industry for its excess capacity. As one expert sympathetic to the shipbuilding industry has written, US shipyards are "navigating between a rock and a hard place."[475]

To this point, the DoN has found it difficult to get Congress to approve further consolidations in the US shipbuilding industry. Given the potential for a disruptive maritime competition with China, this may be a blessing in disguise. A Strategy of the Second Move will require careful balancing between pursuing an "efficient" industrial base that provides ships at the lowest possible cost in the near term, and one that will have the excess capacity to respond to a serious competitive challenge at some point in the future. In the near term, both sides may have to accept slightly higher prices for ships built in small production runs in order to retain the US's competitive stance.

In summary, then, a contemporary Strategy of the Second Move would put more emphasis on R&D spending, demand design competitions to maintain US design expertise (perhaps by building a small number of prototypes), and an industrial base that balances "efficiency" with "excess capacity" in order to be able to respond to a future challenge. Current trends are at odds with the strategy, and should be the urgent focus of the seven TFBN stockholders (the Executive Branch, the Legislative Branch; OSD; DoN; the Navy; the Marine Corps; and the shipbuilding industry).

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[473] Industrial College of the Armed Forces Staff, "Shipbuilding Sector Remains Uncompetitive."

[474] As will be discussed later in the report, the DoN recently tried to change the DD(X) program into a "winner take all" competition, which would have effectively led to the closure of one of two remaining surface combatant shipyards. Congress killed the effort.

[475] Scott Truver, "US Shipyards Navigate Between a Rock and a Hard Place," *Proceedings,* March 2004, pp. 80-89.

## A NEW BATTLE FORCE ERA

The Joint Expeditionary Era's five emerging architectural design imperatives (G*et Connected, Jointly; Get Modular; Get Off-board; Get Unmanned; and Get Payload*) and five naval operational imperatives (*Get Integrated, Get Quick, Get Distributed, Get Combined*, and *Get Configured, Industrially*) seem certain to spur a transition toward a new Battle Force Era, just as was suggested by Huntington in 1954. This new era will surely result in a naval fleet platform architecture very different than those that characterized the three previous Battle Force Eras.

The most obvious difference between the future and past eras will be the diminishing role of "capital ships." Previous eras—the Frigate, Battleship, and Carrier Eras—were all distinguished and identified by the contemporary *capital ships* of the US Battle Force. The association of an era's capital ship with a particular Battle Force Era reflected the predominance of the capital ship in naval operations and thought:

> The capital ship forms the body of the Navy in the same way that the Infantry forms the body of the Army…and in the final analysis, the old maxim about the Infantry that I think was put forward by Napoleon and other numerous gentlemen in the past, holds true of the capital ship…"The Infantry is the Army—when the Infantry is defeated the Army is defeated!"…That, in my opinion, holds good for the capital ship in the navy.[476]

However, in the ultimate Battle Network architecture associated with the Joint Expeditionary Era, there will be no "capital ship" *per se*. Future DoN Battle Networks will derive their power from the aggregate capabilities resident in a distributed network of multi-purpose, modular, reconfigurable components. The loss of any single platform or component thus will be less likely to result in the automatic "defeat of the Battle Force."

Accordingly, in the emerging ***Naval Battle Network Era***, counting ships in the Total Ship Battle Force will be even less helpful in determining the true power of the DoN Battle Force than it is now. DoN planners will have to develop different, more accurate ways to measure to maximum scalable combat power of the DoN's ***Total Force Battle Network***, or the maximum scalable combat power of the National Fleet Battle Network. For example, instead of a Total Ship Battle Force described by 12 carriers, 84 surface combatants, 36 amphibious ships, and 57 submarines, the future DoN Battle Force might be described in terms of a 12,000 aimpoint-a-day, 10,000-VLS cell, *x* number of modular payloads, *y* number of maneuver units TFBN. However they are described, the modular and reconfigurable nature of the future Total Force Battle Network and the larger National Fleet Battle Network will allow future naval planners and commanders to rapidly assemble and tailor tactical Naval Battle Networks designed to meet any likely existing or emerging requirements, challengers, and access conditions.

The acknowledgement that the Battle Force is transitioning to a new Naval Battle Network Era is in no way an automatic endorsement of "the small, the fast, and the many" architecture espoused

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[476] Hagan, *This People's Navy*, p. 271.

by the "Network Centric School." There is no clear preference for either large or small platforms in the overall Total Force Battle Network design—either can be equally effective in a networked architecture, either can exhibit operational fungibility, either can rely on modular and unmanned systems, and either can employ off-board systems. The key is finding the best *mix* of large and small battle network components capable of solving a wide range operational problems and challenges.

This was precisely the conclusion reached after a long and sharp intra-Air Force debate that raged throughout the 1970s and 1980s over the best "high-low" mix of larger, more expensive F-15s air superiority fighters, and smaller, cheaper F-16 air superiority fighters:

> All of this is to say that "quality vs. quantity" is a misleading characterization of the US fighter modernization conundrum. The real issue is how much "quality," across what performance spectrum, in what force mix, numerical strength, and sustainability, do we need to give us our desired mission effectiveness for the most plausible scenarios at a cost we can afford.[477]

It is interesting to note, however, the trend evident in most of our allied navies, which are now moving toward the large, multi-mission combatants long favored by the DoN Battle Force. These navies long emphasized small combatants and local area-defense operations during the Garrison Era. However, in the Joint Expeditionary Era, they are now increasingly interested in ships suited for "out-of-area" operations. This interest is the result of guidance like that found in the 2003 Budget Day Letter for the Netherlands Armed Forces:

> The armed forces of the future will have to concentrate on *high-quality units* suited for *expeditionary operations* along with the *armed forces of other countries*, meaning carrying out military operations at relatively *large distances from the home base* with a logistically, *largely self-sufficient armed force* (emphasis in the original).[478]

The new emphasis on armed forces capable of operating over global ranges is exerting an influence on even the smallest navies. For example, the Royal Danish Navy (RDN), one of the most innovative small ship navies in the world, is making a decided turn towards fewer, large, multi-mission combatants. By 2012, the RDN plans to have 50 percent fewer ships, but a fleet aggregate tonnage that is 60 percent greater than it had in the Garrison Era.[479]

It may turn out that an architecture consisting of many small, fast platforms will provide the best "mission effectiveness for the most plausible scenarios at a cost we can afford." But this outcome should be determined by Battle Network experimentation, trial and error, and not by imagined or

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[477] Benjamin Lambeth, "Pitfalls in Force Planning," *International Security*, Fall 1985.

[478] Captain (RNLN) DRS. Henk M.H. Satjin, "Modern, Smaller, Mission Oriented: Update on the Royal Netherlands Navy," *Naval Forces*, No. III, 2005, p. 149.

[479] Kurt Birger Jensen, Rear Admiral, Admiral Danish Fleet, "The Royal Danish Navy—A Versatile Navy Transiting Into the Future," *Naval Forces*, No. III, 2005, p. 127.

preordained "new rule sets." A Strategy of the Second Move will give DoN planners the time to determine which force mix, numerical strength, and sustainability is needed to achieve the desired effectiveness across the widest range of plausible scenarios at an affordable cost.

For example, legacy platforms may prove to be suitable for quite some time to come. In this regard, the Battle Force's World War II transition from the Battleship to Carrier Eras, and its subsequent adjustment to the Garrison Era, is instructional. This transition, which occurred in little more than two years, was accomplished using ships that were for the most part designed before the war and to architectural design standards associated with Battleship Era. Indeed, as was mentioned in Chapter III, every type of ship with the exception of mine warfare vessels performed a different role in the early years of the Carrier Era than the one for which it was originally envisioned. Moreover, many of the ship designs developed before and during the war, when suitably modified, served well into the Garrison Era. This proves a key point: naval platform architectures that look the same may actually be quite different in their operational design philosophies, training, and capabilities. The implication is that Battle Force designers should not hesitate to look to legacy ship designs, properly modified, as the foundation for a new naval platform architecture.

Indeed, exploiting legacy platforms for as long as necessary is especially important during inter-era shifts between both national security and Battle Force eras because history shows that the first several decades before and after the shifts are initially marked by considerable uncertainty. Recall that after the transition to the Battleship Era, it took 26 years for DoN platform designers to get a mix of speed, armor, and armament that fully satisfied them. On the other hand, the transition to the Carrier Era was preceded by over two decades of intense experimentation. Little more than a decade into the Joint Expeditionary Era, it is reasonable to assume that it will take some time before the key uncertainties about the proper new naval platform architecture will be resolved. In the meantime, exploiting legacy platforms to the maximum extent makes for a smart strategy.

## MINIMIZING KEY SOURCES OF FRICTION

In summary, expected Joint Expeditionary Era racing conditions and challenges suggest a naval competition Strategy of the Second Move, which itself suggests the need for a new architectural design philosophy, new architectural design criteria, and new architectural operational imperatives. All three will shape the DoN's new 21st century competition racer—the TFBN. However, for optimal performance in the competition ahead, the final TFBN design must account for and minimize key sources of institutional friction. The key sources of friction are:

### Paralysis by Analysis

The intra-Navy argument over the ultimate make up of the future naval fleet platform architecture need no longer hold up forward progress. As indicated above, pursuing an adaptable and reconfigurable architecture for a Total Force Battle Network supports the positions of both the "Extended Carrier Era" and "Network Centric Schools." An integral part of the Strategy of the Second Move is a patient transformation effort that emphasizes the exploitation of legacy platforms favored by the former and the rapid architectural adaptation favored by the latter.

The apparent "paralysis by analysis" evident in the Department over the last eight years needs to be replaced by consistent, steady moves toward a future architecture, guided by the five TFBN design and five naval operational imperatives. Key to this effort will be continual fleet operational experiments and analysis of operational experience in order to determine the ultimate and most effective mix of large, medium, and small platforms.

### The Navy-Marine Corps Split

To become truly integrated, DoN leadership will have to focus its concerted attention to resolving the debilitating intra-Departmental arguments between the Navy and Marine Corps. In an era that appears to be characterized by a persistent war against irregular naval opponents and Joint expeditionary operations in distant theaters with uncertain access, the need for more integrated naval fire and maneuver capabilities seems apparent. From this common point, Navy and Marine planners would do well to seek compromises designed to optimize the capabilities of the Total Force Battle Network instead of the capabilities of their own individual services.

In this regard, repairing the split between the Navy and Marine Corps will require that the Navy accept the need to expend the resources necessary to improve the sea-based maneuver capabilities that were allowed to atrophy over the Garrison Era, and to view future sea-based maneuver less in terms of World War II amphibious assaults, and more in terms of opportunistic maneuver from the sea. It will also require the Marines to moderate their expectations, and to seek capabilities better suited to TFBN fiscal realities—especially in terms of legacy platforms and expected future resources. Both of these points will be discussed in later chapters. For now, suffice to say that any hope for compromise between the two services will likely require strong leadership and intervention from the Office of the Secretary of the Navy.

### "Over-specing" Battle Network Platforms

A third key source of friction is the strong tendency of DoN planners to seek progressively more formidable technical overmatches in every new ship, new platform, and new system. A Strategy of the Second Move and the pursuit of Naval Battle Networks that are more than the sum of their individual parts argue for a more conservative, resource-conserving approach. When the Battle Force enjoys such a huge lead in the global naval competition, the pursuit of ever more exquisitely capable platforms will likely simply extend an already formidable lead at a prohibitive cost. Getting DoN leaders to keep and pursue ships and platforms that are "good enough" for the job, with modifications, is the antidote; whether they can or will take the medicine remains an open question.

### Satisfying all Seven Battle Force Stakeholders

Having seven stakeholders behind the Battle Force's participation in the global naval race—the Executive Branch, Legislative Branch, OSD, the Office of the Secretary of the Navy, the Navy, Marine Corps, and industry—has always been a source of institutional friction, and it will continue to be one; seldom will all stakeholders unanimously agree on any particular change in Battle Force design, course, or speed. Recently, however, it appears that the stakeholders may be working at cross purposes with one another.

For example, the Secretary of the Navy and several top admirals recently announced that if future budgets fund so few ships that contractors are forced to look at closing some shipyards, their decision to do so would be a business decision made solely by them:

> [The decision to close a shipyard]...is up to industry. We don't define the industrial base. It's up to the market to arrive at these conclusions…So, it's a commercial world, and they make commercial decisions.[480]

With the prospect of facing a disruptive naval competitor with a large industrial capacity, this is an astounding assertion. One would think that the decision to close US shipyards would be an issue of concern for all seven stakeholders, and not one to be dictated solely by "commercial decisions."

One way to tackle the industrial base problem would be to seek a reasonable, steady-state shipbuilding budget that would force DoN planners to develop more consistent and realistic plans, and form the basis for negotiations among all stakeholders on the shipbuilding base best suited to support the Strategy of the Second Move. But this would only be a start. For a Strategy of the Second Move to have any hope of success, the Executive Branch, Congress, DoD, the Office of the Secretary of the Navy, the Navy, the Marine Corps, and industry will have to establish much higher levels of collaboration and coordination than is now evident.

### Building a National Total Force Battle Network

As has been discussed, the current Total Ship Battle Force is the most powerful fleet in the world by a large margin. Indeed, it is probably the most powerful US fleet ever assembled, period. However, a key source of friction in developing DoN plans is an incessant over-emphasis by actors both inside and outside the Department of the Navy on the number of ships in the TSBF. One simple way to moderate this friction is to change the debate by adopting counting rules that better reflect the full breadth of national naval capabilities in the Joint Expeditionary Era.

Recall that the current TSBF counting rules were created in the Garrison Era in the midst of a closely contested head-to-head competition with the Soviet Navy, and in a time of great service independence. The rules are increasingly unsuited for the expected conditions in the Joint Expeditionary Era, for the era's associated naval racing strategy, and for the architectural design goals that seek to forge a Jointly-interoperable Total Force Battle Network, and contribute toward a more integrated National Fleet.

As a result, when developing a new naval fleet platform architecture for the Joint Expeditionary Era, the following ship counting convention will be tentatively adopted: *any ship or vessel available within 30 days that contributes to defense of the homeland or to the transoceanic projection of Joint expeditionary combat power.* While ships that make up the TFBN can be counted separately to identify those ships procured and operated by the DoN, all vessels that can

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480 Dave Ahearn, "England, Admirals Say Industry Decides If, Where Shipyards Close," *Defense Today*, January 14, 2005, p. 1.

be associated with this new convention—including ships operated by the Coast Guard or other services and agencies—will be added to identify the National Total Force Battle Network.

## STRATEGY IN ACTION: TOWARD AN ADAPTABLE NAVAL FLEET PLATFORM ARCHITECTURE FOR THE JOINT EXPEDITIONARY ERA

Guided by the foregoing analysis and conceptual development, the following chapters develop an alternative naval fleet platform architecture for the Joint Expeditionary Era. The architecture is guided, first and foremost, by a new naval competition strategy designed to exploit the current US lead in the global naval race: a Strategy of the Second Move. This strategy aims to keep the DoN's Total Force Battle Network and the larger National TFBN at the front of the pack in the global naval race while working within expected resource constraints. This strategy prepares for more serious future maritime challenges by planning to introduce advantageous disruptive changes, when appropriate.

The nation's combined maritime capabilities will form an adaptable, interoperable pool of reconfigurable and multi-mission platforms designed to form scalable, distributed, and integrated Naval Battle Networks. It will be shaped and sized to accommodate a new "1+1+1+1" force planning and sizing metric. That is, the network architecture will be designed and sized to prevent a WMD attack on the United States; to help prosecute and win the "Global War on Terrorism" by defeating irregular naval forces and supporting Joint forces operating ashore; to mass and defeat a *single* traditional/catastrophic or disruptive/catastrophic challenger in defended or contested littorals; and to hedge against a disruptive traditional maritime competition with China. The architecture will be consistent with the architectural design criteria and operational imperatives discussed in the previous chapter, and it will be specifically designed to minimize key sources of institutional friction.

As mentioned in the first chapter, this effort focuses on highlighting future TFBN *ship platforms* and their associated shipbuilding costs. The architecture is thus shaped largely by an expected yearly DoN shipbuilding allocation of $8 to $12 billion. In this regard, two comments bear (re)mentioning. First, while US Coast Guard cutters and patrol boats are included in the discussions about National Fleet capabilities, their construction costs are borne by the Department of Homeland Security and do not deduct from the DoN shipbuilding budget. Second, although non-ship TFBN platforms and capabilities are periodically discussed—especially when they impact on the numbers and types of ships required for a particular mission—their costs will not be considered in the report.

Given the relatively modest expected shipbuilding budgets, the current $1.4 billion cost for an "average ship equivalent" presents a major naval platform architecture design challenge. Holding the cost of an ASE at $1.4 billion, or reducing it below $1.4 billion, became a key goal of this report. This led to the adoption of the following three general guidelines:

- To minimize average ship production costs *for warships that cost much more than one average ship equivalent*, consolidating production in a *single yard*, seeking stable class production runs, and using efficient multi-year procurement contracts whenever possible is the first preference. However, in cases where uncertainty exists over the industry's ability to respond to sharp spikes in the future naval competition, a second yard is retained, and an associated shipbuilding "competition premium" identified.

- To minimize average ship production costs *for warships and fleet auxiliaries that cost less than one average ship equivalent*, the first preference is to shift production to smaller Tier II yards, maintain competition, and ruthlessly enforce cost control at all times.

- Finally, a concerted effort is made to start new design efforts focused on reducing the costs of the future ASE. This serves two key purposes: it helps to maintain US submarine and ship design expertise during the current lull in the naval design competition; and it better postures the DoN Battle Force to respond to increased competitive pressures or to exploit quickly bold disruptive design moves. With regard to the latter, reducing the cost of an ASE from $1.4 billion to $1 billion would increase the number of ASEs built per year from 5.7-8.6 to 8-12, and increase the size of the steady state naval platform architecture from 200-300 ASEs to 280-420.

The supporting architecture shipbuilding plan developed herein is an interim transition plan out through 2020. Given the number of variables and imponderables in the emerging naval competition, making projections out that far is difficult enough; making projections beyond 2020, other than for general force projections, are not considered useful. A Strategy of the Second Move assumes there will be updates to this basic plan at four year intervals (i.e., during each QDR).

Making detailed projections about the impact that the architecture will have on DoN weapons procurement and operations and support costs is beyond the scope of this report. The primary focus of discussions about O&S costs will be on highlighting the impact that architecture design decisions have on fleet manning. While they are not the sole contributor to O&S costs, fleet manning is one of the most important ones. Moreover, the steadily rising cost of manpower has diverted money away from procurement dollars. As one expert said, "The cost of retention and recruitment of military personnel over the last ten years has taken more each year from procurement and research and development."[481] As a result, cutting the TFBN's manning requirement in order to free up money for procurement is an explicit goal of the Chief of Naval Operations, and of this report.[482] When appropriate, the impact of architecture decisions on force-wide training, maintenance, and logistics will also be highlighted in discussions on O&S costs.

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[481] James Flanigan, "Troop Costs Take Bigger Bite out of Defense-Contract Pie," *Los Angeles Times*, January 5, 2005.

[482] The CNO's original goal was to draw the Navy down to 320,000 officers and Sailors by 2011—the lowest fleet manning level since 1940. See Mark D. Faram, "Drawdown Plans Target 60,000," *Navy Times*, August 23, 2004, p. 8.

## A Word on "Sea Swap"

With regard to force manning requirements, future naval commanders will aggregate and assemble Naval Battle Networks using a mixture of platforms/capabilities that are either *based* at permanent or forward operating bases; on *rotational forward deployments*; or *surged* from the United States during crises or contingencies.

Because of the distances involved, especially to the central theater of the persistent irregular war, Battle Network platforms on rotational forward deployments from the United States can spend up to half their deployed time transiting to and from their patrol areas. For example, the sailing time from continental US ports to the Persian Gulf could take up to six weeks, each way—nearly half the time of a typical 6-month deployment.[483]

To eliminate the time spent in transit, to maximize the amount of on-station time for Rotationally Deployed Battle Network platforms and their crews, and to increase the number of immediately employable forward forces, the DoN has begun to experiment with *crew rotations*, or "sea swaps." The idea of crew rotations to increase ship availability for rotational deployments is not new; since the 1960s, the SSBN force has assigned separate Blue and Gold crews to each ballistic missile submarine in order to achieve a 66-70 percent force availability rate. More recently, the Navy has rotated crews on small, forward deployed mine warfare vessels, but the program was cancelled for efficiency and cost reasons.[484]

However, soon after he had become the CNO, as part of a broader effort to reduce fleet operating costs and to gain the most efficiency out of a smaller number of ships, Admiral Clark ordered a series of "sea swap" experiments designed to see if the concept of crew rotations could be expanded to include large complex surface combatants.[485] Based on the preliminary results of these experiments, the DoN felt comfortable enough with the program to submit to Congress an alternative 30-year shipbuilding plan that had 65 fewer ships than the baseline one-ship, one crew plan.[486]

While the results of experiments to date have been encouraging, it appears premature to make Battle Network platform architecture decisions based on them. Specifically, the ***long-term*** impact of widespread crew rotations on overall Battle Network capabilities is uncertain. For example, still to be determined are:

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[483] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 58.

[484] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 63, 228.

[485] Dale Eisman, "Navy Officials Are Hoping to Get 'Sea Swap' Program Under Way," *Norfolk Virginia-Pilot*, March 30, 2004.

[486] "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006;" Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

- What are the long-term effects on the material condition of ships that are kept on station for longer periods of time? In this budget climate, if crew rotations wear ships out faster and help to create a future "building deficit," its adoption might cause more problems that it solves;[487]

- What will be the long-term impact of crew rotations on crew readiness and retention? If the scheme decreases retention or increases force-wide training requirements, it may not be worthwhile;[488]

- Can the concept be expanded to replace the combined crews of a rotationally deployed task group, such as an Expeditionary Strike Group? Doing so would likely provide the biggest payoff, but simultaneously swapping out all crews in an entire task group is a much more difficult proposition;[489] and

- Given that the primary driver of fleet O&S costs are people, is keeping more "extra" crews for a given number of ships a smart long-term strategy?

Until these questions are fully answered, "sea swap" will remain a worthwhile experimental program. *Accordingly, the following naval network platform architecture assumes single platform/single crew combinations, except as noted.*[490] However, the idea of having a permanent presence of DoN vessels in a given geographical area for a long period of time is a valid one, and harkens back to the establishment of permanent fleet "stations" assembled during the Continental/Frigate Era. Accordingly, the establishment of new fleet "stations" for the Joint Expeditionary Era is an important part of the following TFBN design.

## COMPONENT FLEETS

The four component fleets developed earlier form the organizational construct for architectural development. To review, these four conceptual fleets include a *Strategic Deterrent/Dissuasion Fleet;* a *National Global Patrol/Irregular Warfare/Homeland Defense Fleet;* a *"Sea as Base" Power-Projection Fleet;* and a *Counter-A2/AD Fleet.*

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[487] Some preliminary reports in this regard have been encouraging. See Otto Kreisher, "Navy Sea Swap Test Leaves Ship 'In Really Good Shape'," *San Diego Union-Tribune,* March 30, 2004. However, the Government Accountability Office had a far more pessimistic view. See Dale Eisman, "Some Question Navy's 'Swap' Savings," *Norfolk Virginia-Pilot,* November 11, 2004; and Christopher P. Cavas, "US Navy's 'Sea Swap' Hit by Report," *Defense News,* November 15, 2004.

[488] There is some anecdotal evidence that the crews on "sea swap" ships have a higher maintenance burden than on non-"sea swap" ships. See Cavas, "US Navy's 'Sea Swap' Hit by Report." If true, long-term retention trends could be problematic. See also James W. Crawley, "Sea Swap Program May Hurt Retention," *San Diego Union-Tribune,* August 2, 2004.

[489] At least one ESG commander is concerned about "Sea Swapping" an entire ESG. See Christopher P. Cavas, "Small Sea Swap Works for US," *Defense News,* November 2004.

[490] As a result, when making comparisons between the recommendations in the report with Navy plans, the comparisons are made with the Navy's "325-ship plan."

To reemphasize an earlier point: this report is not recommending the development of a naval platform architecture made up of four stand-alone fleets. The fleets are used only as conceptual bins in which to build a capabilities-based TFBN. Care will be taken to identify ships and platforms that can be used to perform more than one fleet mission. This will help to identify the most valuable, or operationally fungible, architecture platforms. The final *combined* TFBN and National Fleet result will be the mix of ships best able to meet the wide range of requirements associated with the combined fleet missions.

Before starting, however, an important point must be made. As Vice Admiral Joseph Sestak, the former Deputy Chief of Naval Operations for Warfighting Requirements and Programs, recently remarked, "Sea basing is the one element linking the global war on terror and major combat operations."[491] This powerful thought provides the conceptual starting point for this architecture design effort. *Specifically, the following naval fleet platform architecture is built around the "Sea as Base" Power-Projection Fleet—that is, ship platforms optimized for operations against a regional adversary armed with nuclear weapons in defended access scenarios.* Any platform capable of operating in this environment is immediately employable in operations in unimpeded and guarded access scenarios, and against irregular naval challengers. Similarly, during Joint power-projection operations against an adversary that has a high-end A2/AD network, ships designed to venture into a littoral defended by nuclear weapons will provide important early stand-off support for TFBN counter-network operations, and will become the primary base of operations once the A2/AD network is rolled up. Moreover, ships designed for this mission should also be well suited to respond to any future open-ocean challenge.

In this light, the National Global Patrol/Irregular Warfare/Homeland Defense and Counter-A2/AD Fleets—focused as they are on the left and right hand margins of the access curve—are properly seen as special-purpose extensions of the "Sea as Base" Power-Projection Fleet. As the former shoulders the burden of the persistent irregular war, it simultaneously develops intelligence of local operating areas as well as littoral access conditions that will inform the configuration and scale of a Battle Network responding to a full blown crisis. When responding to that crisis, the National Global Patrol/Irregular Warfare/Homeland Defense Fleet can immediately collapse under the protective fires of Naval Battle Networks to perform important advance force and sea base support. Similarly, at the other end of the access spectrum, the Counter-A2/AD Fleet serves first to probe and reconnoiter potential A2/AD networks, and when necessary, to pry open the network to provide operational freedom of action for the advancing Power-Projection Fleet. On the other hand, The Strategic Deterrent/Dissuasion Fleet is one specifically designed to protect the homeland from strategic nuclear attack, and to shape the overall competitive environment in which the "Sea as Base" Power-Projection fleet operates.

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[491] Cavas, "New Missions Will Rely on Sea Basing," p. 4.

# VII. The Strategic Deterrent and Dissuasion Fleet

Conceptually, the Strategic Deterrent and Dissuasion Fleet is designed to accomplish two key goals: to deter *state*-sponsored WMD attacks against US and allied territory, or against Joint and combined forces operating overseas; and to dissuade a would-be disruptive maritime adversary from mounting an open-ocean challenge against the United States.

The two primary ship platforms associated with the first goal are strategic ballistic missile submarines (SSBNs) and surface combatants or submarines configured for ballistic missile defense. The primary ship platforms associated with the second goal are nuclear attack submarines (SSNs).

SSBNs contribute to the WMD homeland defense mission. Warships configured for the ballistic missile defense mission are useful for both WMD homeland defense and power projection against a nuclear-armed regional adversary. Nuclear attack submarines contribute directly or indirectly to homeland WMD defense (by threatening an adversary's SSBNs), the global war against radical extremists, power projection against a nuclear–armed regional opponent, and hedging against a 21st century maritime open-ocean challenge.

## Strategic Ballistic Missile Submarines

> Strategic deterrence remains a fundamental element of the U.S. defense strategy, just as conventional deterrence has become increasingly important since the fall of the Berlin wall. Nuclear-powered submarines will be the principal component of the future U.S. strategic posture. Land based bombers and intercontinental missiles are being reduced. The SSBN force will be the only Triad element still deploying missiles armed with Multiple Independently targeted Re-entry Vehicles.[492]

The first US SSBN, the *USS George Washington*, was commissioned in 1959. It conducted its first deterrent patrol starting in November 1960, carrying with it 16 Polaris missiles armed with nuclear warheads. It was at sea and underway for 67 days; 66 days and 10 hours were spent unseen, underwater.[493] Because of its ability to hide in the world's oceans, the SSBN force represented a reliable and survivable "second strike" nuclear retaliatory force, which underwrote the nation's nuclear strategic deterrence posture. Forty-five years later, SSBNs remain the foundation for US strategic deterrent forces, and thereby help protect the US homeland from state-sponsored WMD attack.

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[492] "Ballistic Missile Submarines," found at http://www.chinfo.navy.mil/navpalib/cno/n87/today/ssbn.html.

[493] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 63.

Forty additional SSBNs followed the *George Washington* between 1960 and 1967 at an average building rate of five per year. Between 1967 and 1981, the Navy operated these 41 SSBNs, known as the "41 for Freedom," as part of the national nuclear deterrent force. This force carried a combined total of 656 submarine launched ballistic missiles, or SLBMs (41 boats x 16 SLBMs per boat). Each missile could carry a number of multiple independent reentry vehicles, or MIRVs. These submarines were dual-crewed to achieve a high force operational availability for strategic deterrent patrols.[494]

Starting in 1981, the DoN started to replace these 41 original SSBNs with the new *Ohio*-class SSBNs. The *Ohios* were much larger than the SSBNs they replaced, having over twice the submerged displacement. This allowed them to carry 24 SLBMs rather than the 16 carried by the "41 for Freedom" SSBNs. Moreover, the SLBMs they carried—the Trident C4 and D5 missiles—were larger, had longer ranges, and could carry more MIRVs than earlier sub-launched missiles. The retention of a dual-crewing scheme and combination of more missiles per boat, longer missile ranges, and more deployed warheads allowed a drastic reduction in SSBN numbers with no loss in force mission effectiveness. Initial plans for the new *Ohio* SSBN force were for two, ten-boat squadrons carrying 480 SLBMs (20 boats x 24 missiles per boat).[495]

Following the collapse of the Soviet Union, the last of the original 41 "boomers" dedicated to the nuclear deterrent mission was decommissioned in 1995, and last *Ohio*-class boat was commissioned in 1997, completing the SSBN force transition with a fleet of only 18 *Ohios.* More fleet reductions were to come. In 2001, DoD completed a comprehensive post-Garrison Era Nuclear Posture Review (NPR). The NPR recommended that the nation's nuclear arsenal be reduced to between 1,700 and 2,300 nuclear weapons by 2012. Therefore, although the oldest SSBN in the fleet was only about 20 years old, OSD decided to reduce immediately the SSBN force from 18 to 14 boats.[496]

### Thinking About the Current and Future SSBN Fleet

As of December 31, 2004, then, the TFBN counted 14 ballistic missile subs, operating out of two SSBN operating bases located in Bangor, Washington and King's Bay, Georgia. With two 160-man crews assigned to each boat, they have an aggregate crew requirement of 4,480. *These SSBNs perform a singular nuclear deterrent mission; they are not fungible across the TFBN's four component fleets.*

Although the "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006" indicates the SSBN fleet will remain constant at 14 boats through

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[494] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 62-63; see also "41 for Freedom," found online at http://www.boomersailors.net/41.html.

[495] Norman Polmar, *Ships and Aircraft of the US Fleet*, fourteenth edition (Annapolis, MD: US Naval Institute Press, 1987), p. 37.

[496] For a description of the *Ohio*-class submarine, see Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 64-66.

2035, the TFBN may be able to further reduce the fleet. A force as low as ten boats would still be able to meet US nuclear warfighting requirements.[497] For example, a ten-boat SSBN force carrying Trident D5 missiles can carry 1,920 warheads (10 boats x 24 missiles/boat x up to 8 warheads per missile=1,920 warheads). With the United States planning to retain 500 single-warhead Minuteman III ICBMs in its nuclear deterrent force, along with some number of air-delivered weapons assigned to the B-2 bomber force, ten boats would thus have excess payload capacity once the nuclear arsenal falls to a force inventory level between 1,700 and 2,300 nuclear warheads.

Indeed, the question over the proper size of the SSBN force turns not on nuclear warfighting requirements, but whether or not the force is large enough and dispersed enough to survive any type of attack or threat. Force survivability is a key force sizing factor for the US nuclear deterrent force. Among the submarine officers and US Strategic Command officers interviewed for this report, there was no concern about moving to an SSBN force of 12 boats with dual crews, which would allow for seven to eight boats on continuous patrol. However, there was great uncertainty over whether or not a ten-boat force would be survivable enough to ensure a reliable nuclear deterrent.

The interviewees also were very uncertain over the future size and character of the nation's strategic nuclear deterrent forces, the size and capability of future SLBMs and SSBNs, and the required size of the future SSBN force. Some interviewees believed the size of the future nuclear deterrent force will be so small that the SSBN mission might go away entirely. Others believed a rising China with more capable nuclear forces would necessitate an increase in the size of US nuclear forces, and lead to a larger SSBN force. Others believed the future would see a gradual merging of the SSBN and SSN missions, with future US submarines carrying "mixed loads" of conventional and nuclear weapons.

It will be some time before these uncertainties will begin to sort themselves out. Luckily, the SSBN force need not be quickly replaced. The oldest of the 14 surviving SSBNs was commissioned in 1984; the remainder was commissioned at one year intervals through 1997. With expected 42-year service lives, the 14 boats will not need to be replaced until 2026. Assuming a six-year building period for the first replacement boat (the *Ohios* took approximately six years to build), if the SSBNs are to be replaced on a one-for-one basis, the earliest a replacement boat would need to go into production is approximately 2020. However, if the number of SSBNs falls below 14, Battle Force planners could wait to build the first replacement boat until sometime after 2020. Therefore, the projected construction costs for the next SSBN—the SSBN(X)—fall outside the range of this report.

Given the post-2020 SSBN(X) construction requirement and the general uncertainty surrounding the future SSBN mission, there are only three near-term force structure and shipbuilding issues associated with the SSBN fleet. The first is whether or not to further reduce the SSBN fleet by two to four boats. If the answer is yes, the second is whether to convert the excess SSBNs to

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[497] Norman Polmar, "Submarines Under Attack," *Proceedings,* June 2005, p. 89.

SSGNs or other undersea warfighting platforms. And the third is that all remaining SSBNs will each require a mid-life engineering and refueling overhaul (ERO) to keep the boats in service for their entire 42-year service lives. Each SSBN ERO will cost approximately $300 million in FY 05 dollars, or .21 average ship equivalents.[498]

With regard to the first and second issues, immediately moving the SSBN force to 12 boats and converting the two "extra" boats to SSGNs would seem to be a prudent move. There appears to be no nuclear warfighting or force survivability requirement that that argues against such a move, and there are several attractive reasons to do so. First, assuming the force is replaced on a one-for-one basis, this would delay the delivery date for the first SSBN(X) to 2028. Second, it would provide some new near-term design work to help maintain US submarine design expertise.[499] Third, it would increase the SSGN force to six boats, providing a more capable undersea strike and special operations support capability. This will be discussed in more detail later in the report.

Discussions over whether or not to reduce the SSBN force further to ten boats should be tabled until an independent assessment of the potential risks associated with such a force is conducted. In the meantime, TFBN planners should expect to conduct 12 SSBN EROs.

### Homeland Missile Defense

> We are really building a National Defense System for a rogue nation. So if you know the crisis is coming—which we generally do—then you can position two or three ships to cover a particular threat, let us say, from a Middle Eastern country. If you are covering 360 degrees for the whole world, then it takes more ships. So we really need to talk the threat.[500]

Given both the potential proliferation of nuclear weapons in the Joint Expeditionary Era and the rejection of the Garrison Era logic of "mutual assured destruction," achieving a viable defense against *small-scale* WMD-armed missile attacks aimed at the US homeland is now an important part of US thinking on strategic deterrence and dissuasion. In this regard, the Missile Defense Agency (MDA) has long been attracted to the idea of sea-based missile defenses, since they can

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[498] This represents the average expected cost for an SSBN ERO between 2007 and 2011, and does not include the costs for the two SSBN EROs budgeted for in FY 05 and 06. I would like the thank Dr. Eric Labs, analyst at the Congressional Budget Office, for helping me to derive these figures. Any mistakes, of course, are my own.

[499] The first four SSGN conversions involved SSBNs designed to carry the C-4 version of the *Trident* missile. Later SSBNs were designed to carry the larger D-5 version. As a result, further conversions will require modest non-recurring design and engineering costs. I am indebted to Karl Hasslinger, former Navy submariner and now a corporate strategist with General Dynamics, for pointing this out to me.

[500] "Sea-Based Missile Defense," at http://www.fas.org/spp/starwars/program/news99/990311-tmd.htm.

be positioned along likely threat axes to provide for boost, midcourse, and terminal engagement opportunities against missiles fired at United States or allied territory.[501]

Accordingly, the AEGIS radars on some 15 TFBN guided missile destroyers are being upgraded to provide the ships with a Long-Range Search and Track (LRS&T) capability for inter-continental ballistic missiles (ICBMs). These ships will initially be used to provide cueing support to US ground-based interceptors based in Alaska and in Vandenberg, California. The first operational deployment of a converted LRS&T ship occurred on September 27, 2004, when the USS *Curtis Wilbur* (DDG 54) took up station off the North Korean coast in the Sea of Japan.[502] Furthermore, the VLS systems on three additional TFBN guided missile cruisers are being modified to fire the newly modified Standard SM-3 missile, with an initial exo-atmospheric ballistic missile engagement capability against short-, medium-, and intermediate-range ballistic missiles.[503] All of these modifications are being fully funded by the MDA.[504]

The combined force of 18 modified ships will provide the TFBN's initial contribution to homeland ballistic missile defense. Their capabilities will continue to improve over time. By 2010, all 18 of the ships will have the ability to both track *and* engage ballistic missiles, making the force more flexible and capable. Moreover, progressive upgrades to the AEGIS radar, ballistic missile defense combat systems, and the SM-3 missile should allow the force to itself engage some ICBMs in both boost and midcourse phases of flight.[505]

A total of 18 missile defense ships allows for nine, 2-ship ballistic missile defense firing units.[506] These ships would operate as part of the TFBN surface "battle line" composed of large, multi-mission warships. Since the AEGIS radar can be employed either in a ballistic missile defense mode *or* an anti-air warfare mode, when operating in a high threat area a two-ship firing unit would need to be escorted by a third ship acting as an anti-air warfare "shotgun."

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[501] See for example Rear Admiral John G. Morgan, Jr., USN, "A Triangle of Persuasion," *Seapower*, April 2001, pp. 65-72. Admiral Morgan was then deputy for acquisition strategy for the Ballistic Missile Defense organization, the predecessor to the MDA.

[502] See "A Historic Beginning," at http://www.mda.mil/mdalink/pdf/bmdsbook.pdf. See also Will Dunham, "US Ship With Anti-Missile Gear patrols Sea of Japan," *San Diego Union Tribune*, October 2, 2004.

[503] In 1992, the Terrier LEAP (Lightweight Exo-Atmospheric Projectile) demonstration program culminated in four flight tests and demonstrated the feasibility of theater-wide ballistic missile defense. This program evolved into the Standard Missile-3 (SM-3) development program which adds a third-stage rocket motor to the SM-2 Block IV airframe and propulsion stack, a GPS/INS Guidance Section, and a new hit-to-kill kinetic warhead. See RIM-161 SM-3, at http://www.globalsecurity.org/ space/ systems/sm3.htm. See also "Raytheon Missile to be Tested in Defense Role," *Defense News*, November 1, 2004, p. 26.

[504] See Amy Butler, "Testing the Waters," *Aviation Week and Space Technology*, May 2, 2005, pp. 52-53.

[505] "AEGIS Ballistic Missile Defense," Missile Defense Agency Fact Sheet, found at http://www.mda.mil/mdalink/ pdf/aegis.pdf. See also Harold Brubaker, "AEGIS Upgrade's New Mission," *Philadelphia Inquirer*, September 26, 2004.

[506] The Global Conops Navy called for a total of nine, 3-ship, Theater Air and Missile Defense Surface Action Groups. See Mullen, "Global Concept of Operations."

Sea-based ballistic missile defenses are fungible across defended and contested access scenarios, and the MDA-funded advances in the AEGIS radars and combat systems are transferable to the remainder of the AEGIS/VLS fleet, and will inform the development of future combatants like the CG(X)—the planned replacement for the current *Ticonderoga*-class guided missile cruisers. These improvements will provide for improved missile defense of TFBN forces operating at sea, as well as for Joint and allied forces operating ashore. They may also provide a key capability against a potentially disruptive threat to naval forces operating at sea: ballistic missiles with maneuverable anti-ship warheads. Over time, then, it seems likely that more and more ships in the "battle line" will be modified to conduct ballistic missile engagements. (The threat of anti-ship ballistic missiles, CG(X), and further modifications to the TFBN battle line will be discussed in detail in later chapters.)

US surface combatants modified for ballistic missile defense might someday be augmented by additional ships converted for the ballistic missile defense role. For example, there has been some discussion in arming the aforementioned SSGNs with large anti-ballistic missiles. The advantage would be that these submarines could take up station, unseen, close to an enemy's coast, enabling the US Ballistic Missile Defense System to engage a ballistic missile aimed at the United States during its vulnerable boost phase.[507]

Moreover, these 18 initial US ballistic missile defense "shooters" will likely be joined by additional allied AEGIS/VLS ships to form the basis for a global sea-based missile defense system. The Japanese are planning to provide their *Kongou*- and *Improved Kongou*-class guided missile destroyers with the same ballistic missile defense capabilities found on US ships. The South Korean, Spanish, Norwegian, and Danish navies may also opt for improved ballistic missile capabilities for their current and planned AEGIS/VLS combatants.[508]

## Nuclear-Powered Attack Submarines

> Death near—momentarily—sudden—awful—invisible—unavoidable! Nothing conceivably more demoralizing! I don't think it is even faintly realized—the immense impending revolution will effect as offensive weapons of war.[509]

[507] John Pavlos and Karl Hasslinger, "*Ohio* Subs Would be Best Basing Mode for New Interceptor Missile," *Sea Power,* November 2004, pp. 20-22.

[508] "Sea-Based Missile Defense," an undated PowerPoint presentation provided to CSBA by Lockheed Martin. See also Catherine MacRae Hockmuth, "OSD Official: Japan, US Missile Defense Cooperation Increasing," *Inside the Pentagon,* March 10, 2005, pp. 18-19.

[509] Admiral Jackie Fisher, as cited in Robert K. Massie, *Castles of the Sea* (New York, NY: Ballentine Books, 2003), p. 123.

> What is the use of battleships as we have hitherto known them? NONE! Their one and only function—that of ultimate security of defense—is gone—lost.[510]

The above words were written in 1904 by Sir Jackie Fisher as he contemplated the impact that submarines would have on naval warfare. The revolution he foresaw took five decades to come about, triggered by the appearance of the first high-speed, nuclear-powered attack submarine, the USS *Nautilus,* commissioned in 1954. Today, nuclear attack boats remain the most effective tool for the open-ocean sea control mission. With their combination of speed, unlimited range, high endurance, stealth, and payload they can sink anything on or under the oceans, with little to fear except another nuclear submarine. A strong fleet of nuclear-powered attack submarines is likely the best way to dissuade an adversary from entering a global, open-ocean naval competition with the United States. SSNs are thus the third key component of the TFBN's Strategic Deterrent/Dissuasion Fleet.

In addition to their dissuasive power, SSNs are among the most fungible assets in the TFBN. They provide covert ISR, unwarned strike, and special operations support for the irregular warfare mission. They protect the Joint sea base from underwater attack, both in transit and in littoral waters. And few, if any, Battle Network assets are better at penetrating and operating inside an enemy's A2/AD network. Having a large US SSN fleet provides the TFBN with enormous operational flexibility, and helps to set it apart from any other global naval force.

## The US Undersea Order of Battle

The number of Battle Force submarines remained remarkably constant during the Garrison Era. The DoN planning target for submarines in December 1945 was for 90 fleet boats; planning guidance after the Korean War called for 100. With the exception of two periods—during the immediate post-World War II demobilization and during the block retirement of World War II boats in the late 1960's and early 1970s, the force varied between 90 and 105 total submarines.[511] For this reason, the dramatic Joint Expeditionary Era reduction in the number of active boats has been especially trying for the US submarine fleet.

Recall that the 1997 Quadrennial Defense Review called for a SSN force of 50 boats. A subsequent Joint Staff Study on future SSN requirements caused the force planning target to be raised to 55 boats—just over half of the average Garrison Era force. This target was endorsed by the 2001 QDR.[512] Toward this goal, on December 31, 2004, the TFBN operated 53 nuclear-powered attack submarines, more than the rest of the world's navies, combined: Russia operated

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[510] Admiral Jackie Fisher, talking about the development of the submarine on Britain's cherished surface fleet, as cited in Herman, *To Rule the Waves,* p. 482.

[511] McCrea, Domabyl, Parker, *The Offensive Navy Since World War II: How Big and Why?*

[512] Rear Admiral Paul F. Sullivan, USN, "Where's the Nearest Submarine?" found at http://www.chinfo.navy.mil/navpalib/cno/n87/usw/issue.11/nearest_submarine.html. A good review of the changing submarine force structure target can be found in Ronald O'Rourke, "Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress," Congressional Research Service Report RL32418, May 31, 2005.

16 (with an additional seven nuclear-powered boats armed with anti-ship missiles); Britain, 11; France, six; and China four.

This 53 boat fleet consisted of:

- 19 pre-VLS *Los Angeles*-class SSNs. These 19 boats carry crews of 143 officers and Sailors. They have four, 21-inch diameter torpedo tubes, and space in their torpedo rooms for 22 torpedoes/encapsulated weapons. On patrol, by keeping their tubes filled with weapons and one torpedo room stowage space free to allow swap outs of weapons in the tubes, the boats carry a notional patrol load of 25 tube-launched weapons.[513]

- 31 VLS-equipped *Los Angeles* SSNs. These boats also carry crews of 143. However, in addition to carrying 25 tube-launched weapons, they have 12 VLS cells nestled in their hulls, giving them a patrol load of 37 weapons.[514]

- Two *Seawolf* SSNs.[515] These two boats carry crews of 138 officers and Sailors. They do not carry any VLS cells. However, they have spacious two-deck torpedo rooms which allow them to carry a total of 50 tube-launched weapons. In addition, they have eight (instead of four) torpedo tubes, and the tubes are 26.5 inches in diameter, allowing for quiet "swim out" of their 21-inch weapons, or the launch of larger diameter weapons and UUVs.[516]

- One *Virginia*-class SSN. With a crew of 134, the Virginia improves modestly on the *LA*-class patrol load, carrying 27 tube-launched and 12 VLS-launched weapons for a total of 39 war shots.[517]

This 53-boat fleet requires an aggregate crew of 7,560 officers and men. The fleet's total weapons capacity amounts to 1,377 tube-launched weapons and 384 VLS-launched weapons, for a combined magazine capacity of 1,761 21-inch diameter weapons.

The force reflects a long-standing US submarine design philosophy as well as changes in the character of the underwater competition in the Joint Expeditionary Era. With regard to the former, US submariners have consistently valued acoustic stealth combined with advanced

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[513] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 85.

[514] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 83.

[515] The third *Seawolf*-class boat, the USS *Jimmy Carter*, was not commissioned until 2005, and is not included in the numbers. Moreover, although the *Carter* retains all of the combat systems of an SSN, this report considers her a special mission submarine and not a part of the SSN force. She is considered part of the Counter-A2/AD fleet, and will be discussed in that section.

[516] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 80-81.

[517] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 75-76.

acoustical signal processing above all other design characteristics. Together, the two give US submarines a "first-shot advantage" over adversary submarines in most tactical encounters, regardless of ocean environment. The *LA*-class, introduced in 1976, was much quieter and had a better underwater combat system than previous US SSNs, and it enjoyed a significant tactical advantage over contemporary Soviet boats. It was routinely described as the finest ASW platform then afloat. The *Improved LA*-class, introduced in 1988 with even better acoustical silencing, extended the advantage.[518]

Between 1976 and 1996, the United States commissioned no less than 39 basic *Los Angeles* class boats (8 with VLS batteries) and an additional 23 *Improved Los Angeles* class boats (all with VLS batteries), for a total of 62 boats. With expected service lives of 33 years, and with 50 boats remaining in service, the *LAs* and *Improved LAs* will make up the majority of the US SSN fleet for some time to come.[519] In light of the steady acoustical improvements in current and expected foreign nuclear and diesel electric submarines,[520] a key to keeping these submarines effective throughout their service lives is the Acoustic Rapid Commercial-off-the-shelf Technology (COTS) Insertion program, or ARCI. The ARCI introduces a new class-wide Open Systems Architecture (OSA) that enables rapid updates to the fleet's acoustical signal processing software and hardware. The use of COTS-based processors will allow the boat's sonar system computing power to grow at the same rate as computing power in the commercial world. This strategy is perfectly in tune with a Strategy of the Second Move, which emphasizes getting the most out of legacy platforms, and making rapid technological improvements in areas that underwrite US tactical dominance.[521]

Steady improvements in Soviet SSN acoustical stealth over the course of the Garrison Era led to the design and development of the ultimate Garrison Era SSN—the *Seawolf*. The *Seawolf* aimed to re-establish decisive US acoustic superiority over the improving Soviet submarine fleet.[522] Before its commissioning, it was described as being the "world's quietest submarine," a claim never since refuted. It is credited with having a maximum "acoustic speed"—the speed at which the submarine can operate with low enough self-radiated noise levels to allow it to use its more stealthy passive sensors—of 20 knots. A comparative speed for a Soviet nuclear boat built in the

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[518] A.D. Baker III, *Combat Fleets of the World, 1986/87.*

[519] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 83. The original expected ESL for these submarines was 30 years. Subsequent analysis indicated that the ESL could be extended to 33 years by better monitoring of reactor usage.

[520] For a discussion of foreign improvements in acoustical signal processing, see Joris Janssen Lok and Richard Scott, "Sonar Systems Taste Suite Success," *Jane's International Defense Review,* pp. 48-57.

[521] See "SSN-688 *Los Angeles* Class Submarine," at http://www.fas.org/man/dod-101/sys/ship/ssn-688.htm.

[522] The best unclassified account of the US-Soviet undersea competition, the fight for acoustical superiority, and the effect that steady improvements to Soviet acoustical silencing had on US ASW strategy and operations is found in Owen R. Cote, Jr., *The Third Battle: Innovation and the U.S. Navy's Silent Cold War Struggle with Soviet Submarines* (Newport, RI: Naval War College, 2004), Newport Paper 16. See especially pp. 41-67.

latter years of the Garrison Era was 6-8 knots.[523] This advantage would have improved the ability of a *Seawolf* to quickly search and sanitize a given patrol area.

With the collapse of the Soviet Union and the subsequent dismantling of the Russian submarine fleet, construction of the *Seawolf*-class was halted after only three boats were authorized, which explains the small number of boats now in the fleet. These big, 9,137 ton boats (submerged displacement)—specifically designed primarily to hunt Russian nuclear submarines in the open oceans and under the Artic ice cap—were considered too expensive and ill-suited for the emerging undersea competition in the Joint Expeditionary Era, which was shifting into shallow and noisy littoral waters. The DoN thus elected to halt production of the *Seawolf* and to instead rapidly pursue a completely new SSN design better suited for the new competitive regime. The first of the new *Virginia*-class SSNs was commissioned in October 2004.[524]

Not counting small special operations submarines, the *Virginia*-class SSN is the only US submarine currently in production. It has a modular design that specifically allows for the insertion of 30-foot, 800-ton hull plugs with only a .5 knot speed penalty. Future “flights” of the submarine were to take advantage of the submarine’s modularity and introduce more powerful capabilities progressively into the fleet. Moreover, following in the path-breaking steps of the ARCI program, the *Virginias* were designed from the start to have an advanced open combat system architecture that would facilitate rapid fleet upgrades to the submarine’s combat systems.[525]

The *Virginia* is considerably smaller than the *Seawolf*, with a submerged displacement of 7,800 tons, and is 25 percent cheaper. In keeping with US submarine design priorities, the *Virginia’s* acoustic signature is considered to be as good, if not better, than the *Seawolf’s*. Up until *Virginia*, the price paid for increased acoustic stealth was increased submarine size. Improved rafting and other silencing techniques allowed US submarine designers to reverse the trend, and to build a smaller submarine every bit as quiet as the *Seawolf.* The *Virginia* design also benefited from a focus on the littoral environment. It has a special stern arrangement and other control features that improve the ship’s depth keeping and maneuverability in shallow water. Its electromagnetic signature is said to be much better than previous US submarines, giving it a much better ability to penetrate and operate in mine infested waters. In addition, the boat boasts a modular torpedo room that can be reconfigured to transport SEALs (Sea-Air-Land naval special operations forces) and their equipment, and a nine-man lock-in/lock-out trunk to allow them to exit and enter the boat while it is submerged and underway. Despite its many improvements in hull and combat

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[523] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 80-81.

[524] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 75-82.

[525] William H. Kowenhoven and Frederick J. Harris, “The NSSN: a 21st Century Design,” *Proceedings*, June 1997, p. 36; and Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 75-76.

systems, however, it makes only marginal improvements in crew size, carrying 134 officers and Sailors to the *LA's* 143—a savings of only nine crew members.[526]

In addition to building a SSN specifically designed for littoral operations and introducing an innovative fleet-wide open combat systems architecture, the shift to the Joint Expeditionary Era augured in an increased TFBN emphasis on improving SSN Battle Force connectivity. During the Garrison Era, while stalking and hunting Soviet submarines, US SSNs generally operated alone and independently. Now, consistent with the TFBN design criteria of *Get Connected, Jointly,* giving SSNs the ability to maintain communications with and to plug into a Naval Battle Network when operating underwater at speed and depth is the new "holy grail" for US submarine designers. As a result, improving submarine connectivity has jumped toward the top of SSN priority lists, as is indicated by the large number of programs now being pursued.[527]

### Recapitalizing the SSN Fleet

The 53 *Los Angeles*, *Seawolf*, and *Virginia* SSNs represent the most technically advanced, operationally capable, and deadly submarine fleet in the world. One of the most vexing problems facing TFBN planners is how to sustain such a large and capable SSN fleet. Even increasing their expected service lives to 33 years, building the SSN fleet to the JCS force target of 55 boats would require a steady-state build-rate of approximately 1.67 *Virginias* per year, or five boats every three years (e.g., a 2-2-1 building profile). Unfortunately, however, between Fiscal Years 1992 and 1998, the DoN authorized no new attack submarines. With the end of the intense undersea competition with the Soviet Union, the US submarine force was cut nearly in half. More importantly, as was mentioned above, construction of the *Seawolf*-class was halted after just three boats, and the third of the class was converted to a special mission submarine.[528] The DoN judged that it would be better to halt construction of all SSNs until the *Virginia*—a submarine specifically designed to operate in littoral waters—could be designed and built.

Like all US warships, however, the costs of the *Virginia* began to climb; one boat now comes in at just over $2.4 billion in FY 05 dollars.[529] Given the tight shipbuilding budgets in the later 1990s and early 2000s, initial production rates of the boat stabilized at only one boat per year. The *Virginias* modular design still allowed submarine construction work to be split between two different yards—Electric Boat and Newport News. Both yards could build modular hull sections

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[526] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 75-78; and Kowenhoven and Harris, "The NSSN: a 21st Century Design."

[527] For a good overview of these programs, see Scott C. Truver, Thomas P. Holian, and Richard Scott, "Solutions Sought for Straying in Touch at Speed and Depth," *Jane's Navy International,* September 2005, pp. 43-51.

[528] As mentioned earlier, the special mission submarine is the third *Seawolf*-class SSN, the *Jimmy Carter*. It is not considered part of the SSN fleet, and will be discussed in the section on the Counter-A2/AD Fleet.

[529] Admiral Clark put the cost for a *Virginia*-class submarine at $2.427 billion in FY 05 dollars. See Clark's, Statement before the Senate Armed Service Committee, April 12, 2005. See also Andrew Koch, "Funding Curb Forces Virginia Reality Check," *Jane's Defence Weekly,* January 26, 2005, p. 4; and O'Rourke, "Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress."

and could alternate as the assembly/completion yard for the sections. However, this arrangement—designed to keep two different nuclear submarine builders in production—has no precedent in US or foreign experience, is very inefficient for submarine build rates of one per year, and contributes to the continued high unit cost of the submarine.[530]

As a result of halting attack submarine authorizations for six years and building only one *Virginia* per year for an extended period of time, TFBN planners are faced with an uneven force age profile that greatly complicates SSN recapitalization plans. Assuming 33-year ESLs, 23 *LA*- and *Improved LA*-class boats will retire between 2005 and 2020, at an average rate of 1.3 boats per year. From 2020 through 2031, all 27 remaining *LAs* and two *Seawolfs* will disappear, at an average rate of 2.6 boats per year. Therefore, if the TFBN continues to build *Virginias* at a rate of one per year, the SSN force will drop below 40 boats sometime during 2023, and below 33 boats in 2026. The force would bottom out at 27 boats in 2029, and then climb slowly up to a steady-state 33-boat fleet in 2037.[531]

To *maintain* the SSN fleet at the 55 boats called for by the JCS study would require that the DoN increase the *Virginia* build rate to over three boats per year. Unfortunately, at a current cost of some $2.4 billion or higher, or 1.7 ASEs, building even two *Virginias* a year will severely constrain other TFBN options on the projected steady-state shipbuilding budgets that support only 5.7-8.6 ASEs per year.[532] This helps to explain why current DoN plans are to slowly reduce the SSN fleet to 41 boats between now and 2035.[533] However, even reducing the SSN requirement from 55 to 41 boats doesn't completely solve the problem, since maintaining the fleet at even this lower level will still require that the SSN build rate be increased to two boats per year in 2012, and remain there for over a decade.

Given the severe tradeoffs that moving to two SSNs per year would force on TFBN naval architecture planners, two important questions need to be objectively answered. First, is the TFBN in any danger of losing its current comfortable level of undersea superiority in the near

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[530] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 75.

[531] As previously stated, the planned service lives for US SSNs was 30 years. Subsequent analysis indicated that the ESL could be extended to 33 years, depending on reactor usage. Greater than expected reactor usage will result in a boat's retirement sometime between 30 and 33 years. The fleet numbers indicated are calculations based solely on submarine commission dates and expected service lives of 33 years per boat. The actual decommissioning states will depend on the submarine's material condition and the life is left in its core. Readers should be aware that these figures are notional planning numbers only. See O'Rourke, "Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress."

[532] The cost of the second *Virginia*-class submarine, the *USS Texas*, has reportedly climbed to $2.71 billion. See Associated Press, "New Submarine's Price Tag Skyrockets," *The Newport News Daily Press*, August 8, 2005. For a discussion on cost growth in the *Virginia* program, see Christopher Hellman, Fact *Sheet: Cost Growth in the Virginia Submarine Program*, Center for Arms Control and Non-Proliferation, August 19, 2005.

[533] These are the "325-ship Plan" numbers. In the "260-ship Plan," the SSN force drops to 37 boats. See "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006;" Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

term? Second, depending on the answer to the first question, what is the best strategy to sustain US undersea superiority over the long term?

### Quantifying US Undersea Superiority

The only explicit reference made to the number of submarines necessary to sustain US undersea *warfighting* superiority in the aforementioned JCS-sponsored submarine force structure study was a requirement to have 18 submarines with *Virginia/Seawolf*-class silencing by 2015. Its recommended 55-boat force structure turned heavily on the number of peacetime ISR mission days the SSN force could support.[534] The report was quite accurate in this regard; the use of SSNs during peacetime to conduct high priority national and TFBN intelligence missions continues to place high demands on the current 53-boat force.[535]

While these missions are undoubtedly important, the primary wartime mission of the SSN force is to establish undersea superiority and to protect TFBN and Joint sea bases from underwater attack, and to support TFBN and Joint strike operations. Moreover, as will be discussed, the TFBN is gaining new platforms like the Littoral Combat Ship and SSGN that are likely to take some of the intelligence collection load off of the SSN force. Given the high units costs of the *Virginia*-class SSN, TFBN planners need to re-look at the required size of the SSN fleet by focusing first on the near- to long-term threats to US undersea superiority, and then determine the *minimum* number of SSNs necessary to retain a comfortable margin of undersea dominance. ISR collection requirements should be a second priority in determining the final size of the TFBN fleet.

For any navy operating submarines, ensuring the operational availability of just one submarine requires a minimum force size of three or four boats. Exacting submarine maintenance standards require substantial operations and support expenditures, especially as the boats age. Moreover, training requirements are demanding, although modern combat systems and wake-homing torpedoes may make modern torpedo attack training less of a problem. In any event, maintaining a self-sustaining, skilled submarine community consisting of capable boats crewed by qualified submarine officers and enlisted crew members is a daunting proposition for any navy, especially a small one.[536]

Many of the boats purchased during the intense Garrison Era undersea competition between the United States and its allies and the Soviet Empire are now reaching the end of their ESLs. Given

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[534] When considering the number of ISR mission days needed to satisfy the collection requirements of all the Regional Combatant Commanders, the JCS Study concluded that in the year 2015, 68 SSNs would be needed to meet all “highest” (i.e. critical) collection and operational requirements. The JCS study also stated a force structure below 55 SSNs in 2015 would leave the CINCs insufficient capacity to respond to urgent crucial demands without gapping other requirements of high national interest. This study caused the 50-boat SSN force structure target approved in the QDR to be increased to 55 boats. “Unclassified Release of the 1999 CJCS Attack Submarine Study,” two-page DoN information paper, dated February 7, 2000.

[535] Leavenworth, “Panel Hears Navy Chiefs.”

[536] A.D. Baker III, “World Navies Are in Decline,” p. 33.

the collapse of this intense undersea competition and the high costs associated with maintaining a submarine fleet, few world navies are replacing their aging subs on a one-for-one basis; still others are giving up their submarine capability completely. As examples, the British Royal Navy is reducing its nuclear attack submarine fleet from 12 to eight SSNs, and the Royal Danish Navy is eliminating its submarine force entirely in order to improve its out-of-area expeditionary capabilities. As a result, and as was described in Chapter II, the world-wide submarine fleet is shrinking at a relatively rapid rate.

In addition, the types of boats being built are also generally inferior to US SSNs. Nuclear boats are out of reach for all but the most capable and richly resourced navies. Moreover, as previously discussed, despite predictions to the contrary, super-quiet AIP diesel submarines do not appear to be proliferating rapidly. Recall that the cost of a German-built Type 214 AIP boat is approximately $.5 billion, meaning a four-boat force represents a minimum expenditure of $2 billion, not counting support, training, and other life cycle costs. As a result, of the 40 or so AIP boats either in operation or under construction, all will be operated by relatively well-off navies that are either allied with, or friendly to, the United States. Those smaller, less advantaged navies that are opting to retain a submarine capability are generally purchasing either new non-AIP diesel boats or used submarines:

> In fact, far from regarding AIP technology as a "must have,"…many navies continue to express an interest in the venerable, pre-AIP Type 209 designs. Moreover, none of the companies that offer AIP technology are actively developing "next generation" AIP systems...[537]

In an era where the world-wide undersea warfighting threat appears to be diminishing, is the current US submarine fleet large enough to maintain a comfortable degree of undersea superiority? Without the benefit of classified operational analyses, one way to answer this question might be to determine a reasonable one- or two-navy standard—the number of submarines necessary to confront and defeat either the largest, or the next two largest, ROW submarine fleets.

During the 1990s, the PLAN has surpassed the Russian Navy to become the number two submarine force in the world, at least in terms of numbers. The PLAN operates a single SSBN, four SSNs, and 54 diesel-electric boats (with additional ten diesel electric boats in reserve), for a total of 59 operational boats of all types. The once mighty Russian submarine fleet now consists of 12 operational SSBNs, 23 SSNs and SSGNs, and 13 *Kilo*-class diesel electric boats, for a total of 48 boats of all types. The size of the next largest submarine fleet—that operated by the Japanese Maritime Self Defense Force—drops precipitously to only 16 boats.[538]

Recall that at the very end of the Garrison Era the United States operated 93 SSNs. Using a *one-navy standard*, these boats faced a force of 264 Soviet submarines, including 63 SSBNs, 72

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[537] Driver, "Holding Breath on AIP," p. 20.

[538] All numbers are from *Jane's Fighting Ships, 2004-2005*.

guided missile submarines (SSGNs and SSGs), 64 SSNs, and approximately 65 conventional submarines. US submariners felt confident they could defeat the Soviet submarine fleet even though they operated with an unfavorable force ratio of one US boat for every 2.84 Soviet boats. Today, using a *two*-navy standard, today's 53 US SSNs would face a combined Russian-Chinese fleet of 107 total boats, for a force ratio of one US SSN to every 2.02 enemy boats—a much more favorable force ratio. *Said another way, using a two-navy standard, the US SSN force would have to fall below 38 SSNs before it faced a force ratio worse than it confronted at the end of the Garrison Era.* It therefore appears the current 53-boat force provides the TFBN with a clear measure of undersea superiority.

### Maintaining US Undersea Superiority Over the Long Term

Whether or nor this condition holds true over time will depend on whether or not the Russian and Chinese submarine fleets maintain or expand in size, whether the two navies make substantive qualitative improvements to their forces, and the steps the TFBN takes now to ensure its undersea superiority over time.

While the PLAN currently operates the largest ROW submarine fleet, it now consists of many aging, obsolete designs: its four *Han*-class SSNs have had a history of troubles; 22 (and all ten of its reserve subs) are diesel-powered, Soviet-designed, Chinese-built *Romeos* nearing the end of their useful service lives; and 20 more are only slightly more modern diesel-powered, Chinese-built *Mings,* an updated version of the *Romeo*.[539] As a result, the PLAN has embarked on a complete modernization of its submarine fleet. It is expected to introduce at least four new Project 094 SSBNs. It is replacing the *Han SSNs* with the new indigenously-built Type 093 SSN, reportedly based on the Russian *Victor III* design.[540] It is also thoroughly upgrading its diesel-electric fleet. It has 12 Russian *Kilos* either in service or on order, and the first of the new *Yuan*-class recently launched appears to be a Chinese variant of the *Kilo*.[541] It continues to produce the *Song*-class SSG, which appears to be an indigenous design based on the French *Agosta*-class SSG. Despite some rumors to the contrary, none of these boats appear to have an AIP propulsion plant.[542] In other words, although new PLAN submarines are much improved over their out-of-date predecessors, they do not yet appear to represent a substantive qualitative threat to either US submarine design or tactical superiority. Therefore, despite worries about a growing Chinese

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[539] When describing the *Han,* one naval analyst described the SSN as "rather noisy and of little military effectiveness." As for the *Romeo* and *Mings,* the former "are virtually defenseless against modern Western submarines;" and the latter's "overall performance was not really satisfactory." Annati, "China's PLA Navy: The (R)Evolution," pp. 69-73. According to *Combat Fleets of the World 2005-2006,* all *Romeos* will be out of service by 2010.

[540] Annati, "China's PLA Navy: The (R)Evolution," p. 72.

[541] See "Yuan Type 039A," at http://www.globalsecurity.org/military/world/china/yuan.htm.

[542] Some analysts believe the *Yuan*-class and some *Songs* may have AIP plants. For example, see James T. Hackett, "China's Sub Plan Menace," *Washington Times,* April 17, 2005.

"sub menace," the fleet has a long way to go before it can reasonably contest US undersea dominance.[543]

The Russian fleet generally has more modern submarines than those in the PLAN, but these boats have suffered badly because of a severe lack of funding since the collapse of the Soviet Union. The Russian SSBN fleet consists of 16 boats, but only 12 appear to be operational. They evidently will be replaced by an unknown number of Type 955 *Borey*-class SSBNs, the first of which is expected in service in 2006.[544] With the exception of an aging SSBN that was converted into a land attack cruise missile carrier, no Russian SSNs and SSGNs were commissioned before 1984. The apparent replacement for both SSNs and SSGNs is the new Type 885 SSN. However, the first of these boats was laid down in 1993 and is not scheduled to enter fleet service until 2007, if then.[545] Given the age of its design, it is hard to imagine this that this new sub will represent a major qualitative challenge to the *Virginia*. With regard to the Russian conventional submarine fleet, the oldest *Kilos* are approaching 25 years in age, and are likely nearing the end of their service lives. They will evidently be replaced by the new *Lada*-class diesel electric submarine, a "fourth generation" diesel-electric boat now in low-rate production. The Russian *Ladas* are reportedly fitted for, but not with, an AIP fuel cell.[546] Given the current state of the Russian submarine fleet and the Russian Navy's evident funding problems, it is uncertain whether the Russian Navy will be able to sustain its submarine fleet at its current numbers, or maintain its current mix of two-thirds nuclear and one-third diesel boats.

As a result, it seems unlikely that the combined Russian-Chinese fleet of 40 nuclear boats—13 SSBNs and 27 nuclear-powered attack and guided missile submarines—is likely to increase much. A notional mid-term force of ten new Russian and four new Chinese SSBNs, and 20 Russian and ten Chinese SSNs, would see a total combined nuclear force of 44 boats. Assuming the Russians and Chinese opt to maintain their diesel-electric fleets at approximately the same levels they operate today, but move to thoroughly modernize them with the boats now in production, a notional mid-term diesel-electric fleet might consist of 15 Russian *Kilo*/*Ladas*, 12 Chinese *Kilos*, 22 *Songs* (to replace the *Romeos)*, and 20 *Yuans* (to replace the *Mings*), for a total of 69 conventional boats. If accurate, the combined fleet would consist of 113 submarines (68 Chinese and 45 Russian boats).

[543] Even so, the Chinese effort in submarine construction operations is quite impressive. For an excellent discussion of the strides made by the PLAN submarine fleet, see Lyle Goldstein and William Murray, "Undersea Dragons: China's Maturing Submarine Force," *International Security*, Spring 2004, pp. 161-96. Also see Hackett, "China's Sub Plan Menace."

[544] See "Nuclear-powered Ballistic Missile Submarines (SSBNs)—Russia," in *Combat Fleets of the World, 2005-2006*.

[545] *Jane's Fighting Ships 2004-2005*, pp. 593-600.

[546] See "Attack Submarines (SS)—Russia," in *Combat Fleets of the World, 2005-2006.*

Assuming a 33-year ESL for US nuclear attack subs, and projecting a long-term, steady state Russian/Chinese sub fleet of 113 boats, the following repetitive building profiles for *Virginia* SSNs will result in the indicated *steady-state* force ratios:

| | | | | |
|---|---|---|---|---|
| *Virginia* build profile: | 2-2-2 | 2-2-1 | 2-1-1 | 1-1-1 |
| Steady state SSN force: | 66 | 55 | 44 | 33 |
| Two-navy force ratio: | 1:1.71 | 1:2.05 | 1:2.57 | 1:3.42 |
| One-navy force ratio: | 1:1.03 | 1:1.24 | 1:1.55 | 1:2.06 |

As these figures demonstrate, when using the ratio between US and Soviet submarines during the Garrison Era as a guideline (1:2.84), the US SSN force could fall to 24 boats before facing force ratios more unfavorable than it accepted during that intense undersea competition. (24 US SSNs to 68 Chinese submarines). Using a two-navy submarine force sizing standard, the US SSN force could fall to 40 boats (40 US SSNs to 113 Chinese and Russian boats). A steady-state force of 33 SSNs falls in the middle of this range, providing, in effect, a "1.5-navy" standard.

Based on the requirement to prepare for just one major Joint power-projection operation, a force 40 boats would thus appear to provide a substantial margin of superiority in a confrontation against *either* the Russian *or* the Chinese submarine fleet, while retaining a residual force to support irregular warfare operations.[547] This force also appears large enough to dissuade any but the most determined competitors from mounting an open-ocean challenge to the United States. At no time should the force be allowed to fall below 33 boats.

A threshold force level of 33 boats and an objective force level of 40 boats define and bound the SSN shipbuilding planning problem. Recall that even at a build rate of just one *Virginia* a year, by the end of calendar year 2020 the US SSN fleet will consist of 25 *LAs*, 16 *Virginias*, and 2 *Seawolfs*, for a total of 43 boats—still comfortably above the desired force structure. Thereafter, however, by virtue of the TFBN's past uneven SSN construction history, things become less favorable, with the force bottoming out at 27 boats before climbing back up to a steady-state size of 33 SSNs. The focus of TFBN plans should be to eliminate the period of time the force falls below 33 boats.

It currently takes six years to build a *Virginia*-class submarine.[548] Assuming no improvement in the build time, to maintain the SSN fleet at 33 boats or more, TFBN planners would have to shift to two *Virginias* a year in 2018. By building two submarines for seven years, the force would

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[547] The DoN's recently announced plans to maintain the SSN fleet between 37 and 41 boats is consistent with a two-navy force standard. "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006;" Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[548] David Lerman, "Submarine Numbers Shrinking Gradually," *Newport News Daily Press*, June 9, 2005, p. 1.

bottom out at 33-boats 2029, and climb gradually up to a force of 40 boats in 2037. In other words, given no major change in the size of the Chinese and Russian submarine fleets, it thus appears that the DoN could delay moving to a submarine build rate of two subs per year for over a decade and still maintain an adequate level of undersea superiority over the mid- to long-term.

### The Changing Nature of the Undersea Competition

One objection to this analysis is that making plans based solely on projected force ratios disregards other important factors that impinge on the undersea competition, such as advantages in undersea surveillance and cueing and acoustical silencing. Recall that one reason the United States confidently accepted a large disparity in the US-Soviet sub ratio during the Garrison Era was that it had a tremendous advantage in undersea surveillance and cueing, due primarily to the Sound Surveillance System, or SOSUS, which provided deep water long-range detection of relatively noisy Soviet submarines. This system cued Battle Force assets such as P-3 ASW patrol aircraft and SSNs toward Soviet submarines, greatly facilitating their search and attack operations.[549] After the Walker spy ring alerted the Soviets to this advantage, the Soviets made rapid strides in submarine acoustic quieting which negated to a great degree the effectiveness of the US ocean surveillance network, and changed the level of confidence that US naval planners had in their calculations about the undersea correlation of forces.[550]

Moreover, there has been a general improvement in ROW submarine acoustical silencing in the Joint Expeditionary Era. Contemporary Russian and Chinese nuclear-powered attack submarines and diesel-powered SSKs all boast improved quieting over their predecessors. The *Kilo*-class SSK used by both the Russian and Chinese navies is reported to have an acoustical signature equivalent to early US *LA*-class SSNs. The Russian *Lada* SSKs are expected to be eight-to-ten times quieter than early *Kilos*.[551] Moreover, TFBN planners should expect that future Chinese and Russian conventional boats may move toward AIP propulsion, which may make them even more difficult to detect and track. Given the loss of an ocean acoustical cueing advantage and unfavorable trends in acoustical signature, a plausible argument can be made that the United States likely will require far more favorable future force ratios than those US planners were willing to accept during the Garrison Era.

A second argument against using submarine force ratios is that they disregard the long-term disruptive potential of unmanned underwater vehicles. Although the UUVs of today are slow, short-legged, and have small payloads, their capabilities will surely improve over time. Furthermore, many of the limitations on UUVs can be ameliorated if they are operated from

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[549] See "Sound Surveillance System (SOSUS)," at http://www.fas.org/irp/program/collect/sosus.htm; and "Acoustics Monitoring," at http://www.pmel.noaa.gov/vents/acoustics/sosus.html.

[550] For information about the Walker spy ring, see "Family of Spies: the John Walker Jr. Spy Case," at http://www.crimelibrary.com/terrorists_spies/spies/walker/1.html. For the impact that Soviet acoustical silencing had on the Garrison Era undersea competition, See Cote, Jr., *The Third Battle: Innovation and the U.S. Navy's Silent Cold War Struggle with Soviet Submarines.*

[551] See "*Lada* Class, Russian Navy," in *Combat Fleets of the World*, 2005-2006.

fixed land bases and supported by a coastal undersea infrastructure that includes subsea charging stations and communications interfaces. Is it reasonable to assume that future adversaries might introduce such unmanned undersea warfighting networks over the next several decades? If so, then the job of gaining and maintaining local undersea superiority in a Joint Operations Area for a smaller US SSN force may become much tougher over time.[552]

Both of these arguments are strong on their merits. However, they do not necessarily support the dramatic expansion of the future SSN force. Indeed, both counter-arguments suggest the nature of the undersea competition is changing. In the future, undersea superiority likely will be decided by the outcome of battles between distributed undersea combat networks consisting of undersea surveillance systems, manned submarines, and unmanned underwater vehicles. In this competition, comparing submarine force ratios will tell only part of the story; a smaller submarine force that has an advantage in undersea surveillance and UUVs may prevail against a much larger force of manned submarines, especially in confined undersea battles in littoral waters.

Indeed, the move toward distributed undersea combat networks helps to explain the US interest in developing a variety of ocean surveillance systems, including a modernized SOSUS; expeditionary acoustical arrays such as the Advanced Deployable System (ADS), the Advanced Extended-Range Echo Ranging System, and the Deployable Autonomous Distributed System; and new "persistent ocean surveillance systems" involving UUVs, buoys, and other sensors.[553] It also helps to explain the emphasis placed on ISR, ASW, and communications and navigation network nodes in the recent DoN UUV Master Plan,[554] as well as new submarine communications programs such as the Recoverable Tethered Optical Fiber (RTOF) buoy.[555]

### Future Undersea Superiority and the Strategy of the Second Move

In summary, then, here is the situation facing TFBN planners. It seems quite clear that the TFBN is now able to establish undersea superiority in any geographical locale, and against any potential adversary. The *Virginia*-class SSN now in production is likely the best submarine in the world, but it is also the most expensive—so much so that the likelihood of building more than one per year on a steady state budget of $8 to $12 billion is low. Meanwhile, the nature of the undersea

[552] For a discussion about how the US is approaching UUVs, see "Brain-Based Controller," *Seapower*, July 2005, pp. 26-29.

[553] David W. Munns, "121,000 Tracks," *Sea Power*, July 2005; Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 566; "Advanced Deployable System (ADS)," at http://www.fas.org/irp/program/collect/ads.htm; and "Automated Feature Extraction for the Advanced Deployable System," at http://enterprise.spawar.navy.mil/sbir/documents/Orincon_N94-225.pdf.

[554] For information on the Navy's UUV Master Plan, see Department of the Navy, *Unmanned Undersea Vehicle (UUV) Master Plan*, November 9, 2004. The report can be found online at http://www.chinfo.navy.mil/navpalib/technology/uuvmp.pdf. For a good summary of the master plan, see Barbara Fletcher, "UUV Master Plan: A Vision for Navy UUV Development," at http://www.spawar.navy.mil/robots/pubs/oceans2000b.pdf; and Keith Jacobs, "US Navy Master Plan for UUV Development," *Naval Forces*, No. III, 2005, pp. 96-102.

[555] Truver, Holian, and Scott, "Solutions Sought for Straying in Touch at Speed and Depth," p. 44.

competition is changing, with the importance of manned submarines likely to decrease over time as UUVs become more capable and undersea combat networks evolve. To maintain its current level of undersea superiority, the United States must focus its attention on this newly evolving undersea warfighting regime.

These general conditions are tailor-made for a Strategy of the Second Move. The logic of the strategy suggests that TFBN planners continue the steady-state production of one *Virginia*-class SSN per year. This will keep the US submarine industrial base warm, and be sufficient to maintain the size of the SSN fleet above 40 boats through 2023. Both the *Los Angeles* ARCI upgrades and the *Virginia's* open architecture combat system are well- structured to allow for rapid upgrades in weapons, sensors, and combat systems, allowing the United States to rapidly adapt to any unexpected turns in the near-term undersea competition. Moreover, even if not now fully exploited due to funding constraints, the *Virginia's* modular design allows for more complex platform upgrades, if the competition demands it.

Barring any major increase in the Russian and Chinese submarine fleets, a SSN force between 33 and 40 boats through the 2020s and 2030s would provide between a 1.5- to 2-navy standard based on historical force ratios. Assuming the development of US undersea combat warfighting networks including advanced deployable undersea surveillance networks and UUVs, these 33 to 40 boats should be sufficient to guarantee local US undersea superiority anywhere in the world and against any opponent. To maintain the fleet within this range, the SSN build-rate would have to be increased in 2018 to two boats a year, for a period of seven years.

To save costs, these circumstances suggest that construction of the *Virginias* be consolidated in one yard. Given that a build rate of one submarine per year appears more than sufficient for at least a decade, paying the premium to maintain a second yard at this time does not appear to be warranted. Cost savings would result from reduced overhead and learning curve efficiencies associated with construction in a single yard.[556] Moreover, given that future undersea superiority will likely see a rise in the importance of undersea surveillance systems and UUVs, it seems unlikely that the yearly build rate of SSNs will ever exceed two boats per year (resulting in a steady-state force of 66 boats), a capacity well within the capability of a single yard.

This suggests a "right-sized" submarine industrial base would be a single yard easily capable of building two submarines a year. The plant should also be capable of building SSGNs and SSBNs, at least until it is clear that replacement SSGNs or SSBNs will no longer be required. Any undersea challenge requiring a build rate of three or more SSNs per year would be associated with a broader, more serious naval competition challenge and would likely trigger a general mobilization of the US industrial base. Should such a challenge materialize, the reconstitution of a second submarine yard would likely be necessary.

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[556] The savings of moving to one yard would likely be substantial. Officials from both General Dynamics and Northrop Grumman have indicated that they might be able to reduce the cost of a *Virginia*-class submarine from $2.4 to $2.0 billion or less if they could build one boat per year, steady state. Ahearn, "Submarine Builders Might Provide Boats For Lower Price," p. 1.

There are certainly good arguments against consolidating submarine production in a single yard.[557] Moreover, from a political standpoint, it would be very difficult to close one of the two current submarine yards. However, from a competitive perspective, there are two good reasons to consolidate submarine production. The first is that, ton for ton, submarines are the most expensive warships built by the TFBN. Consolidating production in single yard and shooting for learning curve efficiencies is the best way to lower the construction cost of the *Virginia* SSN and to drive down the cost of the ASE. Second, preserving submarine design expertise is much more important than retaining excess SSN building capacity. The logic for a Strategy of the Second Move suggests that a new, sustained submarine design and prototyping effort to keep US submarine design expertise intact will pay higher long-term dividends than keeping two submarine yards. The aim of the effort would be to introduce a new undersea warfighting system (UWS) no later than 2018—the year the submarine build rate must be increased to two-boats-a-year in order to maintain the SSN force between 33 and 40 boats. This new "UWS(X)" would be designed to upend the submarine design regime in favor of the TFBN.[558]

This notional UWS(X) would seek to negate the value of current Russian and Chinese investments in older submarine technologies found in their *Type 093*-, *Kilo*-, *Song*-, *Yuan*-, and *Lada*-class submarines. The new system might involve a radically modified *Virginia*-class submarine, taking advantage of the sub's modular design, or an entirely new SSN design. This new design might involve the jumping of critical "technology barriers," allowing the United States to build manned submarines equal or superior to the *Virginia* in capabilities, but at much less cost.[559] It might be a larger manned undersea warfighting platform with large flexible payload interfaces, and an ability to carry much larger and more capable weapons and UUVs.[560] It might be a modular, crewed system with flexible payload interfaces capable of operating a number of smaller, adjuvant vehicles, both manned and unmanned.[561] Or, it might be a "mother

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557 For example, see Captain James H. Patton, Jr. USN (ret), "Save the Submarine Shipyards," *Proceedings,* June 2005, pp. 20-23. See also O'Rourke, "Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress."

558 This recommendation is consistent with the findings of the 1998 Defense Science Board Task Force on the Submarine of the Future. See Office of the Under Secretary of Defense for Acquisition, *Report of the Defense Science Board Task Force on the Submarine of the Future* (Washington, DC: Office of the Secretary of Defense, July 1988), at http://www.fas.org/man/dod-101/sys/ship/docs/sotf.htm.

559 The "Tango Bravo" program is a DARPA-led effort to address technology barriers for alternative submarine designs, such as shaftless propulsion. See Robert A. Hamilton, "Navy, DARPA Seek Smaller Submarines," *Seapower,* February 2005, pp. 22-25; and Ahearn, "Submarine Builders Might Provide Boats For Lower Price," p. 2

560 The 1998 Defense Science Board (DSB) Task Force on Submarines of the Future decried special purpose interfaces with the sea such as torpedo tubes and VLS cells. In their view, flexible payload interfaces that did not "constrain the ship and the size of weapons, auxiliary vehicles, and other payloads" would result in step increases in submarine warfighting capabilities. This included an ability to deploy and employ UUVs. See their report at http://www.fas.org/man/dod-101/sys/ship/docs/sotf.htm

561 For example, see "DCN Furthers SMX-22 Submarine Promotion," *Jane's International Defense Review*, July 2005, p. 16; and Karl M. Hasslinger and John R. Pavlos, "Enhancing US Undersea Superiority by Distributing Capabilities Among Small Manned and Unmanned Vehicles Supported By Nuclear-Powered Submarine Mother Ships (U)," a paper prepared for Session V of the 2005 Submarine Technology Symposium.

ship" carrying large loads of increasingly powerful UUVs. While the key goal of any of these approaches would be to create a disruptive undersea warfighting system, an equally important goal would be to design a USW(X) that might be built at the rate of two systems a year within expected budget ceilings. Both goals would work to ensure US undersea superiority over the long term, especially if the Chinese or Russian submarine fleets, or both, grow larger than expected.[562]

The move toward a UWS(X) would be greatly facilitated by the construction of experimental platforms or prototypes. For example, between now and 2018, the *Virginias* might be built in flights introducing new capabilities at regular intervals. This was always the TFBN's plan, but keeping the production rate at one boat and plowing learning curve savings into new capabilities would be a way to finance such modifications. Also, should the SSBN force be reduced further to ten boats, consideration should be given to converting the two excess SSBNs into "SSUN(X)s"—experimental nuclear-powered UUV carriers—equipped with a variety of flexible payload interfaces. In addition to the experimental value of such a "pathfinder" conversion, the design of the SSUN(X)'s ocean interfaces and UUV control systems would serve to challenge US submarine design teams. The design of two more SSGNs, two SSUN(X)s, and the USW(X) would help to maintain submarine design expertise over the next two decades, and keep design teams intact up through the decision to build follow-on SSBN(X)s.

This Strategy of the Second Move also suggests why near-term moves to build greater numbers of cheaper submarines, such as AIP diesels, is a poor competitive alternative. As the DSB Task Force on Submarines of the Future noted, US submarines "need to cover the world from the United States [at] high transit speeds, [with] independent logistics and endurance."[563] Given these requirements, AIP submarines would be an unhappy fit for US submarine requirements. Moreover, a force of AIP diesels would have neither the dissuasive effect of an SSN force, nor would it be as fungible in contested access missions. In any event, choosing the AIP pathway would consign the United States to competing with the Russian and Chinese symmetrically in the current undersea design regime, rather than putting it on a pathway toward forcing advantageous, disruptive change. In other words, committing to AIP diesels would be a competitive step backwards, and lower the likelihood that the United States would later be able to invoke disruptive change to its advantage. A better course is to continue to build *Virginia* SSNs, and designing a new undersea warfighting system designed to upend the current design regime.

Moreover, consistent with the TFBN operational imperative of *Get Combined* and the Strategy of the Second Move's emphasis on exploiting naval alliances, the United States might be able to exploit AIP diesel subs without building them. The combined submarine fleet of the United States' 15 allies, friends, and strategic partners numbers 126 boats. As has been noted, all of the

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[562] Recent moves within DoD and the DoN to move toward a more affordable submarine are consistent with a Strategy of the Second Move. Program Budget Decision 753, promulgated in December 2004, earmarked $600 million for the design of a new "undersea superiority system." It is still unclear if this money will be used to design an ASW system of systems, or will be used to design a follow-on to the *Virginia.* See Andrew Koch, "US Navy In Bid to Overhaul Undersea Combat," *Jane's Defence Weekly,* March 9, 2005, p. 11.

[563] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 71.

known AIP diesels are a part of this fleet. By continuing to forge close operational ties with these navies, especially through cooperative submarine exercises like “Shark Hunt 2005,” the US submarine fleet can potentially count on the help of an increasingly capable pool of allied undersea warfighting systems.[564] Moreover, operations against allied AIP and conventional diesel submarines should help to refine US ASW tactics against these types of threats. Indeed, the ultimate expression of this approach was the recent US Navy “leasing” of a Swedish AIP diesel submarine for a year in order to perfect fleet ASW operations against this new type of boat.[565]

## RECOMMENDATIONS FOR THE STRATEGIC DETERRENT/DISSUASION FLEET

Given the foregoing discussions, this report recommends that:

- TFBN architects immediately reduce the SSBN force to 12 boats. The boats should initially retain dual crews in order to maintain higher force availability. A final decision on the force’s crewing scheme (i.e., one or two crews per boat) would be dependent on nuclear alert force posture considerations. The two retired SSBNs should be converted into SSGNs (to be discussed in the next section).[566]

- DoN planners proceed with 12 mid-life SSBN EROs, at a rate of one per year, beginning in FY 07.[567]

- An independent study be conducted by the US Strategic Command to determine if the SSBN fleet can be further reduced to 10 boats with acceptable degrees of risk.

- Should studies indicate the SSBN force can be reduced to ten boats, the DoN should consider converting the two excess SSBN hulls to experimental SSUN(X) prototypes with flexible payload interfaces and large UUV payloads. These conversions might be paid for using R&D funding, perhaps in conjunction with DARPA.[568]

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[564] “Shark Hunt 2005” was a month-long, US-led exercise in the Atlantic and the Mediterranean that featured submarines—as well as surface ships and aircraft—from eight different countries. See Robert Hamilton, “Groton Subs in Mediterranean ‘Shark Hunt’,” *New London Day,* July 3, 2005.

[565] See “Why is the US Leasing a Swedish Submarine?” at http://www.jinsa.org/articles/articles.html/ function/view/ categoryid/164/documentid/2873/history/3,2360,656,164,2873.

[566] The EROs for the two boats to be converted to SSGNs will be discussed in the chapter on the National Homeland Defense/Global Patrol/Irregular Warfare Fleet.

[567] The mid-life EROs for the two additional SSBNs recommended for conversion to SSGNs were budgeted for in FY 05 and FY 06.

[568] The SSUN(X) will be discussed in greater detail in the Chapter on the Counter-A2/AD Fleet.

- The DoN continue to authorize and build Virginia-class SSNs at a rate of one per year through at least 2018. A ten-year, multi-year procurement contract (FY 09-18) should be pursued to help to reduce procurement costs.

- TFBN designers commence an immediate effort to introduce a new, “disruptive” UWS(X) by 2018. The design goal for the UWS(X) program should be an affordable undersea system, producible in the numbers needed to maintain US undersea superiority in the 2020s, with a number of flexible payload interfaces with the water, and an ability to control a number of manned and unmanned adjuvant vehicles. The SSUN(X), if built, would serve as prototypes for the UWS(X). The notional plan would be to build one USW(X) in 2018, two per year between FY 19 and FY 24, and one per year thereafter, to achieve a steady state force of 40 *Virginias* and USW(X)s.

- Attack submarine production be consolidated into a single yard. The yard should have, at a minimum, the ability to build two SSNs per year, an ability to convert SSBNs to SSGNs, and an ability to build one additional SSGN or SSBN per year.

- The TFBN conduct regularly scheduled offensive and defensive ASW exercises with allied navy submarines, including nuclear, AIP, and conventional diesel boats. The exercises should be designed to develop the tactics, techniques, and procedures for undersea combat network warfare.

- TFBN designers continue to work with the MDA to convert 18 AEGIS/VLS combatants into Long-range Search and Track and Ballistic Missile Engagement platforms for Homeland Defense by 2010.

### Associated Annual Shipbuilding Costs

Through 2020, the annual ship building costs associated with these recommendations are:

- $300 million per year (.21 ASEs, FY 05 dollars) for one SSBN ERO, starting in FY 07 and ending in FY 18.

- $2.2 billion per year (1.6 ASEs, FY 05 dollars) for one *Virginia* class submarine from FY 07 through FY 17. This is an average price, based on the assumption that submarine production would be consolidated in a single yard.

- $4.4 billion in FY 18 (3.2 ASEs, FY 05 dollars) for one *Virginia* class and one UWSX), and $4.4 billion per year for two UWS(Xs) in FYs 19 and 20. UWS(X)s would be built at a rate of two per year from FY 21 through FY 24, and a rate of one per year thereafter. For planning purposes, the average cost of an USW(X) is projected to be equal to that of a *Virginia* SSN.

- The costs associated with the ballistic missile defense modifications for 18 guided missile cruisers and destroyers are being funded by the Missile Defense Agency.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

The SSBN force consists of a single class of ships with common training, maintenance, and logistics—the ideal circumstance for minimizing O&S costs. The recommended reduction in the SSBN force to 12 boats would result in an immediate crew savings of 640 officers and Sailors (dual crews for two boats). This would double to 1,280 crew members if the force is further reduced to ten boats.

By December 31, 2020, the SSN force will consist of 43 boats, including 25 VLS-equipped *LAs*, 16 VLS-equipped *Virginias,* and two *Seawolfs.* This 43-boat SSN force will require 1,565 fewer officers and Sailors than the current 53-boat force, resulting in considerable manpower savings. The force would carry a total of 1,157 torpedo tube-launched weapons and 492 VLS-launched weapons for a total magazine capacity of 1,649 war shots, nearly 94 percent of the fleet's current magazine capacity. Force weapon procurement and inventory costs will thus be approximately the same as they are today.

The transition to an ultimate force of *Virginia* SSNs and UWS(X)s during the 2020 would see periods when there are four different submarine classes in fleet service on one time (*LA*, *Virginia*, *Seawolf*, USW(X)), leading to increased submarine force training, maintenance, and logistics costs. The small two-boat *Seawolf* class will pose a continual maintenance and logistics challenge for TFBN planners. Crew savings after 2020 will depend on the crew size and number of UWS(X)s that would augment the *Virginias* and replace legacy *LAs* and *Seawolfs*.

# VIII. THE NATIONAL GLOBAL PATROL/ IRREGULAR WARFARE/HOMELAND DEFENSE FLEET

The National Global Patrol/Irregular Warfare/Homeland Defense Fleet is the primary means to secure the US from the threat of non-state seaborne WMD attack and to conduct day-to-day operations in the persistent irregular war against Radical extremists, terrorists, pirates, and smugglers. It is a fleet optimized for operations in close-in littoral waters—the domain of irregular maritime opponents.

This fleet relies on both the US Navy and US Coast Guard operating platforms. It is dominated by small combatants, although it does include some special-purpose ship platforms. It also includes numerous maritime domain awareness assets. When operating as a component part of a Naval Battle Network, this fleet's assets are fungible across a variety of different missions.

## US COAST GUARD CONTRIBUTIONS TO THE NATIONAL GLOBAL PATROL/IRREGULAR WARFARE/ HOMELAND DEFENSE FLEET

> The Coast Guard…has never been intended to be the American service sustained to fight for the right to use the sea: That, or course, is the role of the Navy. Nonetheless, the conduct of military operations in coastal waters is integral to that purpose, and has to be reflected in the equipment of the Coast Guard.[569]
>
> Colin S. Gray

As has been discussed, the responsibility for securing the US homeland from a seaborne WMD attack and prosecuting the irregular naval campaign is shared by the Navy and the US Coast Guard. As one senior Department of Homeland Security official remarked, this will require "complete synchronization" of DoN and Coast Guard capabilities.[570]

This synchronization is reflected in a growing number of cooperative and collaborative maritime plans, including a *National Plan to Achieve Maritime Domain Awareness,* a *Global Maritime Intelligence Integration Plan,* and an integrated *Maritime Operational Threat Response Plan.*[571]

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[569] Colin S. Gray, "A Coast Guard for the Future: America's Maritime Guardian."

[570] "Maritime NORAD is 'Defense in Depth'."

[571] By signing National Security Presidential Directive-41 and Homeland Security Presidential Directive-13, the President established a Maritime Security Policy Coordinating Committee, and tasked it with the development of a National Strategy for Maritime Security. The strategy has eight supporting implementation plans. The *National Plan*

Together, these plans will help to secure the immediate maritime approaches to the continental US; to sustain forward sea denial operations and enable the United States to mount distributed blockade in the war's central theater—the Indian Ocean, its adjoining seas and gulfs; and to conduct hot pursuit and maritime interdiction of potential irregular targets in littoral waters and on the open ocean.[572]

As helpful as these plans are, an additional step is required: making the concept of a *National Fleet*—first agreed to by the Chief of Naval Operations and the Commandant of the Coast Guard in 1998, and reaffirmed by their successors in 2002—a concrete reality. According to the most recent National Fleet Policy Statement:

- The Fleet is composed of ships, aircraft, and shore Command and Control nodes that are *affordable, adaptable, interoperable, and with complementary capabilities*;

- These forces will be designed, whenever possible, around common equipment and systems, and include coordinated operational planning, training, and logistics; and

- The Fleet will be capable of supporting a broad spectrum of national security requirements, from power projection to security and defense of the homeland.[573]

In keeping with these sensible ideas, and though Coast Guard platforms are paid for with Department of Homeland Security appropriations, the *National* Global Patrol/Irregular Warfare/Homeland Defense Fleet counts both USN *and* USCG ship platforms. The fleet's missions of littoral patrol, maritime hot pursuit, and maritime interdiction operations are the forte of small combatants, and there is no better US small combatant force than the Coast Guard.

In this regard, the Coast Guard currently operates 12 High Endurance Cutters; 30 Medium Endurance Cutters; 49 Patrol Boats; and 56 Coastal Patrol Boats (with an additional eight being built). In addition, the USCG fleet includes five former US Navy Patrol Coastal ships, redesignated by the Coast Guard as Patrol Coastal Cutters. These 160 vessels form the heart of the Coast Guard's fleet; they are augmented by hundreds of smaller craft, buoy tenders, and special purpose ships (e.g., icebreakers).[574]

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*to Achieve Maritime Domain Awareness* and *Global Maritime Intelligence Integration Plan* are two of the eight supporting plans. See draft *National Strategy for Maritime Security: Global Maritime Intelligence Integration Plan* (Washington, DC: Maritime Security Policy Coordinating Committee, July 2005).

[572] *National Strategy for Maritime Security: Global Maritime Intelligence Integration Plan.*

[573] *National Fleet: A Joint Navy/Coast Guard Policy Statement,* July 8, 2002.

[574] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, Chapter 32.

The Coast Guard is in the process of modernizing its fleet of ships and aircraft into a thoroughly networked force known as the Integrated Deepwater System (IDS).[575] The design criteria for the IDS are closely aligned with those of the future TFBN. Under current plans, the IDS will include:

- Eight National Security Cutters, with full load displacements of 4,200 tons, to replace the 12 legacy High Endurance Cutters;[576]

- 25 Offshore Patrol Cutters, with FLDs of 3,200 tons, to replace the 30 legacy Medium Endurance Cutters;[577] and

- 58 Fast Response Cutters, with FLDs greater than 300 tons, to replace the 49 legacy large Patrol Boats.

Although not part of the "deepwater" fleet of 91 cutters, the Coast Guard also operates 64 small, 90-ton Coastal Patrol Boats that perform vital close-in littoral and port security operations. If these boats—roughly the same size as World War II Patrol Torpedo (PT) boats—were not available, the Coast Guard would likely need to make up for them by building more Fast Response Cutters. They are therefore included as a part of the total Coast Guard fighting fleet.[578]

These 155 cutters and coastal patrol boats reflect USCG requirements *prior* to the 9/11 attacks and before the declaration of war on irregular extremists. Several studies have recommended the number of Coast Guard cutters be dramatically increased in light of increased potential irregular and catastrophic maritime threats to the US homeland. For example, a recent RAND report believed the post 9/11 requirement for Coast Guard cutters recommended a total of 180 cutters.[579] As a result, the 155 Deepwater cutters and coastal patrol boats represent the *minimum* likely future Coast Guard contribution to the future National Global Patrol/Irregular Warfare/Homeland Defense Fleet.

As outlined by the CNO and the Commandant of the Coast Guard, the idea of the National Fleet and the requirement for integrated Battle Networks demands that these 155 platforms have as high a degree of commonality as possible with US Navy vessels. This will enable the US Coast

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[575] For more information on the Integrated Deepwater Plan, see the US Coast Guard Deepwater website at http://www.uscg.mil/deepwater; official Deepwater website at http://www.icgsdeepwater.com; John Birkler, et al, *The US Coast Guard's Deepwater Force Modernization Plan;* and Ronald O'Rourke, Congressional Research Service, "Coast Guard Deepwater Program: Background and Issues for Congress," Congressional Research Service Report RS21019, dated April 1, 2005.

[576] These ships have also been referred to as WMSLs, for Maritime Security Cutters, Large.

[577] These ships have also been referred to as WMSMs, for Maritime Security Cutters, Medium.

[578] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 589.

[579] See Birkler, et al, *The US Coast Guard's Deepwater Force Modernization Plan.*

Guard to operate forward in support of persistent TFBN irregular warfare operations, and to surge forward to augment Naval Battle Networks operations as it did in World War I, World War II, Vietnam, *Desert Storm*, and Operation *Iraqi Freedom*. It will also enable the US Navy to augment Coast Guard assets should the need arise to expand the maritime defensive perimeter around the United States, as it did during World War II when German submarines operated off the US east coast, and immediately after the 9/11 attacks.

The National Fleet Policy Statement calls upon both Navy and Coast Guard resource managers to consider the objectives of the National Fleet during budget preparations.[580] As the senior and far larger partner in the National Fleet, this implies that the Navy should take the lead in ensuring that Coast Guard platforms can be usefully integrated into future naval Battle Networks.

## US NAVY CONTRIBUTIONS TO THE NATIONAL GLOBAL PATROL/IRREGULAR WARFARE/ HOMELAND DEFENSE FLEET

> The war on slavers demanded many of the same skills as the close blockade, but with a very different range of ships. The navy had learned the lessons of its failure to stop American smugglers. Frigates, sloops, two-masted brigs, brigantines, and schooners were small enough to work the palm tree-lined inlets and sluggish river estuaries where slave ships hid and picked up their elicit cargo and fast enough to run them down in open sea. Ships of the line were useless for this kind of work; only once did a mighty 74 put in a cameo appearance. Instead, the burden of being world policeman would increasingly fall on the Royal Navy's smaller vessels, and the dedicated, independent-minded captains, commanders, and even lieutenants who officered them.[581]
>
> Arthur Herman, *To Rule the Waves*

Recall the general strategic conditions that the British Royal Navy found after its defeat of France in 1815. With no major naval challenger on the horizon, its primary role became to confront and combat the transnational threat of human slave trading. As indicated in the quote at the start of this chapter, this war called for a different type of warship, one specifically designed for close-in littoral work—one that was small, fast, had a shallow draft, and that could overmatch any slave ship in battle.

Conditions are similar today for TFBN planners. In the persistent irregular war the United States now finds itself in, the enemy practices a modern, distributed form of *guerre de course*, focused on attacking commercial vessels in a seaway, offshore energy infrastructure, and even unwary surface combatants. As was described earlier, the traditional way to defeat a strategy of *guerre de course* is to conduct a close blockade. Given the enemy's global range of operations, this is

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[580] *National Fleet: A Joint Navy/Coast Guard Policy Statement,* July 8, 2002.

[581] Herman, *To Rule the Waves,* p. 420.

not possible. Instead, the National Global Patrol/Irregular Warfare/Homeland Defense Fleet, in conjunction with US allies, must mount a global version of a distributed, "distant blockade." This distant blockade would include global maritime reconnaissance and patrolling, local sea control and sea denial operations, and "maritime hot pursuit" both in close-in littoral waters and on the high seas. As explained by a German naval officer involved in counter-terrorist operations explains:

> We know that…terrorists prefer "soft"—i.e., unprotected—targets. Thus, protection must be made clearly visible. Furthermore, asymmetric warriors are not thinking in out terms of categories like high-intensity/low-intensity conflict or crisis management. There are no safe havens anymore. So-called routine tasks in designated operations areas may immediately lead to high intensity war fighting missions. Therefore, maritime presence in such littorals needs to cover a larger area for a longer period.[582]

Just as the British found during their "global war on slavery," the global irregular war demands a ship with an ability to operate close to the "palm tree-lined inlets and sluggish river estuaries" where irregular naval adversaries hide, and the speed to conduct maritime hot pursuit of suspected terrorist vessels. Moreover, the ship needs to be relatively inexpensive to build and operate, so they can be built in the numbers required to cover a global theater of operations. The Battle Network's powerful AEGIS/VLS combatants, with their large crews, heavy armament, and deep drafts are ill-suited for this type of persistent maritime patrol in close-in, shallow waters. Therefore, there is a clear need for handy, swift combatants with shallow drafts that are optimized for this form of persistent irregular warfare, and that are cheap enough to build in significant numbers.

Although not originally envisioned as an irregular warfare combatant, the new "Littoral Combat Ship" (LCS) now entering production looks to be a relatively good fit for the job. The LCS is one of three ships in the DoN's DD(X) family of ships announced in November 2001. This family of surface combatants included a large, multi-mission land attack destroyer that gave the family its name (DD(X)), a large, multi-mission theater air and missile dominance cruiser (CG(X)), and the smaller, multi-purpose, "focused mission," high- speed LCS.[583]

The announcement of the LCS came as somewhat of a surprise. The Navy leadership had resisted the development of a small combatant for some time.[584] However, their subsequent rapid development of the ship belied their earlier reluctance. In September 2002, the DoN's Program Executive Officer for Ships established an LCS Program Office. Less than two months later, in November 2002, the Program Office awarded six, $500,000, 90-day contracts to six different

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[582] Deertz, "Fast Patrol Boats in Escort Operations," p. 11.

[583] See "Navy Announces DD(X) Program," US Department of Defense News Release 559-01, dated November 1, 2001, found online at http://alt.defenselink.mil/releases/2001/b11012001_bt559-01.html.

[584] For a thorough discussion of the history behind the LCS and the ship itself, see Work, *Naval Transformation and the Littoral Combat Ship*.

industry teams to complete concept studies for a Focused Mission High Speed Ship. Partly informed by these efforts, the DoN published it's Preliminary Design-Interim Requirements Document for the LCS in February 2003. In July of that same year, three of the six industry teams—those led by General Dynamics, Lockheed Martin, and Raytheon—were awarded fixed-price contracts to submit detailed ship design proposals for the "Flight 0" LCS no later than late January 2004. Four months after that, on May 21, 2004, the Navy awarded contract options for final system design with options for detail design and construction of up to two Flight 0 LCSs to both the General Dynamics and Lockheed Martin teams. As it now stands, both teams will build two Flight 0 LCSs.[585] Presuming these vessels will meet the stated requirements and achieve their target cost of $220 million a copy, the DoN plans to shift into series production of either one or both ships in FY 08/09.

As befits a true design competition, the shapes of the two winning designs are very different. The General Dynamics (GD) version is a 417-foot, 2,675 metric ton, aluminum trimaran. It has a planned top speed of 46 knots, and a design draft of 14.8 feet. The Lockheed Martin (LM) version is a 378 foot, 2,839 metric ton, steel semi-planing monohull with an aluminum deckhouse. Its expected top speed is 45 knots, and its planned draft is 12.8 feet. Despite their differences in appearance, however, they are similarly armed and equipped. Their basic armament suite includes a 57mm automatic cannon; a 21-round Rolling Airframe Missile (RAM) launcher; several 50-caliber machine guns; and missile decoy launchers. However, their real payload is found in the 20 different payload stations that are designed to take a variety of mission modules and offboard systems. By mixing and matching modules, the resulting mission packages allow the ships to take on three different "asymmetric" littoral challenges—swarming boat attacks, mines, and submarines—but only one at a time. In other words, it is a modular, reconfigurable surface combatant, the first of its kind in Battle Force service.[586]

In line with Battle Network design imperatives, the mission module payloads rely on off-board systems. For example, the ships' ability to support off-board aviation platforms is quite impressive. The LM flight deck is 483 square meters, more than one-third larger than the flight deck on any other US surface combatant.[587] The GD version's is larger still; at 1,030 square meters, it can land two H-60 size helicopters, or one H-53 helicopter. The hangers of both designs can store two MH-60 helicopters and three vertically-launched, tactical unmanned aerial vehicles called *Fire Scout*.[588] In addition to carrying aviation offboard systems, the ships also

585 For a short overview behind the development of LCS, see Ronald O'Rourke, "Navy Littoral Combat Ship (LCS): Background and Issues for Congress," Congressional Research Service, April 1, 2005. The keel for the first Lockheed Martin Flight 0 LCS, named the *Freedom*, was formally laid on June 2, 2005. See "Yard Lays First LCS Keel," InBrief, *Defense News*, June 6, 2005, p. 3.

586 See Christopher P. Cavas, "US Navy: LCS Module Development on Track," *Defense News*, June 27, 2005.

587 The flight decks for the DDG-79, CG-52, and FF-7 classes are 342, 284, and 330 square meters, respectively.

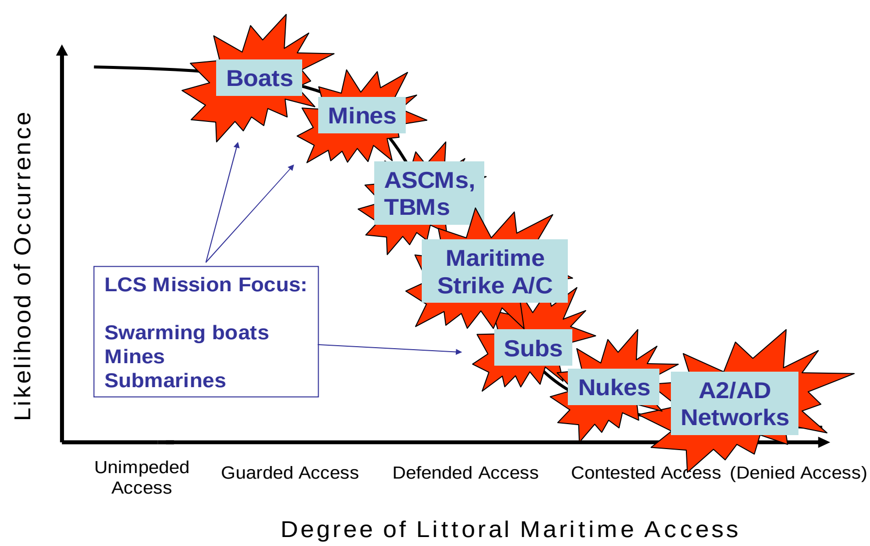
588 Although the hangers can store two MH-60 helicopters and three *Fire Scouts*, the LCS is expected to carry just one helicopter and three *Fire Scouts*. The *Fire Scout* is a small helicopter-like UAV. It will carry and array of sensors to provide real-time images of activities in surrounding waters. See Jason Sherman, "Wave of the Future?" *Seapower*, May 2005, p. 19. The *Fire Scout* may also be armed with torpedoes and other weapons. See Richard R. Burgess. "A Smarter Scout," *Seapower*, May 2005, pp. 16-18.

carry two seven-meter and two 11-meter RHIBs, USVs, or UUVs, as well as additional smaller offboard systems or sensors. In essence, the basic vessels, or "sea frames," serve as mobile bases for nine or more smaller Battle Network systems.

Indeed, because the LCS is so different, it remains a subject of intense scrutiny both inside the DoN and out. Some detractors frown on the rapid development of the ship, and the resultant lack of detailed analysis normally associated with such a program. Others fret that the ship will divert money away from larger, more capable ships like the DD(X). Still others believe the ships will be a death trap for their crews, as they will have neither robust defenses nor the ability to take a hit.[589]

While these are valid concerns, few can argue that the ship appears to be the best near-term TFBN candidate for an irregular warfare vessel. Two of the ship's three primary missions are well matched for the demands of contemporary irregular naval warfare, as swarming boats and mines are ideal weapons for irregular naval adversaries (see Figure Six). Small boats can blend in to crowded coastal shipping traffic, and can be used to mount suicide attacks against much larger ships. They can also be used to mount attacks on offshore energy platforms, and are the vessel of choice for today's pirates.[590]

**Figure Six: LCS Mission Focus**




[589] For other objections to the ship, see Work, *Naval Transformation and the Littoral Combat Ship.*

[590] See Caitlin Harrington, "Navy Official: Small Boats Pose Big Maritime Threat," *Congressional Quarterly*, May 24, 2005.

Mines are also superb irregular naval weapons. They can be employed from almost any type of vessel, and any use provokes a costly, disproportionate defensive response. For example, in 1984, Libya covertly laid mines in the Red Sea shipping lanes. Some 20 commercial vessels were damaged, causing rapid escalation of merchant shipping insurance. A multi-national mine countermeasure effort was required to clear the Red Sea and to restore confidence in the safety of the shipping lanes.[591]

Moreover, from an irregular adversary's perspective, neither small boat operations nor irregular mine warfare require much training or ISR support. The former requires the skills of a speedboat pilot, and a willingness to die. The latter requires only that the operator know the operational limitations of the mine and how to arm them; a boat of almost any size can double as a mine layer. Both suicide boats and mines are weapons that wait within a littoral; the targets invariably come to them.

Both LCS designs appear well-suited for the anti-boat mission. They will be able to carry both armed helicopters and armed UAVs for over-the-horizon anti-boat attacks. Three of the ship's 20 modular stations are weapons stations. These stations can be modified over time to accept a variety of weapons, but the initial weapons will be a remotely controlled stabilized 30mm cannon and the new Non-Line-of-Sight Launch System (NLOS-LS) now in development. Each NLOS-LS is designed to carry a total of 15 missiles—either Precision Attack Missiles (PAMs) with ranges of 40-60 kilometers, or Loitering Attack Missiles (LAMs) with ranges up to 200 kilometers.[592] Each weapon station is large enough to carry up to four NLOS-LS (60 missiles per station), although the ship will seldom carry that many missiles. Nevertheless, each ship will boast a maximum missile load of 180 guided missiles.

In addition to guided missiles, the LCS will also be armed with an automatic 57mm cannon, firing programmable ammunition with several "scattershot" modes that promises to be a fearsome medium-range anti-boat weapon. Finally, the ship's 21-round RAM launcher will fire a supersonic, multi-purpose, anti-missile, anti-air, anti-helicopter, and anti-boat missile that is very effective in terminal engagements.[593] In the future, the ships might also carry unmanned surface

[591] See "Operation Intense Look," at http://www.globalsecurity.org/military/ops/intense_look.htm.

[592] See Majors Mark J. Emerson, Jr., et al, "NLOS Systems for the Modular and Future Forces," *Field Artillery*, November-December 2004, pp. 7-11; "Non-Line-of-Sight Launch System (NLOS-LS)," at http://www.globalsecurity.org/military/systems/munitions/net-fires.htm; "Netfires," at http://www.missilesand firecontrol.com/our_products/firesupport/NETFIRES/product-NETFIRES.html; Christopher F. Foss, "US Army Hastens Development of Missiles for FCS," *Jane's Defence Weekly*, November 24, 2004, p. 30; "Raytheon Precision Attack Missile Makes First Guided Flight," at http://www.raytheon.com/newsroom/ briefs/111802.htm; and "Lockheed Martin Successfully Completes First Test Flight of Netfires LAM Prototype," at http://www.missilesand firecontrol.com/ our_news/pressreleases/02pressrelease/111102_ NETFIRES.htm.

[593] The Mk-110 57mm cannon is an adaptation of the Bofors 57mm/60caliber automatic cannon. The unmanned mount holds 120 rounds, and there are 1,000 rounds in the magazine. The mount fires programmable ammunition with three different proximity fusing options, as well as time, impact, and armor-piercing settings. It has a range of 17,000 meters against surface targets. Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 495. The Helicopter-Aircraft-Surface Craft (HAS) upgrade to the RAM allows it to engage small surface vessels. See "RIM-116 RAM Rolling Airframe Missile," at http://www.globalsecurity.org/military/systems/munitions/ram.htm. See also M.S. Frick, "RAM and Phalanx: System of Systems Testing," *Seapower*, September 2000, pp. 46-48.

vehicles like the SPARTAN, armed with 30mm cannon and direct fire missiles, or even non-lethal engagement options.[594]

For anti-mine warfare, the ships will carry one or more MH-60S mine countermeasure helicopters with a variety of towed and airborne mine detection and neutralization systems;[595] a variety of UUVs designed to hunt for, classify, and neutralize mines in all water depths;[596] and, in the future, unmanned surface vehicles towing countermine systems.[597] Importantly, the LCSs will also remedy the single most limiting operational characteristic of the current mine warfare fleet: lack of speed. The two mine warfare ships now in TFBN service have top speeds of 13.5 and 12 knots, respectively. With top speeds in the range of 45-46 knots, the LCSs will reintroduce into US naval service mine countermeasure ships capable of keeping up with Naval Battle Networks surging forward from the continental United States.

In addition to the counter-boat and counter-mine missions, with its flexible offboard mission systems and powerful littoral fire support armament, both Flight 0 LCSs will also have an inherent SOF support capability, a vital irregular warfare requirement. With an ability to carry two or more H-60 size helicopters, the ships will be conduct the aerial insertions of eight-man SEAL teams with 100 percent platform redundancy, an important consideration for special operations missions. With their ability to carry two 11-meter RHIBs (Rigid-Hulled Inflatable Boats) and two 7-meter RHIBs, they can also support the clandestine insertion of larger SEAL units. With top speeds exceeding those of World War II-era PT boats, the LCSs will be able to conduct deep penetration missions over a wide radius from SOF forward operating locations while under cover of darkness. And both ships will have drafts of less than 15 feet, allowing them to get SEALs closer to the shore, and, in case an emergency extraction, to come in close to shore to provide direct fire support.

The third primary mission for the LCS, anti-submarine warfare, is realistically a mission only for defended and contested access scenarios. For this mission, the MH-60 helicopter would be the

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[594] The SPARTAN is a remotely controlled, modular USV based on a 7-meter and 11-meter Rigid Hulled Inflatable Boats, or RHIBs. The payload for the 7-meter RHIB is 3,000 pounds; the payload for the 11-meter RHIB is 5,000 pounds. Anti-boat/force protection, ASW, and ISR modules are in development. An LCS can carry two 11-meter and two 7-meter SPARTANs. See Vittorio "Vic" Ricci, "SPARTAN Unmanned Surface Vehicle, More Than A US Navy 'Toy'," *Naval Forces*, Vol. 6, 2004, pp. 62-63. See also Richard Scott, "Singapore Eyes Benefits of Unmanned Vehicles," *Jane's Defence Weekly*, p. 32.

[595] See Nick Brown, "A Clean Sweep For AMCM," *Jane's Navy International*, January/February 2005, pp. 13-17; Admiral Robert J. Natter, USN, "Access is Not Assured," *Proceedings*, January 2003, pp. 39-41; and Vivienne Heines, "Mine Killer," *Armed Forces Journal*, April 2004, p. 16.

[596] See Rear Admiral Paul Ryan, USN (ret), "LCS Will Transform Mine Warfare," *Proceedings*, December 2004, pp. 37-39; Christopher P. Cavas, "A Boost for Mine Warfare," *Defense News*, June 21, 2004, p. 22; and Sandra I. Erwin, "Navy Keeps Mine-Warfare Options Open," *National Defense*, December 2002, pp. 22-24. A key offboard system used by the LCS in the mine warfare mission will be the AN/WLD-1 Remote Minehunting System (RMS). See "Remote Minehunting System Fact Sheet," at http://www.ncsc.navy.mil/Our_Mission/Major_Projects/Remote_Minehunting_System_Focus_Sheet.htm.

[597] The LCS will likely employ USVs towing sweeps for influence mines. For example, see "ADI Influence Sweep Gear SWIMS Ahead," *Jane's International Defense Review*, June 2003, p. 16.

primary off-board system, augmented by USVs and UUVs employing both passive and active sonar. The LCS is also designed to lay bottom arrays such as the Advanced Deployable System (ADS), which will provide long-dwell acoustical monitoring of chokepoints and operating areas.[598]

In addition to ASW, the LCS will also perform counter-boat and counter-mine missions in defended access scenarios. Swarming boats operating under centralized command are a threat to any Naval Battle Network operating close to a coast. And, of course, mines are a constant danger to any US ship operating in shallow waters.[599] Whereas the LCS will normally overmatch most likely irregular threats and be capable of independent action in unimpeded and guarded access scenarios, it will need to operate under the defensive fires provided by a more powerful Naval Battle Network in defended littorals. As part of a coherent Battle Network, LCSs should be able to perform anti-surface, countermine, and ASW roles in these more difficult access conditions. In other words, operational fungibility is a key goal for the LCS design—a primary attribute for all TFBN platforms. Indeed, as the first combatant designed from the keel up to be a reconfigurable Battle Network component, the LCS will be the operational test bed for many of the TFBN's architecture design imperatives.

To those that argue that the LCS is a poor substitute for a DD(X), the response is simple: the LCS was never designed or intended to compete with the 14,500-ton DD(X), with its powerful missile and gun armament, 28 foot draft and 150-man crew. Instead, it is designed to replace the Battle Force's mixed fleet of 64 small, *single-purpose* littoral warfare combatants. These 64 ships include:

- 26 active and reserve single-purpose mine warfare vessels—14 MCMs with FLDs of approximately 1,370 tons, drafts of 12 feet, and crews of 83-89; and 12 MHCs with FLDs of approximately 915 tons, drafts of 11 feet, and crews of 51-56;[600]

- Eight active Patrol Coastal Ships (PCs) designed for SOF support, with FLDs of approximately 330 tons, drafts of eight feet, and crews of 28;[601] and

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[598] See Munns, "121,000 Tracks"; and "Advance Deployable System [ADS]," at http://www.fas.org/irp/program/collect/ads.htm. Work is being done to add an ASW capability to the AN/WLD-1 Remote Minehunting System, by replacing its Minehunting sonar with a AQS-20 towed variable depth sonar. Using the same system for both Minehunting and ASW missions will provide important payoffs in training and logistics support for the LCS fleet. See Richard Scott, "New Roles For RMS Unmanned Vehicle," *Jane's Defence Weekly*, July 24, 2002, pp. 76-77.

[599] Captain Massimo Annati, Italian Navy, "Naval Mines: The Threat and Its Counter," and "Mine Warfare: Are We Prepared for the Worst?" in *Naval Forces*, No. III, 2005, pp. 60-77.

[600] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 230-234.

[601] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 216; and Scott Schonauer, "Patrol Coastal Ships Gain New Respect," *European Stars and Stripes*, May 19, 2004. As mentioned earlier, the Navy transferred five additional ships of these craft to the Coast Guard. While manned by Coast Guard crews, their operations and support costs are paid for by the Navy.

- 30 active and reserve FF-7 frigates, capable of littoral ASW and ASuW operations, with FLDs of approximately 4,000 tons, navigational drafts of 26 feet, and crews and aviation detachments totaling 235-239 officers and Sailors.[602]

These 64 vessels have an average displacement of 2,375 tons; an average draft of 15.47 feet; and an aggregate crew size of 9,206 (7,931 active and 1,275 reserve officers and Sailors), for an average crew size of 144 officers and Sailors. In comparison, a 64-ship LCS fleet consisting of roughly equal numbers of Lockheed Martin and General Dynamics versions will have an average displacement of approximately 2,757 tons; an average draft of 13.8 feet; and with an average *maximum* crew size of 75, a maximum fleet crew size of 4,800, just more than half of the legacy fleet.

The LCS fleet will be much more flexible than the legacy fleet, which carries 26 mine warfare "mission modules," 30 ASW and anti-boat modules; eight SOF support modules; thirty 76mm cannon; 30 close-in weapons systems; eight 25mm cannon; and a maximum of 60 H-60 helicopters. In contrast, a similarly sized force of modular, multi-purpose, LCSs could theoretically contribute 64 littoral mine countermeasures packages, *or* 64 SOF support packages, *or* 64 littoral ASW and anti-boat packages, *or* any combination thereof. The fleet would carry nearly twice the number of automatic cannon (albeit a smaller caliber), a maximum littoral guided missile load of 11,520 missiles, over twice the maximum helicopter mission load, and a total of 256 seven- and 11-meter RHIBs, USVs, or UUVs.

Moreover, given its reconfigurable, modular internal volume and payload capability, the LCS will be able to make many more contributions beyond the four missions performed by the legacy littoral combat fleet. For example, both designs could carry and provide direct support to small, Special Purpose Marine Air-Ground Task Forces (SPMAGTFs), reintroducing the old Fast Destroyer Transport (APD) mission. The ships could easily support special-purpose ISR modules and detachments, which might allow some of the ISR requirements currently levied on the SSN force to be conducted by the GWOT patrol fleet, freeing up high-value SSNs to concentrate on ASW and covert strike and SOF support missions. And the LCS's reconfigurable volume gives it the inherent capability to serve as a "fast connector" for expeditionary logistics support.

In keeping with the concept of a National Global Patrol/Irregular Warfare/Homeland Defense Fleet in which the "away" and "home" games have merged into "one game," the capabilities of both Flight 0 LCS capabilities will be broadly compatible with future USCG Deepwater cutters. The LCS and the National Security Cutter, and perhaps the Offshore Patrol Cutter, will carry the same 57mm automatic cannon as their primary gun armament. While the National Security Cutter forgoes the RAM launcher for cost reasons, it carries a rapid-fire *Phalanx* Close-in

[602] The "FF-7" started service as a "guided missile frigate," armed with a single above deck rail launcher and a rotary magazine that normally carried four ASCMs and 36 SM1 local air defense missiles for convoy defense. The DoN recently removed the missile system, making the ship's primary armament its ASW helicopters and ASW combat systems. Despite the removal of its missiles, the Navy still refers to the ships as "FFGs." See Norman Freidman, "US Navy Scraps Frigate's Missiles," *Proceedings*, January 2004, pp. 4-6.

Weapon System (CIWS) in widespread Battle Force service.[603] Both the National Security and Offshore Patrol Cutters have the space and weight to support a single LCS weapons station. The LCS, National Security Cutter, and Offshore Patrol Cutters will all be able to operate H-60 size helicopters and vertically-launched UAVs (although the Navy and Coast Guard UAVs will be different). And every Navy and Coast Guard ship, cutter, or patrol boat will support a standard fleet of 7- and 11-meter RHIBs, albeit in different numbers.

Consistent with a 1992 review of the Coast Guard's underwater warfare responsibilities, the USCG cutters will not have the ability to hunt for mines or submarines.[604] However, design studies indicate there may be the space and weight to support versions of the modular LCS mine and submarine warfare systems should this decision be reversed. While it is undoubtedly true that the designs of the LCS and Deepwater cutters are not as thoroughly integrated as they could have been, they are similar enough to ensure general operational compatibility in general patrol and homeland defense missions and maritime intercept operations—the staples of irregular naval warfare.

In sum, the LCS will be the first of a new type of reconfigurable network component that will be the hallmark of rapidly scalable and adaptable integrated Naval Battle Networks. The LCSs will eventually replace four different hulls, with a payoff in training, maintenance, and logistics support, provide an operational test bed for fleet modular design interfaces and support procedures, and work well with USCG Deepwater assets.[605]

It is also designed to be built in numbers. More than any other TFBN component, the National Global Patrol/Irregular Warfare/Homeland Defense Fleet requires large numbers of platforms to accomplish its assigned tasks. The 14,500-ton DD(X), with an average recurring cost expected to exceed $2 *billion,* will never be built in the numbers needed to replace these 59 legacy vessels in the current small combatant fleet, even if the DD(X) was suited to do so. The average procurement cost for an LCS "sea frame" is expected to be $220 million in FY 05 dollars, or .16 average ship equivalents. The average procurement cost for both the "sea frame" and mission package is projected to be $387 million, or .28 ASEs.[606] This means the Navy will be able to buy over five fully capable LCSs for the price of a single DD(X)—a bargain in today's shipbuilding environment.

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[603] The *Phalanx* is a six-barreled, radar controlled gatling gun. The Coast Guard will use the newest version, the CIWS IB. This weapon is an effective terminal missile defense weapon, and is also capable against surface craft and low-speed aircraft. See Frick, "RAM and Phalanx: System of Systems Testing."

[604] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 577.

[605] The potential of the ship's "reconfigurability" is well captured in Geoff Fein, "LCS Will be Revolutionary Change for Navy, Ship's First Commander Says," *Defense Daily,* July 7, 2005.

[606] The LCS "sea frame" is expected to cost $220 million. The modules will be paid for with Other Procurement, Navy (OPN) funds. Analysis by the Congressional Research Service projects the average cost for the combination of the two will be approximately $387 million. See O'Rourke, "Navy Littoral Combat Ship (LCS): Background and Issues for Congress," pp. 2-3.

Despite these attractive figures, total LCS *system* costs are not yet known, making the cost-benefit analysis of their modular design difficult to assess. For example, the forward support structure to swap out modules and to support extended LCS deployments—should this be necessary—is not yet known. Moreover, TFBN planners are attempting to design common UUV and USV "trucks" that would require swapping out only the sensors needed for each mission. If successful, the forward support requirements would be much less than if entire modules had to be replaced.[607] Also unknown are total number of mission modules to be bought and the total associated LCS manpower costs. The current plan is for each LCS sea frame to have a "core" crew of 30 to 50 officers and Sailors, and for the TFBN to have a number of mission packages and "mission package crews" that rotate among the ships. It is not yet clear if the number of mission packages and mission crews will equal or exceed the total number of LCS hulls. Indeed, over time, some Navy officials suggest the core/mission crew split may be eliminated altogether.[608]

Regardless of what these costs turn out to be, cost control must be an integral part of the LCS program, from construction to operations and support costs. Resisting the temptation to add more capabilities to the ship; building vessels in small Tier II yards that rely on cost control for their existence; and planning for long, efficient production runs will help to control costs. Demanding competition in both ship and mission module construction will also help. Indeed, provided they meet the stated TFBN requirements, the need to maintain competition suggests that the DoN build both GD and Lockheed Martin LCS designs, with the implied threat that production could be easily diverted from builders unable to maintain cost control. It also suggests encouraging, even demanding, international competition for the LCS's payload modules. Such competition would likely help to keep module costs down, and perhaps make the LCS more attractive in the international market.[609]

Building two versions of the same basic craft is not without precedent. After a "Plywood Derby" to select the aforementioned PT boat of World War II fame, the DoN elected to build two different designs. One was faster; one was more maneuverable; both met the overall requirements. Having two different designs hedged against any design proving to be less than successful in operational service, and ensured an industrial base capable of surging to meet any increase in demand. The same would be true today.[610]

Should the boats be built in two versions, it might make sense to build equal numbers of General Dynamics and Lockheed Martin versions of the LCS and to organize them into dissimilar two-ship divisions. The two designs complement one another quite well. The GD version is larger

[607] George Cahlink, "Navy Plans for Common LCS Mission Packages Could Further Trim Crew," *Defense Daily*, June 29, 2005.

[608] Cahlink, "Navy Plans for Common LCS Mission Packages Could Further Trim Crew."

[609] As an example of the benefits associated with international competition, see Joris Janssen Lok, "Battle Is Joined in Programme to Supply Future LCS Radar System," *Jane's International Defense Review*, May 2005, pp. 33-44.

[610] See Work, *Naval Transformation and the Littoral Combat Ship.*

and somewhat less maneuverable, but boasts larger aviation support facilities and a large, open payload bay capable of carrying up 675 troops, or 34, seven-ton Medium Tactical Vehicle Replacement trucks, or other heavy vehicles such as the Marine Corps Expeditionary Fighting Vehicle (EFV).[611] The Lockheed version is smaller and more nimble, and has the shallower draft; it can enter more than 92 percent of the world's ports.[612] Among them, the two ships could carry/provide:

- Four(+) MH-60 helicopters, 12(+) *Fire Scout* UAVs, or any combination thereof, and "lily pad" landing and refueling support for larger CH-53 aircraft;

- A combination of at least eight RHIBs, USVs, or UUVs, with at least four being 11 meters in length; and

- Two 57mm automatic cannon, two 21-round RAM launchers, and up to 360 guided littoral attack missiles—a formidable irregular warfare armament by any measure.

Better yet, with one ship normally fitted for mine warfare missions, one for ASW missions, and both with inherent anti-boat and SOF support capabilities, the two-ship division would be able to independently handle any likely littoral combat mission associated with unimpeded and guarded access scenarios, and be ready to immediately slot into Naval Battle Networks advancing on a defended littoral. In these circumstances, the LCS Division could make immediate contributions to the Power-Projection Fleet by conducting counter-mine operations; augmenting Battle Network ASW operations; protecting naval forces against swarming boat attack; supporting advance force reconnaissance and raiding operations; and functioning as a high-speed sea base connector. Moreover, by focusing each ship's crew on a particular mission, the division would have at least one ship crew that is expert in the employment of their respective mission packages.[613]

The LCS's ability to employ and control unmanned offboard systems from stand-off ranges might also allow it to make contributions in certain contested access scenarios. Under any circumstances, the ship will provide an ideal experimental platform for unmanned system support during Counter A2/AD Fleet operations.[614] The modular reconfigurability of the ship promises to make it a very fungible Battle Network asset.

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[611] At 1,030 square meters, the flight deck on the GD LCS is two-and-a-half times the size of an NBA basket ball court. It will be the largest flight deck of any surface combatant in the world.

[612] To give an appreciation for the maneuverability of the LM LCS, at 45 knots it will be able to turn in only 4.6 times its own length; it can stop in two ship lengths from traveling at 30 knots, and can turn in one ship length at 7 knots.

[613] There is still some skepticism that crews will be able to switch mission focus as fast as the LCS can switch mission modules. See for example Master Chief Mineman John E. Babcock, USN (ret), "Just Mines Please!" *Proceedings*, July 2005, pp. 47-49.

[614] It seems inevitable that the LCS will inspire and spur the development of new unmanned systems. For example, the Maritime Applied Physics Corporation is set to test a small high-speed hydrofoil capable of towing up to 2,500

Indeed, the LCS may help to overcome the Navy's post World War II preference for large, complex multi-mission ships, and usher in a new era in which "small boys" contribute more and more combat capability to the TFBN. Admirals already are talking openly of pursuing ships and craft even smaller than the LCS. One ship commonly mentioned is an operational version of the Littoral Support Craft (Experimental), or X-Craft. This ship, now known as *Sea Fighter*, is a technology demonstrator built for the Office of Naval Research. It is a 960 ton "fast sea frame" with a draft of 11.5 feet; a top speed of over 50 knots; an unrefueled steaming radius of 4,000 miles at 20 knots; a landing pad for two helicopters (but no hanger); and a large open mission bay that can support 12 containerized mission modules.[615] Although originally envisioned as a risk reduction platform for the LCS, some analysts believe a ship like it could eventually complement the LCS, especially for the special operations support mission.[616]

Other admirals believe that the global irregular war might require even smaller craft than either the LCS or X-Craft.[617] Many of US partners in the GWOT have small navies that are incapable of maintaining or operating even 1,000-ton vessels. Moreover, to fully deny the enemy the use of the seas, the TFBN may have to operate even closer to shore than the LCS's 12-15 foot drafts allow. This helps to explain the recent announcement that the DoN will be reconstituting one active and two reserve riverine squadrons—squadrons of craft with extremely shallow drafts capable of operating up rivers and estuaries.[618] It also may spur the development of a new class of patrol boats, perhaps variations of the Coast Guard's new 325-ton FLD Fast Response Cutter, which could be used to support many of the small navies around the world. It seems likely that chronicly increasing budget pressures will divert more and more attention to small network combatants. If this is the case, the LCS should provide TFBN planners with a powerful experimental tool to help point the way toward new missions for small combatants.[619]

## FORWARD FLEET STATIONS AND LCS FLOTILLAS

The LCS will spend the majority of its time prosecuting the irregular maritime war. Accordingly, the LCS force should be sized, organized, and configured to support persistent operations along

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pounds. See Scott Nance, "Unmanned Boat For LCS To Be Tested in Baltimore This Week," *Defense Today*, July 5, 2004, p. 1.

[615] See "X-Craft Sea Fighter (FSF-1), Christened 5 February 2005," at http://www.titan.com/products-Services/load.pdf.html?filename=3641124002000.pdf; Sandi Doughton, "'Sea Fighter' Alters the Look of the Navy," *Seattle Times*, February 4, 2005; and Gidget Fuentes, "Sea Fighter Ready to Set Stage for LCS," *Navy Times*, August 15, 2005.

[616] See for example George R. Worthington, "Naval Special Warfare—Littoral Force of Choice," *Proceedings*, February 2004, p. 2.

[617] Dave Ahearn, "Navy May Need to Develop Small Ship," *Defense Today*, June 16, 2005, p. 1.

[618] Director of the Navy Staff, Memorandum for Distribution, "Implementation of the CNO Guidance—GWOT Capabilities."

[619] Shah, "Clark: Idea for Smaller Ships Raises Questions That Must Be Resolved."

the Indian Ocean littorals, and in adjacent theaters where the enemy may try to expand operations. In prosecuting this irregular naval war, sustained presence in areas of operation will be important. Sustained presence will help the National Global Patrol/Irregular Warfare/Homeland Defense Fleet to gain a better appreciation of local operation conditions; aid in more rapid change detection; aid in the development of close operational ties with smaller regional navies and coast guards allied with the United States in its global fight; and help efforts to build up the capacities of these forces.

Persistent operations suggest the need for a global LCS and National Fleet support network. This forward support network will need to perform maintenance on mission modules and their offboard systems; to store and swap out LCS mission packages or mission package sensors; and to provide support for LCS crews conducting extending operations in austere environments. The network would also support US Coast Guard cutters operating forward in support of irregular warfare operations. To limit political risk, the network's backbone should be located on sovereign US territory, or on the territory of the US's most trusted allies. To maximize US freedom of action, and in keeping with TFBN design goals, the network should also be mobile—that is, operationally reconfigurable—to adjust to developing conditions in the global irregular war.

The advantages inherent in developing a thorough appreciation of local areas of operation and the need to establish a forward support network suggests a return to the flexible Fleet Stations of the Continental/Frigate Era, and a modest expansion of the TFBN's mobile logistics forces. In turn, the new Fleet Stations would become a key asset in forging a global maritime coalition of like-minded nations focused on preserving maritime order and safety. In this regard, five potential Fleet Stations immediately stand out:[620]

- A West Africa Station, perhaps supported off of British-owned Ascension Island. This station would support Battle Network Forces working with naval powers in the South Atlantic to guard the southernmost maritime approaches into the Atlantic Basin and the growing offshore energy infrastructure off the west coast of Africa and the east coast of Brazil; to conduct maritime interdiction operations in the mid- and south-Atlantic; and to patrol the west coast of Africa.[621]

- A Mediterranean Station, supported out of the 6th Fleet forward operating bases in Italy and Spain. This station would support Battle Network Forces working with Mediterranean nations to secure the Straits of Gibraltar, Bosporus Straits, and the Suez

[620] The locations for these stations were suggested by the map found in Scott, "Scourge of the Seas," pp. 20-21.

[621] West Coast Africa is growing in strategic importance for the US. See Sandra Jontz, "Naval Mission Aims to Boost Africa Security," *Mideast Stars and Stripes*, July 31, 2005; and Todd Pitman, "US Eyes West Africa's Coastline, Oil," *Washington Times*, August 11, 2005, p. 13.

Canal; to deny the Mediterranean Sea as an avenue of transportation for extremists, illegal immigrants, or WMD; and to patrol the northwest coast of Africa.[622]

- An Indian Ocean Station, supported out of the 5th Fleet forward operating base in Manama, Bahrain, and Diego Garcia. This station would support Battle Network Forces working with Indian Ocean and Gulf Cooperation Council States to secure the southern approaches to the Red Sea, and the western approaches to the traffic lanes in the Southeast Asian Littoral; to deny the sea to extremists, pirates, and maritime terrorists in the Indian Ocean; and to help build partner capacity in confronting these threats.

- A Southeast Asian Station, supported off of the US territory of Palau, and cooperative security locations in Singapore and northwest Australia. This station would support Battle Network Forces working with Southeast Asian states to secure maritime traffic through the many straits in the region; to deny the sea to extremists, pirates, and maritime terrorists; and to help build partner capacity in confronting these threats.[623]

- A Western Pacific Station, supported off of the US territory of Guam. This station would support Battle Network Forces working with Western Pacific states to secure the eastern approaches to the busy sea lanes of the Southeast Asian littoral and to deny extremist moves beyond the Indian Ocean theater.

Each of these five stations would include a mobile "station ship" and dedicated replenishment vessels. Of course, while these ships would be focused on supporting LCS operations, they would be fungible, multi-purpose National Global Patrol/Irregular Warfare/Homeland Defense and TFBN assets, able to support forward operations of US nuclear attack submarines (such as their rearmament), Coast Guard cutters and vessels, as well as other US combatants (these ships will be discussed more thoroughly in the section on Logistics Sea Base).

Using these stations for support, the TFBN LCS fleet would be structured to support distributed irregular warfare operations throughout the Indian Ocean and its adjoining theaters. The baseline fleet would be organized into 42, two-ship LCS divisions, composed of two Irregular Warfare Flotillas and one Fleet Support Flotilla.

The Irregular Warfare Flotilla assigned to the Atlantic Fleet would support operations in the Atlantic Basin and in the Sixth and Fifth Fleet areas of responsibility. It would consist of four divisions based forward (two permanently assigned to Sixth Fleet for the Mediterranean Station, and two permanently assigned to Fifth Fleet), and a rotational pool of 12 divisions to keep three divisions operating forward—one off of Latin America, one off of the West African Station, and one off the Horn of Africa.

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[622] Cooperative naval activities in the Mediterranean are highlighted in Deertz, "Fast Patrol Boats in Escort Operations."

[623] For a description of the growing importance countries are placing on securing the key straits in the Southeast Asian littoral, see Bateman, "Search for Stability."

The Irregular Warfare Flotilla assigned to the Pacific Fleet would consist of ten divisions based in Guam and Hawaii. Using availability rules for forward deployed naval forces, 50 percent of the Flotilla—five divisions—would maintain patrols off of the Southeast Asian Station, and along the Western Pacific littorals.

The Fleet Support Flotilla would consist of two LCS divisions forward based in Japan, and a rotational pool of 12 divisions to keep three LCS escort divisions forward. These five LCS divisions would provide direct support to rotational forward-deployed Naval Battle Network forces such as Carrier Strike Groups and Expeditionary Strike Groups. Two additional LCS divisions, using the four Flight 0 LCS prototypes, would serve as training/experimental platforms for payload development, one each for both the Atlantic and Pacific Fleets.

This 84-ship force thus provides a total of 40 operational and two training LCS divisions.[624] The three LCS Flotillas previously outlined can keep 17 of the 40 operational Divisions—a total of 34 LCSs (42.5 percent of the force) forward deployed. The baseline number of supporting force mission packages would be 42 mine countermeasure and 42 ASW packages. This would provide 16 more mine warfare and 12 more ASW packages than the current legacy force of small littoral combatants. Anti-boat and SOF support capabilities would be an inherent part of each division.

## SYSTEMS FOR ACHIEVING MARITIME DOMAIN AWARENESS

Given its persistent, distributed global operations, the National Global Patrol/Irregular Warfare/Homeland Defense Fleet—and particularly its LCS force—will help to improve global "maritime domain awareness." However, given the expanse of the irregular warfare operations, the fleet will rely upon and work in tandem with other maritime patrol and surveillance systems that make up the TFBN's broad area maritime surveillance network. Key contributors to this network will be three key aviation platforms: the Broad Area Maritime Surveillance (BAMS) system; the Multi-mission Maritime Aircraft (MMA); and the Airborne Common Sensor (ACS).

As envisioned, the BAMS program will provide the backbone of the TFBN's persistent, global maritime surveillance and reconnaissance capability. It will be an unmanned aerial vehicle with a multi-mission maritime ISR, signals intelligence, and communications relay package. The UAV will have an operating altitude of over 40,000 feet and the ability to loiter on station for up to a day at ranges between 1,000 and 3,000 miles from its operating base; as a result, the UAV will operate above the weather and provide Naval and Joint Battle Networks reliable and persistent coverage of the world's oceans and littoral seas. Five BAMS squadrons—one on the east coast of the United States, in Italy, on Diego Garcia, and in Japan and Hawaii—are notionally planned. The BAMS entered Systems Development and Demonstration (SDD) in FY 05.[625]

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[624] In comparison, the DoN's "365-ship Plan" calls for 82 LCSs. The DoN's administrative and operational organizational plans for the ships are unknown. "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006;" Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[625] See "Broad Area Maritime Surveillance," at http://www.globalsecurity.org/intell/systems/bams.htm. For descriptions of competing designs for the BAMS, see Richard R. Burgess, "Aircraft Manufacturers bring Different

BAMS UAVs will be complemented by the Multi-mission Maritime Aircraft for special purpose, lower-altitude surveillance missions. The MMA will also provide TFBN with a rapid reaction airborne anti-submarine and anti-surface warfare capability. The MMA program will replace the DoN's legacy fleet of 196 turbo-prop P-3 maritime patrol/ASW aircraft with a minimum of 108 P-8s—modified Boeing 737-800ERX twin-engine commercial jets. The final number of P-8s will depend on the number and coverage of the aforementioned BAMS system. The jets will have a higher operational altitude and higher dash speed than the venerable P3s, and will benefit from Boeing's world-wide logistics infrastructure. The plane will have a state-of-the-art open architecture mission system designed to allow rapid technological refresh of its basic ISR, ASW and ASuW combat systems, and new special purpose weapons to allow it to full exploit its higher cruising altitude and speed.[626] Consistent with the goal of "getting combined," DoN planners want to "internationalize" the MMA in hopes of luring ROW navies that currently operate the P-3 aircraft into replacing them with MMAs.[627]

During the 1990s, twelve P-3s were converted into to special purpose Battle Force signal intelligence reconnaissance aircraft. The resulting EP-3E ARIES II (Airborne Reconnaissance Integrated Electronic System II) was equipped with an array of sensitive receivers and high-gain dish antennas, allowing it to collect, analyze, and exploit a wide range of electronic emissions from stand-off ranges.[628] The remaining 11 aircraft are to be replaced by 19 new aircraft called the Airborne Common Sensor, a Joint signal intelligence program with the US Army. Unlike the larger EP-3E, which carries more than 15 workstation operators and linguists who process most of its signals-intelligence intercepts aboard the plane, the ACS will carry only six operator workstations, and will send most signal intercept data to TFBN shore or ship nodes for exploitation.[629] The planned platform for the ACS was to be a modified Brazilian Embraer ERJ-

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Capabilities to BAMS Starting Line," at http://www.navyleague.org/sea_power/jun_04_29.php; and Jason Ma, "Sea Sentinels," *Armed Forces Journal*, August 2005, pp. 34-35. The DoN purchased two RQ-4A Global Hawk UAVs for experimental use to help TFBN planners to set the conditions for a planned BAMS competitive acquisition program scheduled for 2011. See Glenn W. Goodman, Jr., "First US Navy Global Hawks Built for Experiments," *C4ISR Journal*, April 14, 2005; and Richard R. Burgess, "UAV Tests its Sea Legs," *Seapower*, May 2005, pp. 12-14.

[626] The DoN claims the MMA will have a 25 percent higher availability rate, be 30 percent faster, and fly at altitudes 33 percent higher than the P-3. Department of the Navy FY2006/FY2007 President's Budget, "Winning Today…Transforming to Win Tomorrow," PowerPoint briefing dated February 4, 2005. See also "Multi-Mission Maritime Aircraft," *International Airpower Review*, Vol. 14, 2004, p. 19; "P-8 Multi-Mission Maritime Aircraft," at http://www.globalsecurity.org/military/systems/aircraft/p-8.htm; and Glen Goodman, "USN Completes First Major Review of the MMA Program," at http://www.isrjournal.com/story.php?F=457406. One new weapon the MMA may carry is outlined in the High Altitude ASW Weapon Concept (HAAWC). This is a winged torpedo that would allow the MMA to drop on a contact generated by its own or other TFBN sensors without making a time-consuming and fuel-wasting descent to a lower release altitude. See Richard Burgess, "Boeing Eyes High-Flying Torpedo," *Seapower*, June 2005, pp. 68-70.

[627] See Marc Selinger, "Navy Plans to Internationalize New Patrol Aircraft," *Aerospace Daily and Defense Report*, June 16, 2004.

[628] See US Navy Fact File, "EP-3E ARIES II," at http://www.chinfo.navy.mil/navpalib/factfile/aircraft/air-ep3e.html.

[629] See "Vanguards of Change," *C4ISR Online*, found at http://www.isrjournal.com/story.php?F=667056. See also Dave Ahearn, "Lockheed Wins Up to $8 Billion Aerial Common Sensor Contract," *Defense Today*, August 4, 2004,

145 regional jet which, like the Boeing MMA, would benefit from a world-wide commercial logistics infrastructure. However, the ERJ-145 proved to be too small for the task; it is to be replaced by one of several larger, but still commercially-derived, aircraft.[630]

The 108 MMAs, 19 ACSs, five BAMS squadrons, 84 LCSs, and 155+ Deepwater cutters and patrol boats will form the terrestrial and sea-based backbone of the future global maritime domain awareness network. They will be augmented by space-based reconnaissance systems for global coverage, and hundreds of smaller UAVs for local coverage (the 239 LCSs and cutters alone can carry 500+ short range, vertically-launched UAVs). This network will allow the National Global Patrol/Irregular Warfare/Homeland Defense Fleet to conduct a distributed distant blockade unlike any in history, with an ability to track, intercept, and if necessary, destroy maritime targets of interest, globally. Consistent with TFBN design criteria, it will consist of modular, open architecture components, allowing it to quickly adapt to technology advances.

The network will also be scalable and fungible across missions for Sea as Base Power-Projection, and Contested Access Fleets. While it works to establish global maritime domain awareness and prosecutes the global irregular maritime war, the network also develops the intelligence that will be used to configure and scale Naval Battle Networks responding to more serious crises. In this regard, while the LCS is optimized for operations in unimpeded and guarded access scenarios, allowing for cost effective irregular warfare operations and the development of a "power-projection data base," its persistent forward operations and ability to slot into advancing Naval Battle Networks also makes it an ideal advance force operations and sea base support ship for operations in a defended littoral. Moreover, its offboard systems may make important contributions in contested access scenarios.

## Covert Forward Staging Bases for Irregular Warfare

The five Fleet Stations, two main fleet operating bases, and numerous cooperative security locations—like the current Joint forward operating location in Djibouti in the Horn of Africa—provide a global network to support naval special warfare and Joint special operations forces operations. The 42 Division, 84-ship LCS force just described would provide a minimum of 17 small afloat forward staging bases for SOF operations, with impressive aviation, small boat, and fire support capabilities. In the future, these small "lily pad" afloat forward staging bases will be augmented by a new type of covert forward staging base for irregular warfare—namely, cruise missile and special operations support submarines converted from surplus SSBNs.

Recall that the 2001 Nuclear Posture Review recommended a dramatic reduction in the total number of warheads in the US nuclear arsenal. As a result, four *Ohio*-class nuclear-powered

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p. 1; and Dave Ahearn, "Lockheed Martin ACS Expected To Be On Cost, On Schedule," *Defense Today*, October 28, 2004, p. 1.

[630] Dave Ahearn and Scott Nance, "GD, Boeing, Bombardier, Embraer Seen Vying for ACS," *Defense Today*, July 11, 2005, p. 1.

strategic ballistic missile submarines were removed from fleet service. At the time, the SSBNs had over two decades of service life remaining. More importantly, however, they had 24 large, modular payload bays (seven-feet in diameter and 44-feet deep), and a relatively large amount of internally reconfigurable space.[631]

Given both their large internal payload capacity and relatively long remaining service lives, these four *Ohio*-class SSBNs became prime candidates for possible mission conversions. Utilizing excess SSBNs for other fleet missions is nothing new; eight SSBNs were converted into attack submarines between 1980 and 1982. These initial conversions provided limited utility to the fleet. However, between 1984 and 1986, two SSBNs were taken out of service and converted into special operations transport submarines. These conversions proved to be of more utility. Indeed, when these two submarines were decommissioned in 1991-1992, they were replaced by two more converted SSBNs. These last two special operations transports were decommissioned in 1999 and 2002.[632]

Building on the successful use of former SSBNs as special operations transports, DoN planners—with much cajoling from the Office of the Secretary of Defense and Congress—decided to convert all four of the *Ohios* into conventional Cruise Missile and Special Operations Transport Submarines, or SSGNs. The conversions took place in conjunction with their regularly scheduled mid-life Engineering and Refueling Overhaul.

These new SSGNs will represent a vast improvement over previous SSBN special operations transports. Their two most forward SLBM tubes (i.e., those closest to the sail) are being modified to hold a 5-man swimmer lock-in/lock out chamber, and to attach either a Dry Deck Shelter (DDS), or one of the new Advanced SEAL Delivery Systems (ASDSs). The former can carry a single Swimmer Delivery Vehicle, capable of covertly delivering eight SEALs close to a beach; the latter is a small 55-ton submarine capable of delivering up to 16 SEALs close to shore. The remaining 22 large mission bays are being converted to carry either extra SOF equipment, or to receive a Multiple All-Up Round Canister (MAC)—a self-contained seven-cell VLS battery configured to store and fire *Tomahawk* land attack missiles. The SSGNs will also have a SOF mission planning center; permanent berthing and work space for 66 special operations personnel; surge berthing for an additional 36 personnel; and improved Joint Multidimensional Battle Network connectivity.[633]

In essence, the SSGN is designed to be a covert forward operating base for up to four SEAL platoons (each SEAL platoon has 16 men) for several months, although in actual practice the

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[631] John Pavlos and Karl Hasslinger, “Ohio Subs Would Be Best Basing Mode for New Interceptor Missile,” *Seapower*, November 2004, pp. 20-21.

[632] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, p. 67.

[633] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 72; “SSGN: A Transformational Force for the US Navy,” at http://www.chinfo.navy.mil/ navpalib/cno/ n87/usw/issue_13/ssgn.htm; and Commander Robert Aronson, USN, “SSGN: A ‘Second Career’ for the Boomer Force,” at http://www.chinfo.navy.mil/navpalib/cno/ n87/usw/issue_6/ssgn.html.

boat would likely host special operations forces for shorter periods of time. In addition, the boat's maximum strike load of 154 *Tomahawks* (reduced to between 126 and 140 missiles when carrying the DDS or the ASDS) makes it ideal as a persistent covert strike platform, capable of attacking a variety of targets up to 1,350 miles from the boat.[634]

The SSGN's ability to support large covert SOF contingents and to carry up to 154 covert VLS cells makes the platform operationally fungible across the National Global Patrol/Irregular Warfare/Homeland Defense, Sea as Base Power-Projection and Contested/Denied Access Fleets. Moreover, its large internal volume will likely make it even more useful in the future. For example, plans are to replace or augment the single-purpose MACs found in the "Spiral 0" SSGNs with new Flexible Payload Modules, or FPMs. The FPMs are being designed to allow the SSGNs to employ a variety of missiles besides *Tomahawk*; moored, bottom, and mobile mines; expendable UAVs; and possibly UUVs. Two FPMs now being explored include the Broaching Universal Buoyant Launcher (BUBL), and the Stealthy Affordable Capsule System (SACS), both of which will store and transport "non-navalized" weapons. Upon release from a submerged SSGN (or perhaps even SSN), both the BUBL and SACS float to the ocean surface, stabilize, and launch their weapons or payloads. The goal is to allow submarines to fire virtually any weapon in the Joint Multidimensional Battle Network inventory.[635]

All of this operational flexibility comes at a relatively low price. The total cost of the conversion for four SSGNs is expected to be $3.56 billion, including $700 million for non-recurring planning/design costs (FY 05 dollars). The average SSGN conversion cost (not including design work) thus works out to approximately $714 million per boat. However, as discussed, the cost for an already scheduled SSBN mid-life Engineering and Refueling Overhaul is $300 million, making the incremental price for any future SSGN conversion cost "only" $414 million per boat.[636]

Converting two further SSBNs would give the TFBN a fleet of six SSGNs. With three SSGNs manned with dual crews on each coast (located at the SSBN operating bases for logistics reasons), the TFBN should be able to keep four of the boats forward. By conducting crew swaps in secure Fleet Stations, perhaps in Italy and on Guam, two to three of these covert SOF forward operating bases could be maintained on patrol in the Mediterranean, Indian Ocean, and Pacific. On patrol, the boats would normally perform irregular warfare and TFBN ISR missions and provide prompt covert strike coverage. If tasked to support a SOF mission, the boats would likely pull into a Fleet Station or friendly port to pick up the mission team, or move to an open-ocean rendezvous point to pick up air-delivered commandos.

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[634] Gidget Fuentes, "Of Stealth, Subs, and SEALs," *Armed Forces Journal*, November 2004.

[635] See "Raytheon Team Broaches BUBL," found at http://www.gradewinner.com/p/articles/miqa3738/is200305/ain9206248#continue; and "Northrop Grumman Encapsulation Technology Enables New Submarine Capability," at http://www.irconnect.com/noc/press/pages/news_releases.mhtml?d=70540.

[636] Once again, I would like to thank Dr. Eric Labs, CBO, for helping me to come up with these estimations. Once again, any errors are mine alone.

As in the past, SSNs will continue to serve as covert ISR/strike platforms and SOF forward operating locations. The new *Virginia*-class SSN, with its reconfigurable torpedo room and 9-man diver lock-out chamber, is particularly suited for this task. However, given the combination of LCS afloat forward staging bases and SSGN covert operating bases, it seems likely that the SSN SOF and ISR support role could diminish over time, except for special operations penetrations into contested or denied littorals. This would also be keeping with a smaller SSN force focused on warfighting missions and ASW.

## RECOMMENDATIONS FOR THE NATIONAL GLOBAL PATROL/IRREGULAR WARFARE/HOMELAND DEFENSE FLEET

In summary, this report recommends that:

- The entire fleet of Coast Guard cutters and patrol boats be considered “countable” assets in the National Global Patrol/Irregular Warfare/Homeland Defense Fleet. These are vital assets that the DoN would likely have to build if they were not already provided by the US Coast Guard.

- The DoN build 40 General Dynamics and 40 Lockheed Martin LCSs, after completion of the at-sea trails for the four Flight 0 ships now programmed between FY 05 and FY 07, for a total of 84 LCSs. Production would ramp up to four ships (two of each version) in FY 08, followed by a sustained production run of six per year (three of each) between FY 09 and FY 20. The production run would end in 2021 with a final purchase of four ships.

- TFBN architects organize the 84-ship force into three LCS Flotillas with a total of 40, operational two-ship Divisions, and a two-ship training division on each coast. A force of 40 operational divisions could keep a minimum of 17 Divisions forward (42.5 percent of the operational force). The number of forward-deployed ships could be higher if the “sea swap” of LCS crews proves to be possible. Alternatively, if “Sea Swap” is successful, a smaller force of LCSs might be able to sustain the same number forward.[637]

- The DoN immediately convert two additional SSBNs into SSGNs in conjunction with their scheduled mid-life ERO to provide a six-boat special operations support fleet. The fleet would be organized into two 3-boat squadrons, one on each coast. The logical boats for conversion would be the *Henry M. Jackson* and the *Alabama*, the fifth and sixth ships built in the 18-boat *Trident* class, respectively. Their normal mid-life EROs were budgeted for in FYs 05 and 06. This plan would require Congressional approval to expand their EROs into a more expensive SSGN conversion.

[637] Current Navy plans call for a force between 62 and 80 LCSs, depending on whether or not Sea Swap is successful.

- TFBN planners establish five Fleet Stations to provide support to LCS and SOF irregular warfare operations: West Africa; Mediterranean; Indian Ocean; Southeast Asia, and Western Pacific.

- TFBN planners continue experiments with small combatants such as the Sea Fighter Fast Sea Frame or patrol boats based on the Coast Guard's Fast Response Cutter to determine what further TFBN functions can be supported by smaller, cheaper, network combatants. Depending on the outcome of these experiments, the planned LCS buy might be modified to develop a family of small combatants, ranging from riverine craft up to the LCS in size.

### Associated Annual Shipbuilding Costs

Through 2020, the annual ship building costs associated with these recommendations are:

- The current shipbuilding plan includes one LCS in FY 05 (Lockheed Martin version); one LCS in FY 06 (General Dynamics version) and two LCSs in FY 07 (one of each version, total of $440 million, .31 ASEs, FY 05 dollars).[638] Four more Flight 0 ships would be purchased in FY 08 (two of each version, for a total of $880 million, or .63 ASEs), as sea trials for the two ships are completed. Assuming at-sea trials for both LCS versions are successful, serial production would continue at six LCSs per year from FY 09 through FY 20 (three of each version, $1.32 billion per year, .94 ASEs), and four LCSs in 2021 (two of each version, $880 million, .63 ASEs), for a total class production run of 84 ships.

- $828 million (.59 ASEs, FY 05 dollars) for two additional SSGN conversions. As the mid-life EROs for the *Henry M. Jackson* and the *Alabama* were budgeted for in FY 05 and 06, the cost for the two conversions would be a one-time additional cost in the FY 07 budget.[639]

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

Weapons procurement and other weapons systems costs will rise with this plan. The 84-ship LCS fleet will require carry more automatic cannon than the legacy fleet of 30 FF7s, 26 mine warfare vessels, and three PCs, and the costs for arming the 84 RAM systems will also require additional funding. The fleet will also carry a substantial number of NetFire missiles, and carry considerably more UAVs, USVs and UUVs than the legacy fleet.

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[638] This is the procurement cost for the sea frame, which will be paid for out of the SCN account. Modules will be procured under the OPN account, and are not deducted from the shipbuilding budget.

[639] The exact phasing of the conversions would be contingent upon slips or construction bays at Electric Boat, the yard that conducts SSGN conversions. The final two of four SSGN conversions reflected learning curve efficiencies, averaging $93 million less than the first two conversions. However, unlike the first four boats, any further boats undergoing conversion would be configured for the D-5 missile, which would require modest design alterations, and additional engineering costs. Therefore, the higher average is used for planning purposes.

The addition of two more SSGNs creates an additional 308 potential VLS cells to fill. In total, a six-boat SSGN force provides 924 covert VLS cells, the magazine equivalent of ten *Arleigh Burke*-class guided missile destroyers.

Assuming a maximum crew size of 75, the total force crew requirement for the 84-ship LCS fleet would be 6,300 officers and men. Compared to the 64 small combatants now in the fleet, this equates to a total crew savings, including active and reserve billets, of some 2,906 personnel. This reduction will be offset by the requirement for two 160-man crews for each of the additional SSGNs—a total of 640 additional crew members, resulting in a total fleet manpower savings of 2,266 officers and Sailors.

The introduction of two distinct LCS versions will increase fleet-wide training, maintenance, and logistics costs over the short term. During the transition phase, the fleet will have six different small combatants in service (two LCS versions, FF7, MCM, MHC, and PC). However, by 2020, these two ships would replace four different hulls and propulsion plants found in the legacy fleet. As a result, future fleet-wide O&S costs should be dramatically lower after the transition to an all-LCS fleet.

# IX. The Counter-A2/AD Fleet

The job of the Counter-A2/AD Fleet, along with other Joint counter-network forces, will be to disrupt, roll-back, and destroy long-range anti-access and area-denial sensors and weapons as quickly as possible to collapse the area of the sea adjacent to an enemy's coast threatened by sensor and weapon systems. In other words, the Counter-A2/AD Fleet is designed to overcome disruptive naval competitors capable of contesting US Battle Force operations in littoral waters under conditions of battle network parity. By so doing, it restores freedom of action for the larger, and therefore more vulnerable, Sea as base Power-Projection Fleet.

The TFBN's Counter-A2/AD Fleet thus focuses on solving two key operational problems: conducting advance force counter-network operations in the face of increasingly long-range and accurate guided weapons; and rolling back an adversary's A2/AD network in order to restore freedom of action for TFBN forces. These two problems will likely steer the fleet towards a mix of extremely stealthy crewed platforms, unmanned systems, and extended range weapons and platforms of its own. As such, this fleet will likely represent the most "high-tech" component of the future TFBN.

## A2/AD: A Growing Operational Challenge

> I anticipate that the next century will see those foes striving to target concentrations of troops and material ashore and attack our forces at sea and in the air. This is more than a se-denial threat or a Navy problem. It is an area-denial threat whose defeat or negation will become the single most crucial element in projecting a sustaining US military power where it is needed.[640]
>
> Admiral Jay Johnson, US Navy, 1997

Some naval officers describe littoral seas as the waters from the continental shelf to the coastline. Some, like those in the Royal Swedish Navy, describe the littorals as a unique naval operating environment in which threats multiply the closer one operates to the coast. The Israeli Navy, also practitioners of littoral warfare, side with the Swedish Navy. They define the littoral as *the area of the sea adjacent to an enemy coast protected by detection and weapon systems based on land, ships, and aircraft within the area.*[641] Using this definition, the area traditionally known as the "littoral" is expanding. Indeed, systems such as long-range naval strike aircraft armed with long-range anti-ship cruise missiles and ballistic missiles capable of engaging ships at sea are extending the "area of the sea adjacent to an enemy coast protected by detection and weapons

[640] Admiral Jay Johnson, US Navy, "Anytime, Anywhere: A Navy for the 21st Century," *Proceedings,* November 1997, p. 49.

[641] Captain Opher Doron, Israeli Navy (ret), "The Israelis Know Littoral Warfare," *Proceedings,* March 2003, p. 67.

systems" to well beyond the continental shelf and onto the high seas. Moreover, these long-range air and missile attacks would represent just the leading edge of defenses that would get progressively denser as a Naval Battle Network comes closer to the coast.[642]

Two related circumstances will likely impinge on the pace and scope of the development of the Counter-A2/AD Fleet. First, the cost of developing an A2/AD network capable of achieving network parity with a US Joint Multidimensional Battle Network is quite high, ensuring that only a few nations with the most robust resources will be able to afford them. Second, until the cost of guided weapons become more independent of range, the number of long-range systems an adversary can afford will be limited.[643] This should allow future Naval Battle Networks to conduct initial counter-network operations from ranges that dramatically limit adversary salvo densities, and improve the likelihood that Battle Network defenses cannot be saturated. The practical impact of these two circumstances is that the Battle Network will only rarely have to confront a high-end A2/AD network capable of extended-duration, extended-range operations. This suggests that the TFBN's Counter-A2/AD Fleet should be thought of as a special-purpose counter-network force—designed for the suppression of enemy maritime anti-access networks—and not as the basis for the entire TFBN redesign. It also suggests that the development of this special-purpose fleet will be shaped by a time-based competition with any adversary pursuing a viable A2/AD network.

The focus of the Counter-A2/AD Fleet should be on a pacing threat. As previously mentioned, the evolving Chinese A2/AD network will likely represent the most stressing potential mid- to long-term contested/denied access challenge. Again, to emphasize a key point: this report takes no position on whether or not China will emerge as a hostile military competitor along the lines of the Soviet Union. It merely recognizes that the Chinese are clearly developing anti-access and area-denial capabilities that could deny US naval forces freedom of action in the Western Pacific. The TFBN therefore must be shaped in order to counter that threat, should it be necessary to do so.

## BUILDING THE COUNTER-A2/AD FLEET

The TFBN has a solid foundation for a Counter-A2/AD Fleet using fungible assets from other component fleets. The SSN force will normally be the first TFBN asset to penetrate a high-end maritime A2/AD network. Its first role would be to role back the undersea component of the network, and to establish undersea superiority. The new *Virginia*-class SSNs appear quite capable in this regard. However, given that the nature of the undersea competition appears to be moving away from submarine force-on-force engagements and toward confrontations between opposing undersea combat networks, and the unfavorable cost trends associated with building

[642] "The littoral is not a fixed geographic area, but rather an increase in threat level as you near the shore and become more affected by the elements operating under its wing…The nearer you come, the more diverse the enemy's weapons become and the better his targeting." Again, from Doron, "The Israelis Know Littoral Warfare."

[643] Although, since the network-counter-network competition is time-based, an adversary could certainly build up a formidable inventory of long-range weapons over time.

and maintaining a large SSN fleet, it will be important for the TFBN to develop new undersea warfighting networks, concepts, and capabilities.

This shift in the undersea competition suggests that the TFBN must develop deployable undersea surveillance networks that can cue SSNs and other Joint and TFBN attack platforms, and begin to augment SSNs with UUVs, or perhaps even substitute UUVs for SSNs, during early offensive counter-undersea operations. Indeed, to generate force numbers and to increase the areas that each individual SSN can dominate, future SSNs will likely need to control a number of offboard vehicles, autonomous underwater vehicles, or UUVs. A key requirement, then, will be the development of tactics, techniques and procedures to effectively carry, deploy, employ and recover these systems in tactically significant numbers.

These circumstances support the earlier recommendation that the TFBN consider developing one or two experimental platforms to develop UUV operating concepts and procedures. The logical platforms for this task would appear to be converted *Ohio*-class SSBNs, which have the payload capacity for 154, 21-inch diameter UUVs, or a smaller number of larger diameter UUVs. The SSBN's capacious payload bays would even allow for the development of, and experimentation with, larger *optionally-crewed* UUVs that could either operate autonomously, or under the control of a one- or two-man crew. Therefore, should follow-on studies indicate that the SSBN force can be reduced to ten boats, consideration should be made to convert the remaining two boats into SSUNXs—experimental nuclear-powered UUV tenders. As experimental boats, these conversions should be made with research and development money, so as not to divert money from operational shipbuilding accounts.

Concurrently with offensive counter-undersea operations, the submarine fleet would conduct early covert strikes against high-value, land-based, A2/AD network nodes, especially those that threaten the TFBN at range. In this regard, SSNs and SSGNs are the naval equivalent of the B-2 penetrating bomber force. Given their high degree of inherent stealth, these platforms should be able to penetrate an adversary's A2/AD network, operate with relative impunity, and support Joint counter-network operations by providing ISR, strike, and special operations support. Indeed, a 2020 force of 43 SSNs and six SSGNs would provide no less 1,416 covert VLS cells—a formidable stealthy attack force by any standard. With little to fear from counter-fire from enemy ballistic missiles, cruise missiles, or air-launched missiles, this represents the equivalent of nearly 15 *Arleigh Burke* "stealth guided missile destroyers" capable of operating within a hundred or so miles of an adversary's coast—well within the surface engagement range of any capable A2/AD network. The ability of the submarine force to conduct close-in strikes from covert, undersea sanctuaries—without detracting from their primary ASW mission—gives the Joint Multidimensional Battle Network a powerful suppression of littoral defense capability for any future theater break-in operation.

The primary near-term submarine strike weapon will be the *Tactical Tomahawk*, an updated version of the *Tomahawk* land attack missile. Unlike the earlier versions of the *Tomahawk*, the "TACTOM" can loiter for two hours at a range of 1,000 miles, or strike targets at nearly 1,300 miles. Moreover, through the space-based *Tomahawk* Strike Network, the Tactical *Tomahawk*

Weapons Control System (TTWCS) can update target aimpoints and retarget the missile while in flight, giving the missile much the same flexibility of a manned aircraft.[644] Unfortunately, however, the missile is non-stealthy, and would not likely penetrate the most capable future A2/AD air defense networks. This limitation might be remedied over time by firing extended-range versions of the stealthy Joint Air-to-Surface Standoff Missile (JASSM) from SSGN buoyant launchers, or perhaps even VLS cells.[645] Alternatively, the submarines might fire conventional ballistic missiles capable of carrying a payload of 1,200 pounds to ranges of 1,500 nautical miles. Current conceptual studies envision a 32-inch diameter missile, allowing three to be stored in each SSGN missile tube.[646] In any event, the development of special counter-network weapons appears to be a high priority.

The submarine force will attack the enemy's A2/AD network from the inside out; TFBN aviation power-projection platforms will simultaneously attack the network from the outside in. In this regard, the mid-term addition of the Joint Unmanned Combat Air System (J-UCAS) to Carrier Air Wings likely will enhance the carrier fleet's ability to contribute to these operations. The J-UCAS program combined two service efforts—the Defense Advanced Research Project Agency (DARPA)/Air Force Unmanned Combat Air Vehicle (UCAV) program and the DARPA/Navy Naval UCAV (UCAV-N) program. The program aims to develop a relatively low-cost, low observable Joint unmanned aerial vehicle with secure, reliable communications that is capable of autonomously performing complex aerial combat tasks, including ISR, unwarned strike over denied airspace, and suppression of enemy air defenses. Program managers have established several common service performance objectives for Air Force and Navy J-UCAS demonstrators: a payload of 4,500 pounds; an unrefueled combat radius of 1,300 nautical miles; a two-hour loiter time at 1,000 nm; and rapid sortie generation rates with minimum turn time.[647]

Should these performance parameters be achieved, the J-UCAS will give the TFBN's carrier force a means to conduct early aerial counter-network attacks at unrefueled ranges approximately one-and-a-half to two times greater than any existing or planned manned carrier aircraft, allowing the carrier force to contribute to early Joint advance force counter-network operations while operating from safer stand-off ranges.[648] Moreover, because of its stealthy design, the J-

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[644] See Tony Capaccio, "Raytheon's New Tomahawk Missile Ready For Use, US Navy Says," *Bloomberg News*, September 29, 2004. For more information on the new TTWC, see Lieutenant (JG) Christopher Byrnes, USN, "SEA POWER 21: The Impact of Tactical Tomahawks in the Joint Arena," *Proceedings*, July 2005, pp. 74-75.

[645] See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 515; and "AGM-158, Joint Air-to-Surface Standoff Missile (JASSM)," at http://www.fas.org/man/dod-101/sys/smart/jassm.htm.

[646] Nathan Hodge, "Navy Contemplating New Missile For 'Time Critical' Strike," *Defense Daily*, June 17, 2005. The Intermediate Nuclear Forces Treaty with Russia eliminated ballistic missiles in the US arsenal with ranges between 500 and 1500 kilometers (about 300 to 3,400 miles). The introduction of conventional ballistic missiles with these ranges might require modification of the treaty. See "Intermediate-Range Nuclear Forces (INF)," at http://www.fas.org/nuke/control/inf.

[647] David A. Fulghum and Douglas Barrie, "The Future of Stealth," *Aviation Week and Space Technology*, April 4, 2005, pp. 24-25.

[648] The carrier version of the Joint Strike Fighter will have the longest unrefueled range of any manned tactical airplanes on the carrier deck: 810 miles. Bosbotinis, "UK Future Maritime Airpower," p. 42.

UCAS should be able to operate effectively inside an adversary's air A2/AD network. Three J-UCASs, each armed with four 1,000-pound JDAMs, would provide the equivalent attack capability of a single 12-cell VLS battery on a deployed SSN.[649]

Interestingly, the J-UCAS's unrefueled radius of 1,300 nautical miles is very similar to the aforementioned Tactical *Tomahawk*, which is now entering the fleet, and planned submarine-launched ballistic missiles. In effect, then, a distributed Naval Battle Network consisting of J-UCAS-equipped aircraft carriers and SSGNs equipped with cruise missiles or conventional ballistic missiles could be dispersed from as close as 25-50 miles offshore to as far as 1,000 miles from an enemy's coast, and be able to sustain immediate strikes against targets from the coast to over 1,200 miles inland.

As impressive as the J-UCAS and TACTOM ranges are, they may still compel the carrier and her accompanying escorts, not to mention independent surface action groups, to operate within range of long-range, land-based ballistic missiles armed with maneuverable anti-ship warheads. This is not a new threat. The Soviet Navy experimented with developing such a capability in the 1960s and 1970s. They compensated for their lack of high-definition terminal seekers by arming the missile with 550 kiloton to one megaton warheads. Today, the Chinese are pursuing a similar missile capability. However, given the dramatic improvements in seeker technologies since the 1970s, the Chinese appear to be arming their missiles with kinetic hit-to-kill or conventional warheads. It is as yet unclear whether of not they are planning to equip the missiles with an optional nuclear warhead. In any event, having an effective defense against these weapons is a high priority for the Counter-A2/AD force.[650]

The aforementioned upgrades to the 18 AEGIS/VLS ships for the homeland ballistic missile defense mission provide a good first step toward countering the anti-ship ballistic missile threat to US ships at sea. Against a capable adversary with a high-end A2/AD network, these ships appear best suited as anti-ballistic missile "shotguns" for Naval Battle Networks, taking long-range, exo-atmospheric "mid-course," and possibly endo-atmospheric "terminal" shots against inbound missiles. Since an enemy missile is still relatively slow and gives off an enormous heat signature as it climbs up and out of the atmosphere, boost-phase shots are a more effective engagement option. Once a missile deploys its warheads and decoys outside the atmosphere, the interception problem is made much more difficult.[651] However, it seems unlikely that these surface combatants could operate close enough to a capable adversary's coast to get off a boost-

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[649] See Joint Unmanned Combat Air Systems, J-UCAS Overview, at http://www.darpa.mil/j-ucas/fact.sheet.htm. For a good description of future aerial A2/AD networks that are spurring the development of the J-UCAS, see James Hasik, "Air Defense After Kosovo," *Proceedings,* December 2001, pp. 74-77. The J-UCAS may also evolve into a "mother ship" for launching small, expendable UAVs. See Richard R. Burgess, "Mother Ship," *Seapower,* July 2005, pp. 20-21.

[650] Office of Naval Intelligence, *Worldwide Maritime Challenges 2004,* p. 22; and Norman Polmar, "Antiship Ballistic Missiles…Again," *Proceedings,* July 2005, pp. 86-87.

[651] For a thorough discussion of the differences between boost phase, mid-course, and terminal ballistic missile defenses, see http://www.mda.mil/mdalink/html.

phase shot early in a confrontation, since they themselves would be well within range of enemy land-based air, cruise missile, and ballistic missile attack.

Moreover, they would require a dense anti-aircraft escort, since the AEGIS radar cannot operate in ballistic missile defense and air and cruise missile defense modes simultaneously. Indeed, ballistic missile defense "shooters" interposed between the bulk of TFBN forces and an enemy's coast likely will attract concerted and sustained attacks, as suggested by the incessant Japanese strikes aimed at the radar picket destroyers operating between mainland Japan and Okinawa in the final months of World War II. These ships were tasked with providing early warning of impending *Kamikaze* attacks against the vast sea base operating off Okinawa, and they took a savage pounding. It is not hard to imagine forward ballistic missile shooters suffering similar attrition. For this reason, pushing surface ballistic missile shooters deep within an adversary's A2/AD network early in a fight may not be wise. The idea of arming SSGNs with boost phase interceptors may prove to be a better option.[652]

Under any circumstances, future Naval Battle Networks must be prepared to track inbound ballistic missiles at extremely long ranges; to intercept them at extended exo-atmospheric ranges, preferably before they shed any decoys; and to defeat maneuvering reentry vehicles moving through the atmosphere. This discussion suggests that the first priority for the Counter-A2/AD Fleet is to continue to expand the number of surface combatants capable of tracking and engaging ballistic missiles, and to rush additional SM-3 ballistic missile interceptors into TFBN service. After these initial steps, TFBN planners should pursue more effective layered defenses including even longer-range interceptors such as the Kinetic Energy Interceptor (KEI); medium-range exo- and high endo-atmospheric interceptors like a navalized version of the Theater High Altitude Area Defense (THAAD) missile; and reliable terminal reentry vehicle interceptors, perhaps a maritime version of the Patriot PAC-3 ERINT missile.[653] Some strategists suggest that the TFBN also pursue directed energy weapons for fleet ballistic defenses. However, the technology for such weapons is still in the early stages of development.[654]

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[652] Pavlos and Hasslinger, "Ohio Subs Would Be Best Basing Mode for New Interceptor Missile."

[653] For an overview of Joint ballistic missile defenses through 2008, see Charles C. Swicker, Newport Paper 14, "Joint Theater Ballistic Missile Defense Operational Considerations," at http://www.fas.org/spp/eprint/np14/np14chp4.htm. Because of its much high speed, the KEI might be able to take boost phase shots at ranges as far as 1,500 kilometers away. See "Kinetic Energy Interceptor," at http://www. globalsecurity.org/space/ systems/ kei.htm; and "Hard Kill: Kinetic Energy Missile Interceptor," at http://www.military.com/soldiertech/0,14632,SoldiertechKEI.00.html. For information about THAAD, see "THAAD TMD," at http://www. globalsecurity.org/space/systems/thaad.htm; and "THAAD Theater High Altitude Area Defense Missile System, USA," at http://www.army-technology.com/projects/thaad. For the PAC-3 ERINT, see "Patriot Air Defense Missile System, USA," at http://www.army-technology.com/projects/patriot; and "Lockheed Martin Patriot PAC-3," at http://www.designation-systems.net/dusrm/app4/pac-3.html.

[654] Margaret Roth, "As Missile-Defense System Deploys, Some Eye Directed-Energy Options," *Seapower*, November 2004, pp. 16; and Andrew Koch, "US Navy Sees the 'Light'," *Jane's Defence Weekly*, December 18, 2002.

## ADDED INGREDIENTS: R&D, EXPERIMENTATION, AND INTELLIGENCE

The need for new counter-network weapons such as VLS-fired JASSM and conventional submarine launched ballistic missiles, and new TFBN defensive weapons such as improved ballistic missile interceptors, points out the importance of pursuing a robust research and development (R&D) program for counter-A2/AD systems, and the need for continual Battle Network experimentation on counter-A2/AD tactics, techniques, and procedures. Both are important if the Battle Force expects to stay ahead in the emerging time-based A2/AD-power-projection competition. In this regard, several evident questions should inform the TFBN's counter-A2/AD efforts:

- What is the role for surface combatants in the Counter A2/AD Fleet? Should they be designed primarily to conduct extended-range roll-back attacks from the edge of an A2/AD network, or to penetrate immediately and operate inside a network's engagement envelope? If the latter, how much stealth and protection will allow combatants to penetrate a future high-end A2/AD network? Can these ships be reasonably afforded? Are semi-submersible designs a better approach?[655] What about other approaches, such as large numbers of netted, but relatively non-stealthy, unarmored surface platforms?

- Can reliable systems and interceptors for defeating maneuvering tactical ballistic missiles fired in an anti-ship/task force mode be deployed and employed, allowing the fleet to operate early against an adversary armed with these weapons? Will these new systems be able to defeat barrage attacks? How soon could these weapons be fielded and placed in TFBN service?

- In terms of counter-network strike operations against a land power, what new extended range weapons will allow future Battle Networks to solve the traditional disparity in "depth of magazines" between sea-based and land-based forces? Will electromagnetic weapons help to reduce the advantage normally held by land-based forces?[656]

- How can distributed, unmanned systems be best leveraged against a high-end, hardened, and redundant A2/AD network? Can UUVs substitute for SSNs in a contested/denied access environment? UAVs for manned aircraft? USVs for surface ships? Can a Naval Battle Network effectively deploy and control operationally significant numbers of distributed unmanned systems in the air, on the sea, and under the sea from extended ranges?

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[655] For example, Rene Loire, a French ship designer, has recommended a semi-submersible VLS-barge built to commercial standards called *La Frappeur*, or Striker. The ship would be quite stealthy and survivable. Vice Admiral Joseph Metcalf III, USN, ret, enthusiastically endorsed the design concept. See Rene Loire, *The Striker: A Warship for the 21st Century* (A. Ghosh Publisher, 1996).

[656] For a discussion of electromagnetic strike weapons, such as electromagnetic railguns, see Koch, "US Navy Sees the 'Light'."

- How can future Naval Battle Networks best protect themselves from attacks by swarms of unmanned systems launched from land bases?

During the Joint Expeditionary Era, as the Total Force Battle Network increasingly concentrates in home waters, Naval Battle Network experiments could begin to explore these questions, and work to develop doctrine and tactics, techniques, and procedures for Battle Network break-in/roll-back operations against a high-end A2/AD network. Such Naval Battle Network experiments could be modeled along the lines of the Interwar years' annual Fleet Battle problems, which were supported by extensive war games and tactical analyses at the Naval War College, and ongoing practical tactical experimentation.[657] Whenever they are held, these Fleet Battle problems should be open to allied navies. Moreover, as part of an overall strategic maritime dissuasion campaign, their results should be widely publicized. Publicly reporting the results of the problems might work to dissuade would-be adversaries from pursuing A2/AD networks, or cause them to divert additional resources into defensive systems and away from offensive systems that threaten their neighbors and regional US forces.

Both TFBN R&D efforts and Naval Battle Network experiments would benefit from detailed intelligence on the pacing A2/AD threats. In other words, the development of the Counter-A2/AD Fleet should be guided and shaped by aggressive overt and clandestine surveillance, reconnaissance and probing of the evolving Chinese A2/AD network. Given the long history of using US submarines for clandestine peacetime ISR missions, as well as the importance that the PLAN places on their own submarines in counter-Naval Battle Network operations, probing Chinese A2/AD defenses should become a priority peacetime mission of the US attack submarine force.[658] This mission, rather than ISR support for the persistent irregular war, would be consistent with the Garrison Era role of US submarines vis-à-vis against the Soviet anti-access network and submarine fleet, and would dovetail nicely with the gradual refocusing of the US submarine force on ASW operations.

Such a network reconnaissance effort will be aided by the TFBN's specialized denied access reconnaissance platform, the recently commissioned USS *Jimmy Carter*. The *Jimmy Carter* is the third and last of the *Seawolf*-class submarines, modified to become "the most expensive single intelligence gathering platform ever built." During its construction, the boat was cut in half and fitted with a 30-meter, 2,500-ton "Ocean Interface Section," or OIS, an hourglass-shaped section in the submarine's pressure hull. The area of the OIS inside the pressure hull contains a reconfigurable command center and a reconfigurable cargo area capable of supporting up to 50 SOF personnel and their equipment. Between the pressure hull and the outer hulls is a large volume open to sea pressure that can carry a variety of UUVs and remotely operated vehicles (ROVs) useful for underwater reconnaissance—in other words, a "flexible payload

[657] For a good discussion about how these Fleet problems helped to prepare the US Navy for the "carrier revolution," see Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, *American & British Aircraft Carrier Development* (Annapolis, MD: Naval Institute Press, 1999).

[658] For a compelling account of US submarine ISR exploits, see Sherry Sontag, Christopher Drew, and Annette Lawrence Drew, *Blind Man's Bluff: The Untold Story of American Submarine Espionage* (New York, NY: PublicAffairs, 1998).

interface" envisioned by the Defense Science Board and discussed in the previous chapter. Moreover, like the SSGN, the *Carter* has a large lock-out chamber for SOF swimmers, and can accommodate either a Dry Deck Shelter with an SDV, or an ASDS.[659]

The network reconnaissance effort would also be aided by reposturing the submarine force to honor the growing Chinese submarine threat. This would require that the DoN increase the number of boats dedicated to probing the Chinese A2/AD network, as well as the number available for Pacific surge operations should the need arise. For example, submarines now based on the east and west coasts might be moved to Hawaii, which has the capacity to support up to 24 boats, and the number of boats based on Guam might be increased to six. The three *Seawolfs*—both SSNs and the *Jimmy Carter*—could be based at Bangor, Washington, both to put all three boats within a week of Chinese coastal waters (using Great Circle navigation) and to simplify the logistics support for this small, three-ship class. A force of 33 SSNs in the Pacific—approximately 60 percent of the current force—would leave approximately 20 SSNs on the east coast of the United States through 2018. However, as the overall SSN force draws down, the number of boats stationed on the east coast would gradually fall.[660]

## Recommendations for the Counter-A2/AD Fleet

With regard to the Counter-A2/AD this report recommends that:

- The TFBN develop a high-priority R&D effort to field new TFBN capabilities to counter the threat of maneuvering ballistic missiles, including both new interceptors and directed energy weapons.

- The TFBN develop a high-priority R&D effort to field new TFBN counter-network strike weapons, particularly a stealthy cruise missile; a conventional ballistic missile; and electromagnetic guns.

- The TFBN continue a robust research and development program on other contested access capabilities, to include undersea warfighting networks; stealthy unmanned aerial combat vehicles; USVs; AUVs and UUVs; and covert UUV tenders.

- With regard to the latter, should the SSBN force be reduced to ten boats, TFBN planners consider converting two SSBNs into experimental covert UUV tenders. The conversions should be paid for using R&D money. The boats would be manned with single crews, and used primarily as experimental assets. However, they would be available for operational deployment in the event of a crisis.

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[659] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, p. 78; and Rear Admiral John P. Davis, USN, "USS Jimmy Carter (SSN-23)," at http://www.chinfo.navy.mil/navpalib/cno/n87/usw/issue_5/uss jimmycarter.html.

[660] Submarines stationed on the US east coast can quickly deploy to the Pacific by traversing under the Polar ice cap. In some cases, then, a submarine based in New London, Connecticut might be able to close off China's coats as quickly as one stationed in San Diego. A force postured for rapid closure off the Chinese coast might therefore include east coast subs. See Albert H. Konetzni, Jr., "Sinking the Fleet," *New York Post,* July 5, 2005.

- The SSN fleet be repostured to focus on the steadily expanding Chinese A2/AD network, by shifting six SSNs to Guam and 24 to Hawaii, and basing the entire three-boat *Seawolf*-fleet, including the *Jimmy Carter*, in Bangor, Washington.

- The TFBN commence periodic Naval Battle Network Problems that focus attention on offensive counter undersea, suppression of littoral maritime defenses, and roll-back of an enemy's A2/AD network.

### Associated Annual Shipbuilding Costs

Should the SSUN(X) be pursued, and if the conversion is conducted in conjunction with a planned mid-life ERO, each conversion cost would be at least $714 million—the cost of an SSGN conversion. This does not include non-recurring engineering costs. For planning purposes, these costs would be $750 million, the approximate costs associated with the SSGN redesign. However, as these would be experimental platforms, these costs should be paid for out of DoN R&D accounts.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

As is evident, the counter-A2/AD problem should be a primary focus for TFBN R&D efforts. Weapons development and procurement costs for specialized counter-A2/AD weapons, such as navalized versions of the JASSM, conventional ballistic missiles, and new anti-ballistic missile interceptors likely will be quite high. Development and procurement of directed energy weapons would be higher still. However, these developments will be required for the TFBN to guarantee its early freedom of action against a capable A2/AD network.

The optional pursuit of two SSUN(X)s would result in a fleet manning requirement of 320 additional officers and Sailors (one 160-person crew per boat).

Any reposturing of large numbers of SSNs to the Pacific may require substantial expenditures on basing and support infrastructure, such as family housing.

# X. INTERLUDE: A "SEA AS BASE" POWER-PROJECTION FLEET FOR THE JOINT EXPEDITIONARY ERA

> Sea basing is the core of "Sea Power 21." It is about placing at sea—to an extent greater than ever before—capabilities critical to joint and coalition operational success: offensive and defensive firepower, maneuver forces, command and control, and logistics. By doing so, it minimizes the need to build up forces and supplies ashore, reduces their vulnerability, and enhances operational mobility...[661]
>
> Vice Admiral Charles W. Moore, Jr., and
> Lieutenant General Edward Hanlon, Jr., 2003

## SEA BASING: BACK TO THE FUTURE

Given the recent emphasis being placed on "sea basing" by DoN leaders, one would think that the idea of "sea basing" is some dramatically new, "transformational" naval capability. As a former CNO recently said, "Everything we do in the maritime environment is about sea basing."[662] However, the idea of using "floating bases" for transoceanic power-projection is well over a century old. As discussed earlier, in 1901—only 11 years into the (first) Expeditionary Era—Marine planners envisioned the need for a Battle Force capable of basing "offensive and defensive firepower, maneuver forces, command and control, and logistics" at sea.

The reader will recall that these early ideas—tied to seizing advanced bases for the purposes of establishing sea control in forward theaters—started to take a more definitive shape during the Interwar period. As DoN planners grappled with the problem of how to force a decisive sea battle with the Imperial Japanese fleet, the unstated concept of a **Sea-based Sea Control Fleet** became an important part of Navy war plans. The armored battle line would be a mobile naval artillery base, and the primary arm for Battle Force offensive action; newly developed aircraft carriers would be mobile aviation bases, from which aircraft could scout for the enemy's battle line, protect the battle line from air attack, and conduct independent raids; the amphibious assault fleet would form mobile assault bases from which to attack and seize forward fleet operating bases; underway replenishment ships would operate as mobile resupply bases; and tenders and other vessels would act as mobile fleet logistics bases. In practice, during World War II, this vision proved to be remarkably prescient, with only the expected roles of the battle line and aircraft carriers reversed.

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[661] Vice Admiral Charles W. Moore, Jr., USN, and Lieutenant General Edward Hanlon, Jr. USMC, "Sea Basing: Operational Independence for a New Century," *Proceedings*, January 2003, p. 80.

[662] Cavas, "New Missions Will Rely on Sea Basing," p. 4.

Although these floating bases were originally conceived to support sea control operations, by the end of the war, with both the Japanese and German fleets in ruins, naval planners recognized that the broad oceans had been transformed into an uncontested US Joint operating base, from which naval forces could be used to project Joint power and decisively influence combat operations ashore. Accordingly, by the end of the Second World War, the heart of the DoN Battle Force had transformed into a **Sea-based Power-Projection Fleet,** composed of equally capable *Sea-based Strike* and *Sea-based Operational Maneuver Fleets*, supported by a mobile and flexible *Logistics Sea Base*.

The Sea-based Power-projection Fleet was designed primarily to support *Joint forcible entry operations* (JFEOs) in contested theaters as well as subsequent Joint campaigns ashore. The power of the fleet was amply demonstrated during the 1945 invasion of Okinawa, the prelude to the final invasion of Japan.[663] By late 1945, with the rehearsal having proved successful and the Battle Force having been reinforced by the Royal Navy, this Sea-based Power-projection Fleet was prepared to land 1.3 million men (including six Marine divisions) on mainland Japan, and to support them with thousands of combat aircraft, hundreds of mobile artillery bases (surface combatants), and a vast sea-based logistics support network.[664]

This impressive power-projection capability was, in turn, backed up by a huge *Transoceanic Cargo Fleet*. During the War, the US Maritime Commission built and the US Merchant Marine manned 5,777 ships, including 2,751 Liberty Ships and 531 Victory Ships. Each of these wartime transports could haul over 9,000 tons of cargo. Together, these ships are credited with transporting 85 percent of all troops, equipment, and cargo hauled overseas during the war.[665]

However, as has been previously stressed, the requirement to project Joint combat power from the sea took a decided turn in the Garrison Era. With a large, standing force presence in distant theaters, the requirement to project intact combat units that were ready to fight was replaced by the requirement to transport and deliver garrison reinforcements rapidly. With the development of air transport, the most efficient way to accomplish this task was through a combination of pre-positioned equipment sets and supplies on land and sea, equipment and supplies delivered from CONUS by sealift, combat aircraft flown directly to forward main operating bases, and men and women delivered from CONUS by airlift. Each of these methods was facilitated by an established and robust theater logistics infrastructure including numerous ports, main operating

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[663] For a wonderful recap of Battle Force operations off of Okinawa, see Thomas C. Hone, "Seabasing: Poised For Takeoff," in Office of Force Transformation, *Transformation Trends,* February 15, 2005.

[664] Williamson Murray and Allan R. Millett, *A War to be Won* (Cambridge, MA: The Belknap Press of Harvard University Press, 2000). One would be hard-pressed to find a better one volume history of World War II. For a detailed description of the US plans to invade Japan, see *Strategy and Tactics*, no. 230, September 2005. This is a magazine written for war gamers, and it provides an enormous amount of detail on the plans and units that would have been involved in such a massive undertaking.

[665] See "Ships for Victory," at http://www.seawaves.com/bookreviews/shipsforvictory.htm; "Liberty Ships" at http://www.answers.com/main/ntquery?method=4&dsid=2222&dekey=Liberty+ship&gwp=8&curtab=2222_1&linktext=Liberty%20ship; and "Victory Ships" at http://www.answers.com/main/ ntquery?method=&dsid=2222&dekey=Victory+ship&gwp=8&curtab=2222_1&linktext=Victory%20ship.

airbases, and airfields. As a result, as the Garrison Era progressed, all Joint combat forces and operations became more and more "access dependent."

Over the course of the Garrison Era, the character of the Sea-based Power-Projection Fleet gradually changed to adjust to these new strategic conditions. With little need to seize Joint access or to support maneuver from the sea, Navy officers came to conflate the idea of a Sea-based Power-projection Fleet with a Sea-based Strike Fleet. They viewed the sea primarily as a base from which to carry out air and missile strikes—be they for nuclear retaliation, punitive attacks, or to support Joint ground forces engaged ashore. As a result, after 1964, and especially after the Vietnam War, they tended to view the amphibious landing fleet as an expensive legacy of a by-gone strategic era.

For the Marines—the nation's so-called "911 force"—the name of the game became being constantly ready for a fight, and being able to get to a fight as rapidly as possible, by whatever means available. Given that forward access was generally assured, after Vietnam the Marines began to worry less and less about fighting their way into a theater, and more and more about sustaining operations once there. They thus came to view the sea more as an avenue for global patrolling and transport than a base from which to fight, and the amphibious landing fleet as a rotational pool for small sea-based crisis response forces. As a result of both Navy and Marine neglect, the ability to conduct large-scale, combined arms fire and maneuver from the sea became an increasingly lost Battle Force art.

The legacy of the Garrison Era lives on today. The Sea-based Power-Projection Fleet now consists of a *Sea-based Strike Fleet* that requires no theater access "permission slips," and a *Sea-based Transport Fleet* that does. As will soon be discussed, the TFBN's current Sea-based Strike Fleet includes 11 deployable aircraft carriers and 71 major surface combatants. Under the new "Fleet Response Plan" (FRP), this force can assemble six aircraft carriers and 30-40 surface combatants anywhere along the world's littorals with 30 days.[666] Once in position, the carriers' embarked air wings can provide defensive fires for both Naval Battle Networks and Joint forces ashore, and attack thousands of aimpoints per day, sustaining them as long as there is ordnance to drop or fire. Carrier-based defensive and offensive fires would be augmented by the surface combatants, which would bring between 3,000- and 4,000 VLS cells to the fight, filled with a variety of missiles, many devoted to land attack. This powerful Sea-based Strike Fleet would be defended by a number of submarines, which themselves could conduct land attack strikes from their covert, underwater sanctuaries. This Strike Fleet could be sustained at sea indefinitely, with little requirement for access to forward bases.

In contrast, within the same 30-day time period, by using maritime prepositioning ships, the contemporary Sea-based Transport could transport and deliver the *equipment and 30 days of supplies* for three Marine and one Army combat brigades through deep water ports or protected

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[666] As part of the Fleet Response Plan (FRP), these six carriers would be joined by an additional two carriers within 90 days. "Making Big Waves," *US News and World Report,* August 30, 2004. For a more detailed description of the FRP, see Vice Admiral Michael D. Malone, Rear Admiral James M. Zortman, and Commander Samuel J. Papero, US Navy, "Naval Aviation Raises the Readiness Bar," *Proceedings,* February 2004, pp. 39-41.

anchorages made available by another country, using maritime prepositioning ships. The Fleet's surge sealift forces could move approximately 11 additional *sets of equipment* for Army brigade units of action through ports or anchorages also provided by host countries. Moreover, the preponderance of personnel required to man these equipment sets would arrive in theater on commercial air transports, through established airfields provided by foreign governments.

The Sea-based Transport Fleet retains a vestigial amphibious lift capability. The current 35-ship amphibious assault fleet can lift approximately 2.0 fully constituted combat brigades with both their personnel and equipment. Unlike the 15 brigade *equipment sets* outlined above, these brigades would require no port or airfield to facilitate their entry into theater, and they would leave the ships fully ready to fight their way ashore, if necessary. This is the smallest level of Battle Force amphibious lift since World War II.

The fleet's supporting Logistics Sea Base has also been dramatically reduced since World War II. Today, the Battle Force's underway replenishment capability resides in a small but capable 33-ship Combat Logistics Force, and the Force's forward theater logistics capability has been reduced to two submarine tenders, five fleet tugs, and four salvage ships. Moreover, the combat and mobile logistics forces are sized only to support forward operations of the TFBN's Sea-based Strike Fleet, *not* larger Joint Multidimensional Power-projection Networks.

Meanwhile, the TFBN now finds itself "back to the future" in the Joint Expeditionary Era. The TFBN is fighting a persistent irregular war in a vast maritime theater where repositioning of scarce ground forces will be as important as it was in World War II. The TFBN is faced with the possibility of confronting regional adversaries with nuclear weapons, which may be used to coerce their neighbors into denying access to US forces, and to threaten fixed theater points of entry. It is also faced with the prospect of increasingly powerful littoral defenses or anti-access/area-denial networks where progressive roll-back operations, including combined arms counter-network attacks, may be required to unhinge them. Finally, it may be tasked to provide logistics support to Joint forces operating ashore to a degree not required since World War II. All of these circumstances call for the recreation of operationally independent, sea-based fire, maneuver, *and* logistics forces.

It would thus be most accurate to say that "sea basing" is an idea whose time has come again. While it seems unlikely that the future TFBN will support Joint combat power at sea "to a greater extent" than it did during World War II or Korea, it is certainly true that the TFBN will need to be able to project and sustain Joint combat power from the sea to a greater degree than was necessary in the Garrison Era. A key design challenge facing TFBN planners, then, is how to reshape the current Sea-based Power-Projection Fleet so that it is more attuned to the strategic conditions of the Joint Expeditionary Era.

## BASES AT SEA OR SEA AS BASE?

Before designing this new Sea-based Power-projection Fleet, TFBN planners must first resolve an important conceptual question: should the intent of the design effort be to construct bases at sea, or to exploit the sea as a Joint base? The distinction, while subtle, has important implications for TFBN design.

Samuel Huntington, during an earlier period of uncontested US command of the seas, argued that:

> With its command of the sea it is now possible for the United States Navy to develop the base-characteristics of the world's oceans to a much greater degree than it has in the past, and to extend significantly the "floating base" which it originated in World War II. *The objective should be to perform as far as practical the functions now performed on land at sea bases closer to the scene of operations* (emphasis added).[667]

The lure of constructing land bases at sea is a strong one, especially for naval officers. As one Marine officer put it in 1971:

> The time is upon us, when we no longer are tied to the buildup on the beach as a sine qua non of an amphibious operation. We can cut the umbilical cord of shore based facilities, including beaches, beach exits, gradients, airfields, ports, etc., and operate entirely from bases afloat. Seabase is the coming era of the amphibious force...It is a way of providing an appropriate sized landing force anywhere in the world. The requirement for "stepping stones" or land bases on foreign soil is drastically reduced or in some cases eliminated…[668]

Regardless of its conceptual attractions, the strategic conditions of the Garrison Era argued against the expenditure of national resources to create land bases at sea. However, with the transition to the Joint Expeditionary Era, the idea of creating bases at sea again began to gain currency. In 1994, the Joint Staff, at the urging of then-Vice Chairman of the Joint Chiefs Admiral Bill Owens, mulled the development of Mobile Offshore Bases (MOBs). As envisioned, these large, modular ocean mega-structures could be deployed to a Joint Operations Area to provide aviation, maintenance, supply, logistics and operational support for US and Allied forces. Some concepts envisioned MOBs as large as one-mile long and 400 feet wide, enabling the take off and landing of C-17 and C-130 transport aircraft, and housing complete combat brigades.[669]

Undoubtedly, many proponents for building bases at sea would point to Huntington's words as the conceptual guide for the MOB. However, it is important to remember the context in which Huntington was writing when he was urging DoN leaders "to extend significantly the 'floating base' which it originated in World War II." He was laboring under 150-year old model in which the service most suited for the peculiar strategic environment of a national security policy era would receive the dominant share of national resources devoted to peacetime defense. At the time Huntington wrote these words, the Air Force was receiving the bulk of the DoD's total

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[667] Huntington, "National Policy and the Transoceanic Navy," p. 491.

[668] Lieutenant Colonel J.W. Hammond, Jr., "Seabase: The True Amphibious Operation," *Marine Corps Gazette*, April 1971.

[669] "Mobile Offshore Bases," at http://www.globalsecurity.org/ military/systems/ship/mob.htm; and Christopher J. Castelli, "DoD Panel Mulls Seabasing Ideas, Including Mobile Offshore Bases," *Inside the Navy*, November 18, 2002, p. 1.

budget. In effect, he was attempting to fashion an argument to help DoN leaders grab a bigger share of the DoD resource pie from the Air Force. The subsequent adoption of the Strategy of Flexible Response, the introduction of the PPBS, and the emphasis on maintaining strong, ready Joint forces made Huntington's line of argument moot; the "dominant service model" upon which his argument rested was replaced by a "balanced service model." And in this model, any move by the DoN to recreate land bases at sea would have to provide a tangible operational payoff to all Joint forces.

In any event, it seems certain that Huntington would have objected to anyone focusing on the idea to recreate land bases at sea. His far more powerful point was that when the United States enjoys unchallenged command of the seas, it can claim the sea itself as a base of operations:

> …it is also possible to argue…in a very real sense *the sea is now the base* from which the Navy operates in carrying out its offensive activities against the land…*The base of the United States Navy should be conceived of as including all those land areas under our control and the seas of the world right up to within a few miles of the enemy's shores.* This gives American power a flexibility and a breadth impossible of achievement by land-locked powers. (emphasis added)[670]

In other words, with no challenge from a naval peer and no need to fight across the oceans, the Battle Force can concentrate on exploiting its control of the high seas. Making use of the "vast size and ubiquity of the world's oceans and of [its] own inherent flexibility," the Battle Force can contribute critically to the Joint force's capacity to maneuver at the strategic, operational, and tactical levels.[671]

This broader conception helps to better understand Huntington's recommendation that the DoN "develop the base-characteristics of the world's oceans…***as far as practical***" (emphasis added). In other words, Huntington was suggesting that there were many different base-characteristics the DoN might exploit, and he logically implied that some, however conceptually attractive they might be, might be impractical in their implementation. Indeed, Huntington would likely argue that any meaningful debate about "sea basing" would need to first focus on a fuller discussion of the great strategic, operational, and tactical advantages enjoyed by any great power that claims the *sea as base,* rather than the pursuit of any particular sea basing capability.

For example, as described below, there are at least eight different "base-characteristics" of the world's oceans:

- Claiming the sea as a Joint base provides future Naval Battle Networks and Joint forces with rapid, unobstructed global freedom of movement, much like the Roman road network gave the Roman Legions freedom of movement within their Mediterranean-centered empire, and the world's oceans gave the Royal Navy and British Army

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[670] Huntington, "National Policy and the Transoceanic Navy," p. 491.

[671] Till, "Navies and the New World Order," p. 61.

unrestricted global movement during the the *Pax Britannia*. As a consequence, the US military can rapidly reposition and resupply forward expeditionary forces without threat. Importantly, transports, mobile logistics ships, and combat logistics ships can move freely, *without accompanying escort*, which means the future TFBN can be smaller than it might otherwise be.

- As naval officers are fond of saying, enjoying freedom on the seas allows the Battle Force to consider most of the 70 percent of the earth's surface that is covered with water as a vast, secure operating sanctuary, allowing for the establishment of global listening posts, facilitating global scouting and patrolling, and providing for advanced forward staging bases for naval and Joint aviation, strike, special operations, and rapid reaction forces. This improves TFBN and Joint force global ISR activities, and provides staging points for surprise punitive strikes and small maneuver raids from hidden, over-the-horizon locations. It also provides the ideal base from which to conduct offshore Joint prosecution of the persistent irregular war. To exploit this advantage, the TFBN must keep some of its forces forward to provide persistent ISR, fire, and maneuver coverage.

- For the foreseeable future, any Joint power-projection operation larger than a small-to-medium-size raid will require that the United States introduce land-based air and ground forces into a theater of operations. In conditions of unimpeded or guarded littoral access and with established theater infrastructure, the current Sea-based Transport Fleet is quite effective in the delivery of *equipment and supplies*. Personnel associated with the equipment are transported by air. Concentrated sea-based missile defense platforms, aviation power-projection platforms, and missile and artillery fire support platforms can conduct advance force operations and screen the arrival and delivery of both equipment and personnel, provide cover as units prepare themselves for combat, and support them once they are committed to combat. Over time, faster means of sea-based transportation may improve strategic closure timelines in unimpeded and guarded access conditions, but the cost of developing them must be balanced against other TFBN and Joint priorities.

- For Joint power-projection operations in defended and contested access scenarios, the sea can be used as a base from which to conduct sustained offensive aviation and missile strikes against the enemy. Sea-based aviation power-projection platforms and missile and artillery-armed surface combatants can threaten an enemy across the entire breadth and depth of his battlespace. This was the prime role of the Battle Force in the Garrison Era, and it will remain an important one in the Joint Expeditionary Era.

- For Joint power-projection operations in defended and contested access scenarios, the sea also can be used as a base from which to project operational maneuver forces into an enemy's defended battlespace. Given that most Joint forces are now "access sensitive," an important mission for the relatively small residual sea-based operational maneuver forces will be to forcibly enter a defended theater and to create access for follow-on forces. This is quite clear in Joint doctrine, which defines a forcible entry operation as:

  > …seizing and holding a military lodgment in the face of armed opposition. A lodgment is a designated area in a hostile or potentially

> hostile territory that, when seized and held, *makes the continuous landing of troops and material possible and provides maneuver space for subsequent operations* (a lodgment may be an airhead, a beachhead, or a combination thereof). A lodgment may have established facilities and infrastructure (such as those found at international air and sea ports) or may simply have an undeveloped landing strip, an austere drop zone, or an obscure assault beach (emphasis added).[672]

The forces typically associated with this mission are airborne, air assault, and special operations forces, and *amphibious assault forces*.

- Joint forces can also use the sea as a base from which to conduct "underway replenishment" of Joint forces operating inland. In this way, they forego building up large, immobile, and temping logistics targets ashore. Being able to warehouse the majority of supplies at sea and to selectively offload and deliver the right supplies to the right unit and the right time—a process now known as "just-in-time" and "sense and response logistics"—would help mask a critical Joint Multidimensional Battle Network vulnerability, especially early in a JFEO. [673]

- At some point, however, pushing large amounts of supplies ashore will normally be required. US adversaries are well aware that their current power projection model depends heavily on the availability of deep water ports, and may make special provisions to defend, destroy, or target established theater ports. In these cases, the sea can be used to create a theater logistics portal—a harbor or a sea-based logistics hub—where one did not exist before. Operation *Overlord*—the allied invasion of mainland Europe—provides the model. Allied planners decided not to try to seize the French port of Calais, opting instead to seize a combined lodgment and to build two artificial harbors at Normandy that would serve as the primary means for injecting reinforcements and supplies for combined forces until better ports could seized. The creation of two MULBERRY artificial harbors was a huge and successful undertaking, despite the loss of one to a huge Channel storm that struck soon after the invasion.[674] An ability to rapidly create a working theater logistics portal, along with improved capabilities to offload the Sea-based Transport Fleet "in stream," would allow the future TFBN to plan future power-projection operations without the need to seize a deep water port. As in World War II, having such an ability would open a wide range of operational options, and complicate the job of any defender.

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[672] Joint Staff, *Joint Publication 3-18: Joint Forcible Entry Operations* (Washington, DC: Director of the Joint Staff, July 16, 2001), p. I-1.

[673] A good real world example of the problem created by moving large amounts of ammunition and supplies ashore is discussed in Adam Siegel, "Scuds Against Al-Jubayl?" *Proceedings*, December 2002. A copy of the article can be found online at http://www.military.com/NewContent/0,13190,NIScuds1202,00.html. For a more detailed explanation of the event see Adam S. Siegel, "Missile Defense at the Waterfront: Implications of the SCUD Missile Attack on Al Jubayl Port, February 15-16, 1991," *Defense and Security Analysis*, Vol. 19, No. 1, 2003, pp 15-33.

[674] See "Mulberry Harbours," at http://www.combinedops.com/Mulberry%20Harbours.htm; "Operation Mulberry (D-Day, 1944)," at http://www.transchool.eustis.army.mil/Museum/ Mulberry.htm; and "Mulberry B," at http://roselli.org/tour/06_2001/167.html.

- The ultimate exploitation of the sea as Joint base would be to recreate land bases at sea "closer to the scene of operations"—perhaps in the form of Mobile Offshore Bases, Distributed Bases, or Logistics Sea Bases completely independent from land. What makes this level of exploitation so different are its goals of *completely* eliminating the logistics footprint ashore, and allowing forces to *assemble, constitute, and reconstitute at sea*. If achieved, these goals would decouple the Joint Force from any dependence on land bases, and allow the United States complete freedom of action along the world's littorals.[675]

After reviewing these successive levels of rich operational possibilities, two key conclusions come to mind. First, the Garrison Era Battle Force was optimized to exploit only the first four base-characteristics of the world's oceans; this was dictated by the general condition of assured access. In constrast, for the Joint Expeditionary Era, the broad aim of the TFBN's Sea as Base Power-Projection Fleet should be to develop and exploit more of the ocean's base-characteristics, consistent with the general condition of uncertain access. Second, by conceiving of the sea as base, creating land bases at sea is seen for what it is: an ultimate conceptual goal that is perhaps impractical. Said another way, given the important operational benefits offered by exploiting other base-characteristics of the world's oceans, it is not clear that the incremental costs necessary to pursue this ultimate goal are worth it.

In keeping with this line of thinking, the following chapters aim to develop an affordable "Sea as Base" Power-Projection Fleet that exploits the base-characteristics of the world's oceans to the maximum, and is capable of meeting the expected challenges of Joint Expeditionary Era. Guiding the effort will be the thought introduced earlier in this report—specifically, that: "Sea basing is the one element linking the global war on terror and major combat operations."

Consistent with this thinking and the "1+1+1+1" force planning and sizing construct introduced in this report, the Sea as Base Power-Projection Fleet will have an inherent capability to conduct missions in defense of the homeland or in support of major national disasters. However, that will not be its primary function. Instead, it will be sized and shaped to help fight the persistent irregular war now being fought by US Joint forces, and to be able to simultaneously support *one* major Joint power-projection operation. Importantly, the force will be capable of confronting a regional power armed with nuclear weapons. When reinforced by capabilities associated with the Counter-A2/AD Fleet, this fleet will also be capable of operating in contested access conditions, and therefore serves as a hedge against the development of a capable A2/AD network.

Because of the range of issues involved, the Sea as Base Power-Projection Fleet will be covered in four separate chapters. The next two chapters focus on the two components of the Sea as Base Strike Fleet: Chapter X focuses on aviation power-projection platforms; Chapter XI focuses on the fleet's surface combatant "battle line" composed of large, VLS-equipped, surface combatants. Chapters XII focuses on the Sea as Base Expeditionary Maneuver Fleet. And

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[675] See Lieutenant General J.E. Rhodes, USMC, and Rear Admiral G.S. Holder, USN, "Seabased Logistics," Marine Corps Concept Paper, found at http://www.fas.org/man/dod-101/sys/ship/docs/sbl.htm.

Chapter XIII explores the TFBN’s Logistics Sea Base composed of Combat and Mobile Logistics Forces and support ships.

# XI. Aviation Power-projection Platforms

> …naval forces are able, without resorting to diplomatic channels, to establish off-shore, anywhere in the world, airfields completely equipped with machine shops, ammunition dumps, tank farms, warehouses, together with quarters and all types of accommodations for personnel. Such task forces are virtually as complete as any air base ever established. They constitute the only air bases that can be made available near enemy territory without assault or conquest, and furthermore, they are mobile offensive bases that can be employed with the unique attribute of secrecy and surprise, which contributes equally to their defensive as well as offensive effectiveness.[676]
>
> Admiral Chester Nimitz

## Aircraft Carriers Ascendant

It is impossible to overstate the pride of place that aircraft carriers have enjoyed in DoN strategic and operational thinking during and after World War II. Although the Battle Force had been experimenting with aircraft carriers for two decades during the Interwar Period, on December 7, 1941, the administrative structure of the DoN was still built around the battleship as the capital ship of the fleet.[677] The rise of the aircraft carrier and the eclipse of the battleship that occurred between 1942 and 1944 changed the power structure within the DoN, and coincided with the rapid advancement of the DoN Battle Force to the top spot in the global naval competition. Partly because of this visceral connection, aircraft carriers have remained at the top of the pecking order of TFBN platforms ever since.

However, it would be a mistake to think that the DoN's continued emphasis on aircraft carriers is due solely to some nostalgic, emotional link to World War II. In contemporary terms, the rapid advancement of the aircraft carrier during World War II and its enduring success thereafter can be attributed to three things: its modularity; reconfigurability; and operational fungibility. Aircraft carriers were among the first truly modular warships in the DoN Battle Force, with large payload capacities for interchangeable off-board systems (aircraft). This allowed the carrier to operate increasingly larger, heavier, and more capable aircraft without major redesign, and made the carrier's payload—its embarked air wing—flexibly reconfigurable, which allowed the carriers to rapidly adapt to changing operational conditions. For example, during the great carrier battles at the start of the war, 75 percent of the aircraft carried were dive and torpedo bombers. By 1945, when faced with the *kamikaze* threat, 70 percent of a carrier's air wings were fighters

[676] Admiral Chester Nimitz, as cited in Huntington, "National Policy and the Transoceanic Navy."

[677] After over 20 years of carrier development in the Navy, the President of the Naval War College prepared a confidential study in September 1941 that included scathing criticisms about carrier aviation, and an argument against building a "carrier" navy. There were many reasons why the institutional Navy was not yet ready to fully embrace the aircraft carrier. For an account of them, see Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development, 1919-1941*. A description of the aforementioned study is found on p. 81.

or fighter-bombers.[678] Because of their modular design and the reconfigurability of their air wings, aircraft carriers proved to be fungible across the full range of naval warfare tasks, and they changed the way the Battle Force was organized and operated—from fleet defense, strike, anti-surface and anti-submarine warfare, and close support of ground troops.[679]

To exploit fully the impact of aircraft carriers and naval airpower on naval warfare, World War II planners moved aggressively to expand Battle Force aviation capabilities and to more widely distribute aircraft carriers throughout the fleet. Even on a wartime budget, however, planners had to take into account the cost of doing so. The result was a cost-effective mix of three different types of aviation power-projection platforms. The most powerful of the platforms were the large fast fleet carriers (CVs), with air groups of over 100 fighters, dive bombers, and torpedo bombers. These formed the heart of the Battle Force's striking fleet. However, these ships were expensive, and took a long time to build.[680] The CVs were therefore augmented by smaller light carriers (CVLs)—converted light cruisers that were as fast as the CVs, but capable of carrying only one-third the numbers of planes. These were used first as a stop-gap measure until more CVs could be built, and then to augment them in concentrated carrier task forces.[681] The most numerous types of platforms built were escort carriers, or CVEs, which their crews took to stand for "combustible, vulnerable, and expendable." Early CVEs generally were small converted merchantmen; later CVEs were purpose-built from the keel up. However, they all one thing in common: with top speeds of 17-19 knots, they were capable of keeping up only with slower transoceanic convoys and amphibious task groups. When accompanying the former, they concentrated on ASW work; when accompanying the latter, they concentrated on fleet air defense and close air support.[682]

After World War II, although sea-based aviation remained central to naval warfare in general, and to US Battle Force operations in particular, the variety of different Battle Force aviation power-projection platforms diminished. Because they were too small to support larger and heavier jet aircraft, and too slow to keep up with the faster post-war transoceanic convoys and amphibious task groups, both the smaller CVLs and CVEs gradually disappeared from the Battle Force.[683] Similarly, as the SSN and land-based maritime patrol aircraft took over more and more

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[678] Bob Kress and Rear Admiral Paul Gilcrist, USN (ret), "Battle of the Super Fighters," *Flight Journal,* February 2002, p. 31.

[679] For a great history about the Battle Force's transition to the Carrier Era, see Clark G. Reynolds, *The Fast Carriers: The Forging of an Air Navy* (Annapolis, MD: Naval Institute Press, 1968).

[680] See Chapter 7, "The *Essex* Class," in Norman Freidman, *US Aircraft Carriers* (Annapolis, MD: Naval Institute Press, 1983).

[681] A total of nine CVLs were built. See Freidman, *US Aircraft Carriers,* pp. 182-92; also Reynolds, *The Fast Carriers: The Forging of an Air Navy,* p. 38.

[682] CE1 Robert A. Germinsky, USNR, "Escort Carriers," from a Brief History of US Navy Aircraft Carriers, found at http://www.chinfo.navy.mil/navpalib/ships/carriers/cv-escrt.html.

[683] For example, the average speed of amphibious task forces during World War II was 10-12 knots, if not slower. During the Cold War, the average speed of amphibious task forces rose to 20 knots.

Battle Force ASW duties, World War II CVs that had been converted to ASW carriers also disappeared from the scene.[684] Battle Force designers therefore focused their energies on building progressively larger and more capable conventional and nuclear-powered aircraft carriers (CVs and CVNs, respectively) with great carrying capacities—for aircraft, aviation fuel, and ordnance.[685]

## The Contemporary Aircraft Carrier Fleet

The contemporary TFBN includes twelve large aircraft carriers—ten large CVNs (two classes) and two CVs (also two classes)—with average full load displacements of nearly 100,000 tons.[686] The modular design and great capacity of these large aircraft carriers give them the flexibility to adapt to changes in aircraft design that the smaller CVLs and CVEs lacked. Therefore, they have the longest expected service lives of any TFBN platform: 50 years.[687]

Because of their long service lives, one of the 12 carriers is always either in a lengthy, three-year long, mid-life Service Life Extension Program (SLEP, for conventional carriers) or Refueling and Complex Overhaul (RCOH, for nuclear-powered carriers). The *USS Carl Vinson*, normally homeported in San Diego, recently moved to Norfolk and is next in line for its mid-life RCOH. As an example of the vagaries of ship counting rules, during the Garrison Era, DoN planners counted only "deployable" carriers in the TSBF ship count; ships in SLEP or RCOH were left out of the count. Today, they count all carriers, regardless of their maintenance status.

With one carrier always in SLEP or RCOH, the DoN maintains 11 air wings—ten active, and one reserve. However, the reserve air wing is considered an emergency mobilization asset; in peacetime, the ten active air wings rotate among the 11 active carriers. Standing up an eleventh active duty CAW has long been a goal of Navy planners, but the associated costs have thwarted their plans.[688]

The average crew size for the 12 large-deck carriers is 3,140 officers and Sailors, making the aggregate crew requirement for the 12 carriers some 37,683 officers and Sailors.[689] Each of the

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[684] These converted ASW aircraft carriers were termed CVSs. See Chapter 16, "Postwar ASW Carriers," in Freidman, *US Aircraft Carriers.*

[685] For a thorough history of the development of post-World War II CVs and CVNs, see Chapters 12-14 in Freidman, *US Aircraft Carriers*.

[686] The nuclear carrier force consists of nine Nimitz-class CVNs and the USS *Enterprise*, a single ship CVN class. The two remaining conventional carriers consist of a single CV from the three-ship *Kitty Hawk* class, and the USS *John F. Kennedy*, a variant of the *Kitty Hawk* that is considered a separate class of ship.

[687] For example, the *USS Midway*, CV-41, was commissioned in 1945. She was decommissioned in 1992 after 47 years of service. See "USS Midway, CVB-41," at http://www.chinfo.navy.mil/navpalib/ships/carriers/histories/cv41-midway/cv41-midway.html.

[688] David Brown, "Leaner and Meaner: The New Aviation Plan," *Navy Times*, March 6, 2000, p. 18.

[689] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 112-23.

ten active air wings requires an additional 1,700 personnel, resulting in a total force active duty manning requirement of nearly 55,000 officers and Sailors.[690]

Carriers and their air wings form the centerpieces of contemporary Carrier Strike Groups, or CSGs. Task groups of ships centered around a carrier were long called Carrier Groups if commanded by a naval aviator, or Cruiser-Destroyer Groups if commanded by a surface warfare officer. On deployment, they were referred to as Carrier Battle Groups, or CVBGs. Now the task groups are known as CSGs both administratively and on deployment. The notional make-up of a CSG includes a carrier, a guided missile cruiser (CG), two guided missile destroyers (DDGs), a SSN in direct support, and a combat logistics ship.[691]

Eleven CSGs are based in the United States. In the Atlantic Fleet, five CVNs are homeported in Norfolk, Virginia, and one CV is homeported in Mayport, Florida. In the Pacific, three CVNs are normally homeported in San Diego. Two CVNs are homeported in Washington State, one each in Everett and Bremerton.[692] The twelfth carrier is based in Japan, the result of an August 31, 1972 agreement with the Government of Japan that allowed the United States to homeport a *conventional* aircraft carrier and her escorts at the Japanese naval base located in Yokosuka. Japan. This agreement gives the United States a "1.0" carrier presence in the Western Pacific, meaning that a single carrier is on call in the region at all times.[693]

Partly in order to hedge against a conflict with China over Taiwan, the 2001 QDR directed the Navy to increase its carrier presence in "the Western Pacific."[694] There are two ways to accomplish this. The first would be to base a second carrier somewhere in the Western Pacific. However, the only two plausible alternatives are Guam and Hawaii; no foreign country other than Japan is likely to approve the basing of an aircraft carrier, its air wing, and its escorts on its territory.[695] Unfortunately, the infrastructure costs necessary to support a carrier, its aircraft, and its assigned personnel on Guam would be substantial, possibly in the billions of dollars.[696] Moreover, the response times for a carrier based in Hawaii would be little better than carriers taking the great circle route from bases in Washington State. Therefore, neither option is attractive. A second alternative would be to establish a rotational pool of six carriers on the west

[690] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 112-23.

[691] This change in designation was made official in October 2004. See James. W. Crawley, "Navy Changes How It Names Carriers' Warship Groups," *San Diego Union-Tribune*, October 11, 2004.

[692] Naval Vessel Register, at http://www.nvr.navy.mil.

[693] Using operational and personnel tempo rules for "forward deployed naval forces," the Japan-based carrier is at sea only about 50 percent of the year. However, since it is based in the region, DoN leaders claim it provides a "1.0" carrier presence in the Western Pacific.

[694] *2001 Quadrennial Defense Report*, p. 27.

[695] William Cole, "Pacific Carrier Still on the Table," *Honolulu Advertiser*, October 14, 2004.

[696] "Island's Message to Navy: There's No Place Like Guam," *Navy Times*, June 13, 2005, p. 30.

coast, which would allow the TFBN to maintain a deployed carrier continuously in the region. However, this would decrease the number of carriers available in the Indian Ocean and Persian Gulf. DoN planners continue to study the problem, with no clear resolution in sight.

Consistent with the TFBN design criteria of *Getting Connected, Jointly*, CSGs are now an integral component of Joint Multidimensional Battle Networks. During Operation *Desert Storm*, Garrison Era CVBGs—designed for *independent* strike operations against the Soviet Union—found it difficult to exchange information with Air Force mission planners.[697] Since then, large deck carriers have been given exquisite command and control suites and robust Joint connectivity.[698] Moreover, the rigid Garrison Era rotational carrier deployment cycle, designed to maintain force of two to three carriers constantly forward, has been changed to provide more flexibility in carrier availably and to improve the force's ability to support rapid Joint power-projection operations. As part of the aforementioned Fleet Response Plan and the associated Flexible Deployment Plan (FDP), DoN planners now aim to provide six fully ready CSGs for deployment within 30 days, and an additional two CSGs within 90 days. This "6+2" planning metric is based on the requirement to support *two* overlapping Joint power-projection operations.

The strike power that CSGs can provide in support of Joint air operations is steadily improving. In the near-term, the notional 2010 integrated carrier air wing will consist of 12 Navy two-seat F/A-18Fs, 12 Navy single-seat F/A-18Es, ten Navy single-seat F/A-18Cs, and ten USMC single-seat F/A-18Cs, for a total of 44 F/A-18 strike fighters of all types.[699] These will be joined by four or five E/A-6B electronic attack aircraft; four or five E-2C command and control aircraft; two carrier onboard delivery (COD aircraft); and a squadron of ten helicopters. At maximum "surge" battle conditions, this air wing will be able to strike a maximum of nearly 1,080 individual aim-points a day using guided air-to-ground weapons, and be able to sustain a continuous 24-hour combat air patrol (CAP) over a naval task group or Joint forces operating ashore.[700]

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[697] Norman Friedman, "Naval Lessons of the Gulf War," *Desert Shield/Desert Storm: The 10th Anniversary of the Gulf War* (London, UK: Faircount LLC, 2000), p. 127.

[698] Carriers are now central information and data hubs in TFBN and Joint operations. The are equipped with Defense Satellite Communications System (DSCS), Global Broadcast System, Challenge Athena, Ultra-high Frequency medium data rate systems, and INMARSAT high rate data systems, and are fully interoperable with Air Force communications systems. See Captain Jacob L. Shuford, USN, "Tomorrow's Sea Power Plays Today," *Proceedings*, January 2000, pp. 32-35.

[699] The two-seat F/A-18F *Super Hornet* is replacing the venerable F-14 *Tomcat* in the fleet air defense role. The transition to the new aircraft will be complete in Fall 2006. See Lorenzo Cortes, "*Tomcat* Transition to Super Hornet Complete By Fall '06, Admiral Says," *Defense Daily*, June 16, 2004, p. 9. The single seat F/A-18E replaces many of the Navy's aging F/A-18Cs. The F/A-18E/Fs will have 40 percent greater combat radius, 50 percent greater endurance, 25 percent greater weapons payload, and will be five times more survivable than the F/A-18C. Department of the Navy FY2006/FY2007 President's Budget, "Winning Today…Transforming to Win Tomorrow." The single Marine squadron assigned to the Carrier Air Wings is a result of the Tac-Air Integration plan. See Government Accountability Office (GAO), *Department of the Navy's Tactical Aviation Plan is Reasonable, But Some Factors Could Affect Implementation* (Washington, DC: GAO, August 2004), p. 6. The new F/A-18 E/Fs are proving to be quite effective in operational deployments. See Robert Wall, "*Super Hornets* at Sea," *Aviation Week and Space Technology*, March 17, 2003, pp. 46-47.

[700] With the introduction of the new Small Diameter Bomb (SDB), this number could go even higher. The SDB Increment I is a 250-pound bomb with a wing kit and a GPS-navigation package, allowing the bomb to achieve great

These surge rates can only be sustained for four days. Normal procedure for sustained operations in support of a Joint power-projection operation would be for two carriers to operate together, with one operating for 12 hours on a day cycle, and another operating for 12 hours on a night cycle. This two-carrier force would give the Joint Force Air Component Commander a combined air wing consisting of 88-100 strike aircraft, that could deliver a total of 10,000 weapons in a 30-day period of high intensity combat, roughly the number of weapons carried by a carrier and and their accompanying fast combat support ships.[701]

Just as in World War II, carrier air wings will also provide "top cover" for Naval Battle Networks and Joint forces ashore against the modern equivalent of World War II *Kamikaze*s: cruise missiles. In January 2005, "Block II" F/A-18Es and Fs equipped with the new APG-79 active electronically scanned array (AESA) radar were delivered to the TFBN. The AESA radar has the resolution to spot and destroy small and stealthy cruise missiles fired at ships offshore, land-based airfields, and forces maneuvering ashore. When combined with new versions of the Advanced Medium Range Air-to-Air Missile (AMRAAM) equipped with special warheads designed to strike small, slow, and stealthy targets head-on, future F/A-18s will be able to fire one shot at a inbound cruise missile and, in the event of a miss, turn and make a second pass from behind—all without leaving their patrol areas.[702]

In the mid-term, both the Navy and Marine F/A-18C squadrons will convert to the new Joint Strike Fighter (JSF). Navy squadrons will be equipped with the F-35 carrier (CV) variant; Marine squadrons will most likely be equipped with the F-35 STOVL variant.[703] At the same time, the four-seat E/A-6Bs will be replaced by the new two-seat E/A-18G, a plane with a high degree of commonality with the F/A-18E/F fleet.[704] Armed with F/A-18E/Fs E/A-18Gs, and JSFs, a future CAW will be able to deliver more strike payload from 450 nautical miles than an F-18C-equipped air wing can deliver at 250 miles, and be able to sustain combat air patrols

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accuracy and hit fixed targets. The planned Increment II weapon will add a multi-mode seeker capable of characterizing and hitting moving targets—the "Holy Grail" for the next generation of weapons. See Amy Butler, "Searching for a Seeker," *Aviation Week and Space Technology,* August 15, 2005, p. 49. For a good discussion about the potential consequences of the SDB, see Joris Janssen Lok, "Small Size, Massive Consequence," *Jane's International Defense Review,* December 2004, pp. 56-59.

701 Perin, "Are Big Decks Still the Answer?" *Proceedings,* June 2001, p. 33.

702 See "First of New APG-79 AESA Radars Delivered for F/A-18E/F *Super Hornets*," at http://rfdesign.com/news/defense/radarsforhornet; and David Fulghum, "*Super Hornet* vs. JSF," *Aviation Week and Space Technology,* May 2, 2005, p. 27.

703 For a full account of the transition plan, see GAO, *Department of the Navy's Tactical Aviation Plan is Reasonable, But Some Factors Could Affect Implementation.*

704 The EA-6B Prowler is near the end of a long service life and is increasingly difficult to maintain. Defective parts take up to two years to replace. Construction of the first of 90 E/A-18Gs began in October 2004; the first squadron will deploy in 2009. See William McMichael, "US Navy's *Prowlers* Return to the Air," *Defense News*, November 8, 2004, p. 26; Richard Mullen, "Boeing Starts Production on EA-18G Test Craft," *Defense Today*, October 22, 2004, p. 1; and Richard R. Burgess, "Northrop Grumman Jamming System to Equip EA-18G EW Jet," *Sea Power*, April 2004, p. 52.

farther, and for longer periods, from the carrier.[705] The next step will be the introduction of the aforementioned Joint Unmanned Combat Air System. Over time, the addition of F/A-18E/F, JSFs, and J-UCAS to carrier air wings will allow a carrier to strike targets over increasingly long ranges. Indeed, with the J-UCAS, carrier air wings will be able to strike targets over an *unrefueled* 1,300-mile radius, ranges heretofore possible only with cruise missiles.[706]

## RECAPITALIZING TFBN AVIATION POWER-PROJECTION PLATFORMS

No US Joint power-projection operation since 1942 has been conducted without local tactical air superiority—provided either by land-based or carrier-based aircraft, or a combination thereof. With access to forward basing once again uncertain, the requirement to seize access once again a possible naval task, and with their steadily expanding Joint combat capabilities, aircraft carriers will remain a vitally important component of the Sea as Base Strike Fleet in the Joint Expeditionary Era. Not surprisingly, then, until very recently DoN leaders had insisted that the 12 carriers now in service represented the absolute minimum force for the future TFBN, and they needed to be replaced on a one-for-one basis as they reached the end of their service lives.[707]

The only aircraft carrier design still in production is the *Nimitz*-class CVN. The design of this class is over 40 years old, the first of the class being commissioned in 1975. Since then, eight additional models, each with successive upgrades, have entered fleet service. The tenth ship of the class, the *George H.W. Bush,* will be commissioned in 2008, replacing the USS *Kitty Hawk*, one of two remaining conventional carriers. However, the *Nimitz*-class has reached the limits of its design, and the *Bush* will be the last of the class to be built. In its place, a new aircraft carrier design will soon enter production: the CVN-21—for 21st century aircraft carrier. In order to keep a force of 12 carriers in service, original plans called for the first CVN-21 to enter production in 2007, and for follow-on ships to be built at a steady-state rate of one every four years.[708]

The CVN-21 will boast impressive improvements over *Nimitz*-class carriers. It will have a modified version of the *Virginia* SSN reactor which will be simpler to build and require fewer operators and less maintenance, while generating three times the electrical power of a *Nimitz* reactor. It will have a more efficient electrical distribution systems, allowing for electrical vice steam auxiliaries and providing for a new electromagnetic aircraft launch and recovery system. It

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[705] David A. Perin, “Are Big Decks Still the Answer?” p. 32.

[706] The steady improvement of carrier capabilities is nicely captured in Bill Sweetman, “Carriers Playing With a Full Deck,” *Jane’s International Defense Review,* December 2003, pp. 48-51.

[707] David Ahearn, “12 Carriers Needed Despite Efficiencies—Admiral,” *Defense Today*, July 9, 2004, p. 1; and Dale Eisman, “Carrier Speeding to Retirement,” *Norfolk Virginia Pilot*, March 11, 2005.

[708] Harold Kennedy, “Navy Starts Work on Next Class of Carriers,” *National Defense*, May 2003, pp. 43-45; and Christopher P. Cavas, “DoD Cancels Review of Healthy CVN-21 Program,” *Defense News*, June 6, 2005.

will also have improved survivability features, and reconfigurable command and decision centers for the embarked Battle Network and air staffs.[709]

Compared to aircraft operating from land bases, carrier-based aircraft have generally suffered lower sortie generation rates. With a smaller island, redesigned flight deck, innovative aircraft "pit stops," and advanced weapons elevators, the CVN-21 will partially redress this disparity.[710] A *Nimitz*-class CVN can today sustain 120 sorties in a 12-hour flying day, and can launch 230 "surge" sorties per 24-hour flying day for four days. In contrast, a CVN-21 should be able to sustain 160 sorties per 12-hour flying day, and 270 surge sorties for four days. The final CVN-21 surge objective is for 310 sorties per day over four days.[711]

Like the world-class *Virginia*-class submarine, however, these new capabilities will not come cheap. Indeed, the ships will likely be the single most expensive platforms in the entire DoD weapons inventory. The first CVN-21, counting $5.6 billion in R&D, development, and non-recurring engineering costs, will cost no less than $13.7 billion (9.79 ASEs), more than the average expected total yearly shipbuilding budget projected by this report. Follow-on ships are expected to cost between $8 billion, or up to 5.71 of the 7 ASEs expected to be built in any given year.[712]

Moreover, the $7.5-8 billion procurement cost does not cover the carrier's required mid-life Refueling and Complex Overhaul, or its end-of-life decommissioning costs. Aircraft carriers, with a design life of five decades, generally receive a RCOH in their twenty-third or twenty-fourth year of service. A RCOH is one of "the most challenging engineering and industrial task[s] undertaken anywhere by any organization."[713] The carrier's onboard reactor is refueled, all of the ship's distributed systems (e.g., electrical power, aircraft refueling, and air conditioning) are modernized, and its combat systems upgraded. This process is both lengthy, and expensive; the carrier is out of service in the yards for a period of approximately three years, and a RCOH consumes approximately $3.0 billion in shipbuilding funds, or 2.14 ASEs. It seems reasonable to project that the RCOH costs for a CVN-21 will be about the same.

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[709] David Brown, "Ready to Hone Ship's Details," *Defense News*, April 12, 2004; Cavas, "DoD Cancels Review of Healthy CVN-21 Program;" and Lorenzo Cortes. "CVN-21 Will Be the 'Big Hammer' of ESF, Admiral Says," *Defense Daily*, April 9, 2004, p. 4.

[710] Sandra I. Erwin, "Carrier Flight Decks Will have 'Pit Stops' for Navy Fighter Jets," *National Defense*, November 2004; "Northrop Grumman Selects Preliminary Designers for CVN-21 Advanced Weapons Elevators," found at http://www.nn.northropgrumman.com/news/2004/040216_cvn21.stm; and Hunter Keeter, "New Carrier Island Is at Heart of Higher Sortie Rates for CVN-21," *Seapower*, June 2003, pp. 23-24.

[711] Lorenzo Cortes, "Navy Aims For Higher CVN-21 Sortie Rate Over Current *Nimitz*-class Aircraft Carriers," *DefenseNews*, January 23, 2004; and Geoff Fein, "Navy Wants Reduced Crew Size, Lower Costs for CVN-21," *Defense Daily*, June 3, 2005.

[712] Cavas, "DoD Cancels Review of Healthy CVN-21 Program;" and Dave Ahearn. "New Carrier to Cost $8 Billion, Not $13 Billion, Admiral Says," *Defense Today*, August 12, 2005, p. 1.

[713] John F. Schank, et al, *Refueling and Complex Overhaul of the USS Nimitz (CVN 68): Lessons for the Future* (Santa Monica, CA: RAND Corporation, 2002), p. xiii.

The DoN has yet to pay for a nuclear carrier decommissioning. As a result, their associated costs are less certain. The USS *Enterprise* will be the test case; its nuclear core is expected to run out by 2015.[714] The current rough order of magnitude planning figure for a *Nimitz*-class CVN decommissioning is $1.14 billion (compared to a CV decommissioning cost of $260 million).[715] However, a *Nimitz*-class carrier has only two nuclear reactors, while the *Enterprise* has eight. Therefore, the cost of the *Enterprise's* decommissioning seems certain to cost more.[716]

In other words, each CVN-21 represents a minimum investment of approximately $12.14 billion, not counting their yearly operating costs. To help offset the CVN-21's high SCN costs, DoN planners are counting on the ship to have dramatically reduced O&S life cycle costs. Chief among the O&S savings will be combined ship crew and CAW manning reduction of 1,200 officers and Sailors.[717] This equates to a recurring manpower savings of $144 million a year, which, over the 50-year life of the ship, amounts to a life cycle savings of $3.48 billion.[718]

Regardless of life-cycle cost savings, however, building one CVN-21 every four years will put considerable pressure on expected shipbuilding budgets and TFBN redesign plans. The total shipbuilding cost to recapitalize the current 12-ship force with CVN-21s is somewhere between $145 and $151 billion (including R&D and procurement, RCOH, and nuclear decommissioning costs). This represents 16 to 17 average yearly shipbuilding budgets! These budget pressures help to explain, in part, the DoN's recent decision to reduce the size of the big deck carrier force to 11 ships.

This decision was strongly implied by the surprise December 2004 announcement that the DoN intended to retire the *USS John F. Kennedy*, CV-67, in 2006, 12 years before its previously announced retirement date.[719] As part of the aforementioned Program Budget Decision 753 that allocated spending cuts across all Services, DoN officials justified the retirement of the *Kennedy* because it would save an immediate $350 million in scheduled overhaul costs, as well $1.2 billion in operating costs over the six-year "future year defense plan."[720] However, the fact that

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[714] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 121.

[715] Eric J. Labs, National Security Division, Congressional Budget Office.

[716] The costs of the *Enterprise* decommissioning are a mounting worry in the DoN. Several officials interviewed forecast the costs would exceed $5 billion, although this seems excessively high.

[717] Cavas, "DoD Cancels Review of Healthy CVN-21 Program." In separate reports, the CVN-21 crew is said to have been cut by 577 officers and Sailors. This implies that the air wing savings will be 623 officers and Sailors. See Dave Ahearn, "Ship Crew Shrinks by 577 Sailors on CVN-21, More To Be Cut," *Defense Today*, December 2, 2004.

[718] Given average manpower costs of $58,000 for every Sailor ($115,000 per officer), the minimum yearly manpower savings for a crew reduction of 1,200 is $69.6 million. This equates to a 50-year life-cycle savings of $3.48 billion.

[719] Dale Decamp, "Lawmakers Didn't See Carrier at Risk," *Florida Times Union (Jacksonville)*, January 10, 2005.

[720] See Allison Connolly, "Navy Delays Overhaul Bids on JFK," *Norfolk Virginia-Pilot*, January 7, 2005; and Dale Eisman, "Navy Leaders Back Plans to Retire the Kennedy," *Virginia-Pilot*, April 20, 2005.

the retirement of the *Kennedy* was not just a temporary budget savings measure was confirmed in the DoN's subsequent 30-year shipbuilding plan. This plan clearly reflected the DoN intention to reduce the big-deck carrier fleet from 12 to 11 ships.[721]

In comparison, DoN planning in December 1945 called for a Battle Force carrier force of 13 large carriers. However, during the subsequent demobilization and amid the debates with the Air Force over the proper course of American air power, the force fell to only seven active ships in 1950. However, national security planning immediately after the start of the Korean War called for a permanent force structure of 12 carriers, a force quickly established by reactivating "mothballed" World War II carriers. However, in the latter part of the Garrison Era, the DoN's *Maritime Strategy* called for 15 *deployable* carriers, requiring a force structure of 16. In the event, the average number of carriers in the Garrison Era Battle Force was 13.67 ships. While a force of 11 carriers would represent the smallest carrier fleet operated since 1950, because of the aforementioned improvements, it would be by far and away the most capable.[722]

However, because of the higher historic carrier force levels and the DoN's recent insistence that 12 carriers represented the minimum desirable carrier force, Congress refused to go along with the DoN's plan—evidence of the friction associated with having seven different TFBN "stakeholders." In April 2005, by a vote of bipartisan 58-38, the Senate blocked the move to reduce the carrier fleet to 11 ships, complaining that there had "been no analysis to support reducing the Navy's carrier fleet to 11 [ships.]"[723] The Senate was responding, in part, to a Congressional Research Service Report that concluded that the decision to cut the *Kennedy* should be driven by a more thorough strategic review rather than by "narrow budget-driven planning drills." Additionally, among other arguments, the Report also pointed out that the Government of Japan had not yet formally approved the home-porting of a nuclear-powered aircraft carrier in their country. Until that decision was certain, decommissioning one of the two remaining conventionally powered aircraft carriers entailed some risk. As a result, the Senate directed that the final decision on the size of the carrier force be deferred until after the completion of the 2005 QDR.[724]

The debate over the size of the big deck carrier force may be deferred until after the completion of the 2005 QDR, but it will not go away. Because of the cascading effect that the carrier recapitalization plan will have on future shipbuilding plans and the entire TFBN, this is a

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[721] As this report also assumes one crew per ship, for comparison it uses the "325-ship plan" outlined in the DoN's "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006." This plan indicates the carrier fleet will be reduced to 11 carriers. The "260-ship plan" indicates an 11-carrier force through 2029 and a 10-carrier force in 2035. For a description of these plans, see Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[722] McRae, Domabyl, and Parker, "The Offensive Navy Since World War II: How Big and Why?" pp. 8-16.

[723] Dale Eisman, "Senate Nixes Navy Plan to Mothball *Kennedy*," *Virginia-Pilot*, April 21, 2005.

[724] Ron O'Rourke, "Navy Aircraft Carriers: Proposed Retirement of the USS *John F. Kennedy*—Issues and Options for Congress," Congressional Research Service, April 7, 2005. For a synopsis of the report, see Dave Ahearn, "Retiring Carrier *Kennedy* Early Entails Risks, CRS Report Says," *Defense Today*, January 19, 2005, p. 4.

decision that must be made relatively quickly. In this light, it is important for Congress to keep in mind that the conditions of the Joint Expeditionary Era as well as new TFBN design criteria call for a Total Force Battle Network that is "capable of more dispersed operations so [it] can be in more places, not [a] massive force with a few ships in a few places."[725]

## TOWARD A MIXED AVIATION POWER-PROJECTION FLEET

The problem of balancing the impact that large-deck carriers have on a shipbuilding budget with the desire to more broadly distribute aviation capabilities throughout the TFBN has a very familiar ring to it. Battle Force planners in the First Expeditionary Era tackled the very same problem. Their solution—a cost effective mix of CVs, CVLs, and CVEs—provides a very important lesson for both contemporary TFBN designers and Congressional leaders. It suggests that the question about how best to recapitalize the large-deck aircraft carrier fleet should be subordinate a larger question: what is best *mix* of TFBN aviation power-projection platforms in Sea as (Joint) Base Power-projection Fleet?

In attempting to answer this question, several immediate observations come to mind. First, aviation power-projection platforms will remain among the most fungible assets in the TFBN, being able to make important contributions in guarded, unimpeded, defended, and contested access scenarios. In the persistent irregular war, carriers operating relatively close to shore provide invaluable air support for larger Joint terrorist counter-sanctuary operations when land access cannot be, or is not yet, negotiated, and provide persistent strike and close air support thereafter. Positioned further out to sea, they provide vital aviation support in the case of power-projection operations against a nuclear-armed regional power. And, in the face of an A2/AD network, they will make critical long-range contributions to counter-network roll-back operations, especially with new long-range penetrating systems like the J-UCAS. The only difference between these three scenarios will be the range from shore at which the aviation power-projection platform must *initially* operate to ensure its survival.

Second, despite their high costs, the DoN planners would be ill-advised to dramatically cut the number of large-deck, nuclear-powered aviation power-projection platforms in the TFBN. As has been discussed, these ships represent a unique US aviation power-projection asset. They represent a formidable blend of persistent aviation combat power, and sea-based tactical aircraft sortie generation rates unmatched by any other navy. Indeed, only three other navies now operate large-deck carriers, and each has only one operational model. They carry aircraft wings that are both smaller and less diverse than US carrier wings, and far less capable. The US fleet of large nuclear-powered carriers, like its large SSN force, helps to set the TFBN apart as the world's only "Rank 1" Global Power-projection Navy.[726]

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[725] Dave Ahearn, "Clark Says DD(X) Costs Not Fairly Weighted," *Defense Today*, June 15, 2005.

[726] For a concise discussion about the advantages of the large deck aircraft carrier, see Perin, "Are Big Decks Still the Answer?"

Third, the vastly improved warfighting capabilities of the TFBN's large deck carrier force suggest that the large deck carrier force can and should be modestly reduced, regardless of their costs. The numbers are quite stunning: In 2010, every single carrier on station will have the daily sustained equivalent firepower of nearly *seven* 1989 carriers (1,080 aimpoints versus 162 aimpoints). A 2010 fleet with 11 deployable aircraft carriers under maximum surge conditions will have a maximum theoretical strike capacity of 11,880 aimpoints per day—over five times that of the 1989 carrier fleet of 13 deployable carriers. Therefore, a modest reduction in the large deck carrier force would not appear to threaten the TFBN's dominant position in naval aviation.[727]

Fourth, smaller aviation power-projection platforms are once again becoming an attractive option. In World War II and Korea, CVLs and CVEs operated piston-driven aircraft that were the same or generally as capable as the planes found on the larger carriers. The only difference was that their air wings were smaller, and they could not generate the same number of sorties or combat power.[728] However, these smaller ships were simply too small to handle the shift to heavier, larger jet aircraft. While some of them survived to serve as the Battle Force's first helicopter carriers, aircraft-carrying CVLs and CVEs gradually disappeared from Battle Force service.[729]

Smaller aviation platforms made a slight resurgence with the development of the aforementioned AV-8 *Harrier* "jump jet." This small VSTOL aircraft allowed navies to get a modest jet aviation capability to sea on much smaller, conventionally-powered, purpose-built VSTOL aircraft carriers, or CVVs. The British, Spanish, Italian, Indian, and Thai navies operate a total of seven CVVs capable of operating small numbers of *Harriers.* However, as was discussed earlier, the air groups on these ships are typically quite small, seldom numbering over 8-12 aircraft.

For its part, after experimenting with a variety of helicopter carriers, the DoN Battle Force elected to give their new large-deck amphibious assault ships like the LHA and LHD (at 40,000 tons, bigger than the World War II *Essex*-class CVs) an ability to support Marine Corps VSTOL aircraft in addition to their normal air groups of light, medium, and heavy rotary-wing aircraft. Although these ships' primary missions are to support aerial and surface maneuver in amphibious operations, recall that they have the inherent ability to operate as dedicated "*Harrier* carriers" with up to 24 aircraft.[730]

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[727] Jason Sherman, "Defense Department Eyes Further Cuts to Aircraft Carrier Fleet," *Inside the Pentagon,* April 21, 2005, p. 1.

[728] US CVEs continued to operate Battle Force piston-engine aircraft through the Korean War. The *Sicily* and the *Badoeng Strait* operated Marine *Corsair*s throughout the early years of the war. See "History of Marine Aviation: Korea," at http://www.acepilots.com/usmc/hist14.html.

[729]See "History of Marine Aviation: 1950s—Technological Developments," at http://www.acepilots.com/usmc/hist16.html.

[730] The development of big-deck amphibious assault ships is dicussed in Chapter 17, Freidman, *US Aircraft Carriers.* For a good description of US *Harrier* Carrier operations, see "Marine *Harriers* at War: MAG-13 in Iraqi Freedom," *International Air Power Review*, Vol. 15, 2005, pp. 16-25.

The idea of *Harrier* Carriers or CVVs never attracted much attention from Battle Force planners. In comparison with the larger CVNs, the smaller ships offer far less performance and capability.[731] Similarly, the idea of using big deck amphibious assault ships as *Harrier* carriers was never seen as anything more than a secondary capability. Both reactions were strongly influenced by the performance of the *Harrier* itself, which generally suffered in comparison with the larger, more capable aircraft that flew off the decks of the much larger CVs and CVNs.[732] However, the STOVL version of the Joint Strike Fighter is expected to have a level of performance as good as or better than the airplanes found on larger aircraft carriers—a circumstance not seen since CVLs and CVEs supported operations off the Korean Peninsula.[733] The improved performance of the STOVL-version of the JSF should warrant renewed Navy interest in new types of CVLs or CVEs, which may be attractive in scenarios that do not require sustained high sortie generation rates—such as supporting troops fighting against irregular opponents.

A related, fifth observation is that despite the encouraging moves toward intra-Departmental cooperation represented by the aforementioned Navy-Marine Corps Tac-Air Integration Plan, there are several unanswered questions about how best to mesh future Navy and Marine sea-based aviation capabilities. Indeed, because of the demands generated by the War on Terrorism and the new Fleet Response Plan, the Marines have been released, at least temporarily, from the requirement to assign a Marine squadron to each of the ten active air wings. Similarly, Navy "expeditionary" squadrons are no longer "hard-wired" into the deployment schedule.[734] Additionally, the current plan is for all Marine Corps F/A-18C squadrons to transition to STOVL JSFs. It is not entirely certain that the STOVL JSF can be easily incorporated into carrier deck operations with catapult-launched Navy aircraft.

More importantly, however, Marine aviation is going back to sea. During the Garrison Era, Marine aviators assumed that they would have immediate access to land air bases, or that their *Harriers* would be able to operate off of austere expeditionary airfields close behind Marines engaged in ground combat. Now, in the Joint Expeditionary Era, Marine planners want to move their aviation assets to sea, and maintain them there for as long as possible. This is creating a

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[731] See Chapter 15, "Return to the Small Carrier: CVV, 1972-78," in Freidman, *US Aircraft Carriers*; and Perin, "Are Big Decks Still the Answer?"

[732] A panel of experts developed a capability score for all DoN aircraft. The AV-8B scored the lowest of any DoN aircraft, receiving a 0.111. For comparison, the F/A-18C/D scored 0.193, and the Block I F/A-18E/F scored 0.316. See Government Accountability Office, *Department of the Navy's Tactical Aviation Plan is Reasonable, But Some Factors Could Affect Implementation,* p. 11.

[733] The carrier version of the JSF is expected to have a capability score of 1.0. The STOVL JSF did not receive a separate score, but, given that it will have an unrefueled range about 40 percent less than the carrier version and only 50 percent of the internal payload, it is reasonable to assume it would score less. A reasonable assumption would be that the STOVL JSF has approximately the same or better effectiveness as the next best aircraft in the big deck carrier air wing—the Block 2 F/A-18E/F, which has a capability score of 0.65. Government Accountability Office, *Department of the Navy's Tactical Aviation Plan is Reasonable, But Some Factors Could Affect Implementation,* pp. 11-13.

[734] Richard R. Burgess, "The Power Tool," *Seapower,* August 2005, p. 28.

greater demand for TFBN flight deck space—a demand complicated by the fact that both the STOVL JSF and the new MV-22 tilt-rotor are both far larger and heavier than the aircraft they replace (the *Harrier* and the CH-46 helicopter, respectively).[735]

With the exception of the added complication of helicopters, the problem of taking Marine aviation to sea is the same one that faced DoN planners in 1943-1944. For the first several years of the war, Marine aviation was heavily committed in the Solomons campaign, and its planes operated primarily off of land bases. Carrier air wings on the CVs were composed of all-Navy squadrons. As the Solomons campaign moved toward a successful conclusion, and with the decision made to by-pass the Japanese base at Rabaul, Battle Force planners wrestled with the issue of how best to sea-base Marine aviation for the final drive across the Pacific. The options were to integrate Marine squadrons into the large deck carrier air wings, to have all-Marine air wings on CVEs, or a combination thereof. In 1944, the decision was made to form six all-Marine air wings on *Commencement Bay*-class CVEs, and to augment CV carrier air wings with Marine squadrons only when necessary. A total of four Marine CVEs made it to the Pacific before war's end, and ten Marine fighter squadrons augmented large deck carrier air wings as the Kamikaze threat became more intense.[736]

These discussions shed new light both the DoN Tac-Air Integration Plan and on recent moves to recapitalize the big-deck amphibious ship fleet. Faced with the prospective requirement to lift the larger air combat elements (ACEs) for 2.5 MEBs, DoN planners ordered a review of potential alternatives to replace the five oldest big-deck amphibious assault ships in service—the *Tarawa*-class LHAs. Alternatives included a new 69,000-ton "dual tram line design" capable of supporting simultaneous MV-22 and JSF operations; an expanded, "plug-plus" version of the LHD, the sole big-deck amphibious ship still in production; a minimally modified repeat of the LHD, with improved aviation capabilities; and distributed approaches using smaller, stretched amphibious landing ships.[737] In the end, although the desired alternative was for the LHD "plug-plus" design, cost considerations drove the design of the new ship, which is now known as the LHAR (for LHA replacement), toward a minimal-cost conversion of the LHD.[738]

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[735] The typical deck spotting factor for aircraft on a big-deck amphibious assault ship like the LHA or LHD is based on the CH-46 medium helicopter, which has a spotting factor of 1.0 with its blades folded. The MV-22, with its blades folded, has a spotting factor of 2.22. The AV-8B has a spotting factor of 1.53; the JSF has a spotting factor of 2.05.

[736] Robert Sherrod, *History of Marine Corps Aviation in World War II* (Washington, DC: Combat Forces Press, 1952), pp. 324-33. See also "History of Marine Aviation, Central Pacific Operations," at http://www.acepilots.com/usmc/hist10.html; and "History of Marine Aviation, the Philippines," at http://www.acepilots.com/usmc/hist11.html .

[737] David A. Perin, Peter B. Strickland, Denise B. Anderson, and Jason E. Thomas, *The LHA(R) Analysis of Alternatives Summary Report* (Alexandria, VA: Center for Naval Analysis, July 2002). A good picture of the large "dual tram" design can be found in Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 183.

[738] "Plug-plus" meant that the LHD would be lengthened by inserting a 77-foot "plug" in the hull, which itself would be widened by 10 feet. Dale Eisman, "Navy Tilting Toward Enlargement of *Wasp*-class Ships For Sea Bases," *Norfolk Virginia-Pilot*, December 4, 2002. See Donald G. Gellar, Jr., "LPD-17 and LHA(R)," a PowerPoint presentation dated June 23, 2005, found at http://64.233.167.104/search?q=cache: qDHsNQjLGlYJ:hqinet001.

To get the enhanced aviation capabilities needed, the LHAR would give up its wet well deck, which would make it the first big-deck amphibious assault ship since 1976 to be built without one. In essence, the new ship would extend the LHD's hanger bay forward, and the displaced shops and spaces, along with expanded cargo and ammunition magazines, would be relocated to the space freed up by closing the well deck. The removal of the well deck would allow the ship to carry 23 STOVL JSFs or 28 MV-22s, or a combination thereof, plus two MH-60 helicopters.[739] The decision to give up the ship's well deck was made in relative haste, with little Departmental debate or comment. Nevertheless, Marine aviation officials were happy, saying that the "LHAR is exactly the ship for where we are going with sea-basing."[740]

Marine ground officers were less enthralled by the decision to remove the well deck in the LHAR, which dramatically reduces the ship's contribution to a major surface assault. In their eyes, the removal of its well deck made the LHAR nothing more than a repeat of the failed experiment known as the LPH, which disappeared from service because it was optimized only for aerial assault. However, if viewed as an updated version of the *Commencement Bay* CVE, the LHAR will provide a capability not seen in the Battle Force for over 50 years: a small aviation power-projection platform, capable of keeping up with amphibious task forces, with an ability to carry more than one-third the number of tactical fighters found on the decks of larger CVNs. Assuming 85 percent aircraft availability, and six days of surge operations followed by nine days of sustained operations, a CVE carrying 23 STOVL JSFs could launch 1,115 sorties, or an average of about 75 sorties a day.[741] While nowhere near the number of sorties capable of being generated by a large-deck aircraft carrier, this represents a substantial number of close air support sorties in direct support of a MEB operating ashore, and would likely be more than enough for normal air support operations associated with the global irregular war.

Sixth, while the move toward a 40,000-ton CVE may be appropriate, a move towards even smaller carriers is premature. For example, Vice Admiral Arthur Cebrowski, former head of the Office of Force Transformation, recommended the TFBN move toward "mini-carriers," each as small as 367 feet long and 2,500 tons. Consistent with the tenets of the Network Centric School, these carriers—each carrying just five STOVL JSFs—would form a distributed, sea-based aviation network.[742]

Attractive as this concept may sound, the STOVL JSF is nearly a decade away from service, and it still faces many technological challenges. These challenges could cause a delay in the aircraft's

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hqmc.usmc.mil/AVN/ASL/Ordnance/Documents/LPD17_LHAR_Aviation_Ordnance_Overview.ppt+lpd-17+and+LHAR&hl=en.

[739] Gellar, Jr., "LPD-17 and LHA(R)."

[740] Weinberger, "LHAR To Be More Aviation Capable, Official Says," p. 8.

[741] Gellar, Jr., "LPD-17 and LHA(R)."

[742] Christopher J. Castelli, "Cebrowski: Develop Small Aircraft Carriers From High-Speed Ships," *Inside the Navy*, August 9, 2004, p. 1.

service date, or result in further performance trade-offs and limitations. Designing ships before the STOVL JSF's delivery schedule and operating performance are better known would be quite risky.[743] Moreover, the logistical challenges and the tactical payoffs associated with operating many small carriers with "micro air wings" are not fully understood.[744] Therefore, while the goal of distributing sea-based aviation is a good one, any decision to move toward extremely small carriers appears to be at least a decade away. In the meantime, if the JSF turns out to be less capable than expected, the LHAR/CVE will still be able to carry large numbers of TFBN and Joint rotary wing aircraft.

Seventh, having a dedicated multi-purpose *Joint* aviation power-projection platform appears to be an increasingly attractive TFBN capability. The first "non-traditional" use of aircraft carriers in the Joint Expeditionary Era occurred in September 1994, with the "adaptive force packaging" of the USS *Eisenhower* (a *Nimitz*-class CVN) and the Army's 10th Mountain Division. The division's soldiers and equipment were loaded on board the carrier, and the *Eisenhower* then headed for the Caribbean in support of Operation *Uphold Democracy*, the US-led effort to restore the democratically elected government of Haiti.[745] The second non-traditional use of carriers involved the USS *Kitty Hawk* (an older CV) and Joint special operations forces during Operation *Enduring Freedom* in 2001. In this instance, the *Kitty Hawk* left the bulk of her air wing in Japan, and sailed for the Indian Ocean. She was then positioned off of the coast of Pakistan, where she housed and operated Joint special operations helicopters and forces supporting operations in Afghanistan.[746]

Following the successful use of the *Kitty Hawk* in a Joint aviation support role, the Department of Defense examined the possibility of pursuing a dedicated special operations Afloat Forward Staging Base, or AFSB. In February 2002, Maersk Line Ltd. received a commercial award for the design of an AFSB based on its highly successful S-class container ship. The S-class are known as "post-PANAMAX" (for Panama Maximum) ships, meaning they are too large to fit in through the Panama Canal. As a result, these large ships have an abundance of usable space. The derived design has two separate flight decks, one fore and aft of its superstructure, with the capacity to accommodate no less than 15 CH-53 helicopters or 12 MV-22 Tilt-rotor aircraft in "ready-to-fly" condition; a full hanger deck capable of storing 72 CH-46 helicopter equivalents;

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[743] The British are facing this very problem; their first future aircraft carrier, the *HMS Queen Elizabeth*, will be delivered *at least* two years before it will receive its STOVL JSFs. See Michael Evans, "Jet Delay Leaves Navy's Carriers All At Sea," *London Times*, March 7, 2005.

[744] Perin, "Are Big Decks Still the Answer?" pp. 31-33.

[745] See "Dwight D. Eisenhower Strike Group," at http://www.globalsecurity.org/military/agency/navy/batgru-69.htm.

[746] Reportedly, the *Kitty Hawk* carried a total of eight F-14 Tomcats and F/A-18C/D strike aircraft, which eventually flew about 100 strike missions. Over 1,000 Special Operations Forces personnel were on the carrier, including the Army's 160th Special Operations Aviation Regiment, Navy SEALS, and Air Force Special Operations forces. Aircraft included a dozen special operations MH-60 Blackhawk helicopters, a half-dozen MH-47 Chinook medium-lift helicopters and several MH-53 Pave Low helicopters. See "Operation Enduring Freedom—Deployments," at http://www.globalsecurity.org/military/ops/enduring-freedom_deploy.htm.

modular berthing and support facilities for 6,000 troops; ammunition magazines; and roll-on/roll-off ramps.[747]

While the S-class AFSB would demonstrably increase the TFBN's ability to support rotary-wing, and in some instances, VTOL and STOVL aircraft, it could not replace the versatility of an aircraft carrier. With its long unobstructed flight deck, a CV or CVN can also support any rotary wing or naval fixed-wing tactical aircraft in the Joint inventory. For example, it could temporarily operate Marine EA-6B electronic attack aircraft. It also has a greater capacity for on-board aviation fuel and ordnance. Moreover, a CV could serve as a high-speed test bed for emerging sea base concepts, such as high-speed "connectors" for Joint rotary-wing aircraft, or forward C-130 transport aircraft landing bases.[748] While the concept of an S-class AFSB is attractive, as will be discussed, it is best thought of as a component of the Sea as Base Maneuver Fleet. In contrast, an aircraft carrier in this role is best thought of as a Joint Forward Aviation Base, or J-FAB, and a component of the aviation power-projection fleet

Eighth, by 2015, the European Union is expected to have four medium-sized CVs and CVNs—two British CVs equipped with 36-40 STOVL JSFs, and one French CVN and one French CV equipped with 32 or more of the *Rafale M* multi-role strike fighters.[749] These will be augmented by two, and possible three, smaller European CVVs operating small STOVL JSF air groups. This will represent the largest and most capable allied carrier contingent since the Korean War. This force should largely alleviate any requirement to maintain any US aviation power-projection platform in the Mediterranean. Moreover, in many scenarios, especially those warranting a multi-national response, the US TFBN will likely be able to count on two or three allied aviation power-projection platforms with aircraft as capable as those operated by the US carrier force, or nearly so.

Ninth, given the guidance to increase the permanent carrier presence in the Pacific Ocean, two key issues still need to be resolved. The first is whether of not the Government of Japan will allow the United States to replace the conventionally-powered *Kitty Hawk* with a nuclear-powered carrier. For the Japanese, this is not a simple issue. Indeed, it could even turn on the

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747 Norman Polmar, "Sea Base Ships for the Future," *Proceedings,* March 2005, pp 104-05; and Stephen M. Carmel, "A Commercial Approach to Sea Basing—Afloat Forward Staging Bases," *Proceedings,* January 2004, pp. 78-80.

748 Landing a C-130 on an aircraft carrier has already been demonstrated. However, further experimentation would be required to determine if being able to land, refuel, and operate a C-130 on a Joint sea base is a practical option. See "C-130," at http://www.scenery.org/c-130.htm.

749 Future British and French aircraft carriers will likely have a high degree of commonality. See Pierre Tran, "Collaboration Grows on UK, French Carriers," *Defense News,* June 13, 2005, p. 3. However, there will be some key differences. The British CVF will be fitted for, but not with, catapults. It will operate STOVL JSFs. The number of JSFs carried on the British CVFs will depend on their final size and displacement. See Bosbotinis, "UK Future Maritime Airpower," p. 40; and "CVF—Royal Navy Future Aircraft Carrier, United Kingdom," at http://www.naval-technology.com/ projects/cvf. The second French aircraft carrier, like the *Charles de Gaulle*, will be fitted with catapults, and will likely support an all-*Rafale* air group. The *Charles de Gaulle* is able to carry 32 Rafales, with 12 on deck and 20 in the hangers. The new French carrier, known as PA2, will be bigger than the *de Gaulle* and will likely be able to carry more. See "*Charles de Gaulle* and the French Carrier Air Group;" "Pragmatic *Rafale*: a Study in French Philosophy," *Jane's International Defense Review,* June 2005, pp. 64-67; and "Air and Sea-Supported Land Attack Operations," Supplement, *Armada,* Issue 1/2005.

decision of the mayor of Yokosuka (the location of the base in which the carrier is homeported), who has the authority to deny the laying of the pipes and cables needed to support the carrier.[750] The second is whether or not Congress will allow the realignment of large deck carriers to do so. Each carrier and air wing brings with it 5,000 personnel, with important economic benefits for any local economy.[751] The dramatic negative Congressional reaction to the aforementioned announcement of the early retirement of the *John F. Kennedy* is not a hopeful sign that the Congress would approve any DoN plans to shift carriers from the Atlantic to the Pacific.

Finally, if the DoN is to stay in the business of building complex aviation power-projection platforms, then the method for paying for them must change. For over 40 years, Congress has funded the construction of US Navy ships by appropriating enough money to pay for the entire construction project in the initial year of constructing. The steadily increasing cost of aircraft carriers has led to the practice of spacing the cost of the ships over several years through "advance appropriations" and "split-year appropriations."[752] Given an expected future shipbuilding budget of only $8 to $12 billion per year, a better approach might be to establish an Aviation Power-projection Platform Capital Account. This account would pay for the construction of nuclear-powered aircraft carriers, RCOHs, nuclear and conventional aircraft carrier decommissioning, as well as any new CVEs or dual-purpose LHDs. It would be funded by a yearly, steady-state contribution from the total shipbuilding and conversion budget. Because such an account would be subject to "raiding" with the DoD and the DoN, strict legislative limits would have to be put in place for it to work.[753]

## Recommendations for the Aviation Power-projection Fleet

With these observations in mind, TFBN planners should move to create a broader mix of distributed, aviation power-projection platforms, with improved Joint support capabilities. Accordingly, TFBN planners should pursue the following measures:

- Consistent with the "1+1+1+1" force sizing and planning metric outlined earlier in the report, focus the large-deck carrier force on supporting a single large-scale power projection operation in one theater, and hedging against a broader maritime competition

[750] "Can Yokosuka Refuse Nuclear Carrier," *Asahi Shimbun*, June 17, 2005. For a more complete discussion about homeporting a CVN in Japan, see Christopher P. Cavas, "Next US Carrier in Japan May be Nuclear," *Defense News*, February 21, 2005; and Christopher P. Cavas, "Nuclear Carrier May Berth In Japan," *Navy Times*, April 25, 2005.

[751] The San Diego Regional Chamber of Commerce figured each carrier has an annual $270 million economic benefit, including $111 million in payroll spent locally and $40 million in maintenance contracts. See Cole, "Pacific Carrier Base Still on Table."

[752] See Christopher J. Castelli, "Pentagon Seeks Authority on *Carl Vinson*, LHA(R), Prepositioning Ships," *Inside the Navy*, May 2, 2005.

[753] A Carrier Capital Account is one of several carrier funding options analyzed by John Birkler, et al, *Options for Funding Aircraft Carriers* (Santa Monica, CA: RAND, 2002).

with China. This would allow the adoption of a "5+1" force planning and sizing metric for the large-deck carrier force. A "5+1" metric would provide for two, 2-carrier Carrier Strike Groups and one single-carrier CSG within 30 days of alert ("5").[754] It would also provide a ready reserve of one carrier that would be available within 90 days. ("+1"). Such a "5+1" metric would require a force of nine deployable CVNs, which would provide a deep reserve of three additional large-deck carriers.[755]

- In support of the "5+1" force planning metric, adopt a front-line large-deck carrier fleet of ten *Nimitz*-class CVNs.[756] With one CVN always in the yards undergoing a RCOH, the resulting force would support nine deployable carriers. Accordingly, when the USS *George H. W. Bush*, CVN-77, is commissioned in 2008, the DoN should retire any remaining conventional class carriers. This recommendation presupposes that the Government of Japan will approve the basing of a nuclear-powered aircraft carrier in Japan. If this turns out not to be the case, one of the two conventional aircraft carriers would need to be retained.[757] An option would be to place one or both conventional carriers in a Category B inactive status, sometimes referred to as "mothballed," which would minimally maintain the ships as emergency mobilization assets.

- Concurrent with the shift to a ten big-deck carrier force, reorganize Navy tactical aviation into nine active duty and one reserve carrier air wings. In the process, and over time, change the composition of these nine wings to: one 12-plane Navy F/A-18E squadron; one 12-plane Navy F/A-18F squadron; two 10-plane Navy JSF squadrons; a J-UCAS squadron; five to six E/A-18G electronic attack aircraft; five to six E-2C airborne battle management aircraft; two carrier onboard delivery aircraft; and ten helicopters. Assuming the STOVL JSF can be efficiently accommodated in carrier deck cycles, one Marine JSF squadron would be assigned to each carrier air wing as a augmentation squadron, deployed and employed as part of the CAW when required.

- Begin recapitalizing the large-deck carrier force in FY 08 with the construction of CVN-21. A ten-carrier force will require a sustained building rate of one CVN every five years, meaning two additional CVN-21s would be started between now and 2020—one in FY

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[754] Of course, the carrier supporting irregular warfare could easily shift to support the major combat operation, providing for five carriers. The current "6+2" planning metric is based on the requirement to support *two* major, overlapping Joint power projection operations. It requires a total force of 12 large-deck carriers.

[755] The DoN has indicated a ten-carrier force might be able to sustain a "6+2" surge profile, if maintenance cycles were adjusted. See Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[756] The author had originally leaned toward recommending that aircraft carriers be redesignated J-CVNs, with the understanding that the Navy and Air Force would operate similar J-UCAS aircraft. However, the Air Force is now clearly moving toward a J-UCAS that would be too large for carrier operations. See "Northrop Grumman Proposes J-UCAS Revision," *Jane's International Defense Review*, June 2005, p. 6.

[757] Jon R. Anderson, "*Kitty Hawk* Still Has Slim Chance of Reprieve If Japan Nixes Nuclear-Powered Ship," *Star & Stripes*, April 21, 2005. See also Cavas, "Next US Carrier in Japan May be Nuclear;" and Cavas, "Nuclear Carrier May Berth In Japan."

13, and one in FY 18. Barring any change in plans, CVNs would continue to be built at five year intervals thereafter. With a nominal building time of six years, the 2020 force would consist of eight *Nimitz* and two CVN-21s.

- Redesignate the LHAR program as the *Commencement Bay* J-CVE program. As their predecessors did in World War II, the new J-CVEs would serve as small, multi-purpose aviation power-projection platforms, augmenting the larger CVNs. Their primary mission would be to provide support to forces engaged in irregular warfare operations, and close air support to Marines and Joint ground combat, using the STOVL version of the JSF. The first ship of class would be built in FY 07, as planned, and build three additional ships at three year intervals thereafter—one each in FY 10, FY 13, and FY 16. With building times of just over three years, the 2020 TFBN would include four J-CVEs.

- With a nominal 35-year hull life, LHD-1, the *Wasp*, is currently scheduled to retire in 2024.[758] Accordingly, in FY 19 the J-CVE production line would shift over to a new large-deck amphibious assault ship, tentatively dubbed LHDX. Like today's big-deck amphibs, this ship would also have a secondary STOVL support mission, allowing them to function as auxiliary J-CVEs. The first LHDX would replace the *Wasp*. Follow-on LHDXs would be built at the rate of one every three years until the eight-ship LHD-class was retired.

- Establish four Marine air wings consisting of two, 10-plane STOVL JSF squadrons and three to five spare aircraft. Should the Air Force pursue the STOVL JSF, these air wings could eventually include Air Force JSF squadrons, or Air Force STOVL aircraft on exchange missions.[759] The J-CVEs could also serve as auxiliary Joint Forward Air Bases, supporting Marine, Army, and special operations helicopters, or perhaps even allied helicopters and JSFs. During a major Joint power-projection operation, the four-ship class should be capable of surging a minimum of three ships forward, carrying a total of 69-75 JSFs, enough aircraft to support the tactical aircraft requirements for two MEBs air combat elements.

- The USS *Enterprise* should be designated as a Joint Forward Aviation Base, or J-FAB, and its crew reorganized to include a mixture of active duty, reserve, and Military Sealift Command personnel, with appropriate Joint augmentation. In peacetime, the *Enterprise* would serve as a test platform for sea basing and high-speed aviation connector experiments. In a crisis, she could duplicate the role performed by the USS *Kitty Hawk* during Operation *Enduring Freedom*, supporting special operations forces and helicopters; or act as a base for US Army air assault forces and helicopters; or host additional Marine and Air Force JSF squadrons (and Marine electronic attack aircraft).

[758] "LHD-1 *Wasp*-class," found at http://www.fas.org/man/dod-101/sys/ship/lhd-1.htm.

[759] The Air Force has announced plans to replace its A-10 fleet with STOVL JSFs. See "USAF Expected to Update JSF Purchase Plans by December," *Aerospace Daily & Defense Report*, June 15, 2005. See also "US Air Force Defines STOVL Version of Joint Strike Fighter," *Jane's International Defense Review*, June 2005, p. 15.

The ship would also serve as an "active spare" for the carrier fleet. The goal would be to operate the *Enterprise* for as long as her core allowed, deferring the ship's decommissioning costs for as long as possible.

- With the commissioning of CVN-21 in 2014, retire the USS *George Washington*, CVN-73 in order to keep the large deck carrier force at ten ships. Conduct a modified RCOH, converting the *George Washington* into a J-FAB as a replacement for the *Enterprise*. Alternatively, retire the ship and use the RCOH savings to defray the *Enterprise's* nuclear decommissioning costs.

- Subject to the approval of the Government of Japan, base one CVN in Japan, and subject to the approval of Congress, station six CVNs on the west coast, split between Washington State and San Diego. An option would be to station one of the six ships in Hawaii. Together, these moves would provide "2.0" carrier presence in the Western Pacific. The remaining three CVNs, four J-CVEs, and single J-FAB would provide a rotational pool to support the requirement for a single aviation power-projection platform in the Indian Ocean. This basing structure satisfies the intent of the "1+1+1+1" force structure sizing goal established in this report, and is consistent with 2001 QDR planning guidance. However, it would trade a CVN and a CV based on the East Coast for four smaller J-CVEs, and would undoubtedly meet with heavy political opposition.

- Establish an Aviation Power-projection Platform Capital Account to steady out the spikes in shipbuilding funding associated with these large complex, and expensive platforms. The account would pay for *all* aviation power-projection platforms and their supporting costs: CVNs; RCOHs; carrier decommissionings; J-CVEs; J-FAB conversions; and LHDXs. To be viable, the account would likely need to be protected from budgetary "raiding" by legislative action.

## Associated Annual Shipbuilding Costs

This report concentrates on the shipbuilding plan from FY 07 through FY 20. The plan outlined above would require payment for:

- Three CVN-21s in FYs 08, 13, and 18 ($24 billion, FY 05 dollars);[760]

- Five J-CVEs in FYs 07, 10, 13, 16, 19 ($12.5 billion);[761]

- Three *Nimitz* RCOHs: the *Theodore Roosevelt* during FYs 10-12; *Abraham Lincoln* during FYs 12-15; the *John C. Stennis* during FYs 18-21 ($9 billion);

[760] This assumes a recurring procurement cost of $8 billion for the first, second, and third carriers. It also assumes that CVN-21's non-recurring engineering costs have been paid for with advance appropriations in FYs 05-07.

[761] This works out to an average ship cost of $2.5 billion per ship, in FY 05 dollars.

- Three decommissionings: the *Kitty Hawk* and *John F. Kennedy* in FY 08; and the *Enterprise* sometime between FY 15 and 18 ($2.52 billion);[762] and

- The conversion of the *George Washington* into a J-FAB from FY 15 through FY 18 ($2.25 billion).[763]

This equates to a yearly Aviation Power-Projection Capital Account payment of $3.59 billion, or 2.6 ASEs, from FY 07 through FY 20. By extending the planning horizon over a 30-year interval (FY 07 through FY 36), this plan would require three additional CVN-21s, five additional J-CVEs/LHDXs, three additional *Nimitz* RCOHs, and five *Nimitz* decommissionings.[764] The projected yearly account payment would drop slightly to $3.36 billion (2.4 ASEs). Installment payments would have to be updated to account for more accurate cost data and improved fiscal projections; a formal review every four years, in conjunction with each QDR, would likely be the most sensible approach.

As these calculations demonstrate, aviation power projection platforms require a sustained commitment of shipbuilding resources of well over two ASEs per year. This represents a substantial investment on shipbuilding budgets expected to support between 5.7 to 8.6 ASEs per year.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

In 2020, the active aviation power-projection fleet would be ten large-deck CVNs, including eight *Nimitz*-class carriers and two CVN-21s (nine deployable), four J-CVEs, and one J-FAB. This distributed "10+4+1" force would increase the number of deployable aviation power-projection platforms from the current 11 to 14. These primary power-projection platforms would be augmented by an additional eight LHDs; with their built-in flexibility to support STOVL JSFs, they would retain an ability to function as auxiliary J-CVEs, when required.

The shift to nine all-Navy active duty air wings and one reserve air wing would require a total of 40 tactical fighter squadrons. This is generally consistent with current DoN aircraft procurement plans. The original Navy plan was to procure 20 squadrons of F/A-18E/Fs and 20 JSF squadrons. The current Navy plan is buy 22 squadrons of F/A-18E/Fs and 18 squadrons of JSFs.[765] The

[762] This assumes a decommissioning cost of $260 million for each of the two conventional carriers, and $2 billion for the Enterprise—about twice the rough order of magnitude estimate for a *Nimitz*-class carrier.

[763] This is an optional conversion cost. Because the *George Washington* would not receive a full CVN combat system, the costs are projected to be 75 percent of a normal RCOH.

[764] CVN-21 would replace the *George Washington* in 2014; CVN-22 would replace the *Nimitz* in 2019; CVN-23 would replace the *Eisenhower* in 2024; CVN-24 would replace the *Carl Vinson* in 2029; CVN-25 would replace the *Theodore Roosevelt* in 2034. CVN-26, laid down in 2033, would not replace the *Abraham Lincoln* until 2039, which is outside the 30-year projection.

[765] "Boeing Hedges Against JSF Delays With Stealthier Super Hornet," *Jane's International Defense Review*, June 2005, p. 16.

notional air wing described above would require ten F/A-18F squadrons (nine active, one reserve); ten F/A-18E squadrons (nine active, one reserve); and 20 JSF squadrons (eighteen active, two reserve)—a mix consistent with the original plan. Moving from ten to nine CAWs opens up the possibility of increasing the numbers of supporting aircraft per wing (e.g., E-2Cs and E/A-18Gs).

The removal of Marine JSF squadrons from active duty CAWs would require the Marines to once again assume total responsibility for the unit rotation of tactical fighter squadrons to Iwakuni, Japan.[766]

Assuming two J-CVEs have a combined magazine capacity roughly equal to a single CVN, weapons procurement for DoN aviation power-projection platforms would remain approximately the same as today.

The combined manning requirement for the "10+4+1" aviation power projection fleet will be at least 4,022 fewer officers and Sailors than today's force.[767] The elimination of one active duty carrier air wing would result in the additional savings of approximately 1,700 personnel, for a total manpower savings of over 5,700.

The introduction of a new big-deck carrier class and J-CVE and will impose new training, maintenance, and logistics costs on the TFBN throughout the decades-long transition from the *Nimitz*-class carriers to the CVN-21s. However, these costs should not exceed the costs necessary to maintain three old, one-ship classes of conventional and nuclear aircraft carriers.

The notional force laydown would be one CVN forward based in Japan; six CVNs based in the Pacific (two in Washington state, three in San Diego, and a sixth in either Hawaii or San Diego); three CVNs and four J-CVEs based in Norfolk; and a J-FAB based in Mayport, Florida. The location of the J-CVEs are dictated by the nearby location of Marine JSF squadrons in Cherry Point, North Carolina. The home port for the J-FAB is dictated because of the nearby locations of Hurlburt Air Force Base, home base of the Air Force Special Operations Command and the 16th Special Operations Wing; and Fort Campbell, Kentucky and Savannah, Georgia, home bases for the Army's 160th Special Operations Aviation Regiment (Airborne).

The cost to shift an additional carrier and its air wing to the West Coast or Hawaii to provide for one forward-based and six deployable carriers in the Pacific would depend on the selection of its

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[766] The Tac-Air Integration plan resulted in the Navy dedicating several "expeditionary" squadrons to the Unit Deployment Program. This plan would require that these squadrons be redirected onboard the CVNs.

[767] The decommissioning of the *Kitty Hawk* and *JFK* would save 6,190 personnel. Both CVN-21 and CVN-22 will save at least 1,200 total personnel (the DoN hopes for more), resulting in a total manpower savings in the 2020 big-deck CVN force of 8,590. These savings would be offset by the crew requirements for four J-CVEs; assuming a crew size of 1,142, the same crew size as a LHD, these requirements would be 4,568 personnel. As the air wings will consist of active duty Marine squadrons, there will be no increase in air wing manning requirements. The net savings would be 2,776 officers and Sailors. The conversion of the *George Washington* into a J-FAB with a mixed active duty, reserve, and MSC-mariner crew would result in an additional unknown savings.

home port. The costs to base a nuclear-powered J-FAB in Mayport would be substantial. The political costs to gain support for these moves would also be substantial.

# XII. THE SURFACE "BATTLE LINE"

> For the foreseeable future…surface warships will remain a key component of the US Navy because of their capacious magazines, hard-hitting armament, sensors, endurance, and command and control facilities. Only the surface warship can carry out all four missions advanced by Admiral Stansfield Turner for the Navy: strategic deterrence, sea control, naval presence, and projection of power.[768]
>
> Malcolm Muir, Jr.
> *Black Shoes and Black Water*

## A SURFACE WARFARE RENAISSANCE

For much of the Garrison Era, surface combatants had a strictly defensive role, protecting aircraft carriers, other high value units such as battleships, amphibious taskforces, underway replenishment groups, and convoys from air and submarine attack. US surface combatants did not carry anti-ship cruise missiles until 1977, or conventional land attack missiles until the late 1980s.[769] Because of its subordinate defensive orientation, the surface warfare community was third among the three major Navy warfighting communities, behind both naval aviation and submariners.[770]

Now, as a consequence of new ship-launched guided weapons such as the *Harpoon* anti-ship missile, *Tomahawk* land attack cruise missile, and SM-3 ballistic missile interceptor, the development and proliferation of AEGIS and the vertical launch missile system, and the change in strategic eras, surface combatants perform a much wider range of TFBN roles. In addition to conducting naval presence missions, the surface combatant fleet protects the US homeland from ballistic missile attack and performs three key roles during power-projection operations: it protects naval forces and the Joint sea base from air, cruise and ballistic missile, and submarine attack with heavy, multi-layered defensive fires; it protects Joint forces operating ashore from air and cruise and ballistic missile attacks by providing extended-range defensive fires; and it augments the offensive punch provided by TFBN aviation power-projection platforms with sustained offensive missile and gun fire.

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[768] Muir, Jr., *Black Shoes and Blue Water: Surface Warfare in the United States Navy, 1945-1975*.

[769] The *Regulus I* strategic land attack cruise missile was first deployed on a US heavy cruiser in 1955. However, the system was cancelled for budgetary reasons in favor of the submarine-launched *Polaris* ballistic missile. Initial operating capability (IOC) for the *Harpoon* anti-ship missile was 1977. The *Tomahawk* anti-ship missile (TASM), and conventional and nuclear armed versions of the Tomahawk land attack missile (TLAM) were tested between 1983 and 1985, and were introduced into fleet service soon thereafter. See "Regulus Guided Cruise Missile" at http://www.wa3key.com/regulus.html; "AGM-84 *Harpoon*" at http://www.fas.org/man/dod-101/sys/smart/agm-84.htm. and "BGM-109 *Tomahawk*" at http:// www.fas.org/man/dod-101/sys/smart/bgm-109.htm.

[770] See the Introduction and Chapter I, "Sinking Fast: The Surface Navy, 1945-1950," in Muir, Jr., *Black Shoes and Blue Water: Surface Warfare in the United States Navy, 1945-1975*.

Because of these new important TFBN roles, the surface warfare community is undergoing a renaissance, returning to a position of power within the DoN hierarchy not seen since before World War II. The surface community has clearly surpassed the submarine community in importance, and it is now pressing even naval aviators in terms of prestige. Indeed, three of the last four CNOs have been surface warfare officers. As a result, some would say that DoN shipbuilding plans are unduly skewed toward surface combatants.

## TFBN SHIPS OF THE LINE

On December 31, 2004, the US combatant fleet consisted of 101 surface combatants, including 30 FF7 littoral ASW frigates discussed earlier. This chapter focuses on the 71 large, multi-mission surface combatants in TFBN service, additional large combatants now being built, and their prospective replacements.

The 71 ships in the current multi-mission combatant fleet include:

- Two legacy CG-47 *Ticonderoga*-class "guided missile cruisers," referred to hereafter as the CG-47 class. With average full load displacements of 9,939 tons, these were the first TFBN ships to carry the powerful AEGIS anti-air/anti-missile combat system. They are equipped with two above-deck rail missile launchers, and are armed with 88 surface-to air missiles, eight *Harpoon* anti-ship cruise missiles, two 5-inch naval guns, up to two MH-60 helicopters, and two *Phalanx* Close-in Weapons Systems for terminal missile defense. During operations, they have a crew of 372, including 351 in the ship's complement and a 21-man aviation detachment.[771]

- 22 VLS-equipped *Ticonderoga*-class "guided missile cruisers." These ships, referred to hereafter as the CG-52 class, have an average FLD of 9,877 tons. They are an improved version of the CG-47, having the same hull and machinery as the earlier class. They also carry the same AEGIS combat system as the CG-47, but trade their two, above-deck missile launchers for two 61-cell VLS batteries, giving them a missile capacity of 130 battle force missiles (122 carried in VLS cells and eight ASCMs). The addition of VLS allows these ships to carry and fire *Tomahawk* land attack missiles, a capability missing in the CG-47. They have crews of 379, augmented by 21-man aviation detachments.[772]

- 28 "Flight I/II" *Arleigh Burke*-class "guided missile destroyers," referred to hereafter as the DDG-51 class. These ships have average full load displacements of 8,900 tons. These all-steel ships are equipped with a smaller, more compact version of the AEGIS air combat system, a towed array sonar, 90 VLS cells, eight ASCMs, one 5-inch gun, and two *Phalanx* CIWSs. They carry only three missile directors rather than the four carried

[771] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 142. The average full load displacement for the CG-47 and all following ships was calculated by the FLDs indicated in the Naval Vessel Registry.

[772] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 138-41.

on the guided missile cruisers. They have a landing pad for helicopters, but have no hanger. They carry crews of approximately 320 officers and Sailors.[773]

- 16 "Flight IIA" *Arleigh Burke*-class "guided missile destroyers," referred to hereafter as the DDG-79 class. Although a variation of the DDG-51s, these ships represent a major upgrade in combat capabilities, and deserved a separate class designator. These ships have average full load displacements of 9,203 tons. Among other things, they differ from the DDG-51 class in that they have a new zonal electrical distribution system; trade eight ASCMs for six more VLS cells; have a helicopter hanger and facilities to support two MH-60 helicopters; and have a new combat direction finding capability. To get these improvements, the ships give up the eight *Harpoons* and towed array sonar found on the DDG-51 class. They carry crews of approximately 315 officers and Sailors, plus a 21-man aviation detachment.[774]

- Three *Spruance*-class "multi-purpose destroyers." With average FLDs of 9,354, these are the largest "destroyers" in the world. They are the only large, US multi-mission surface combatants not armed with the AEGIS combat system. They are armed with 61 VLS cells, two ASW helicopters, eight ASCMs, two 5-inch naval guns, an above-deck eight-cell launcher for Sea Sparrow terminal defense SAMs, and two CIWSs. They carry a total crew of 346 officers and Sailors, including a 21-man aviation detachment.[775]

The aggregate crew size of this 71-ship force is 25,506 officers and sailors. This equates to an average crew size of 359 men and women.

The 71 warships in the surface battle line exhibit a high degree of standardization and commonality. They are of similar size, with full load displacements between 8,900 and 9,900 tons. All have gas turbine propulsion plants, using variations of the proven and reliable LM 2500 gas turbine; all have common electronic warfare and digital ASW combat systems; and 69 of 71 ships carry the vertical launch system for their primary missile batteries.[776]

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[773] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 150-51.

[774] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 147-49. For a thorough discussion of the DDG-79 improvements, see Tom Schauder and Waldemar Koscinski, "*Oscar Austin*, Arriving," *Seapower*, September 2000, pp. 43-45. Later US DDGs might be further separated. Today, many naval officers would consider DDG-91, which introduced the SPY-1D(V) version of the AEGIS, to be a separate class. However, as will be discussed, with the new AEGIS Open Architecture (AOA), differences between DDG radars will be minimal. Having the ability to hanger helicopters is considered by the author to be the key distinguishing feature among the DDGs.

[775] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 154-55.

[776] All ships carry versions of the SLQ-32(V) Electronic Countermeasures System and versions of the AN/SQQ-89(V) ASW Combat System. For information on the former, see Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 543. For the latter, see pp. 546-47.

Moreover, 68 of 71 ships are equipped with the AEGIS combat system. The heart of the system is the SPY-1 phased array multi-function radar. Unlike legacy rotating radars, the SPY-1 has four, fixed, flat- panel arrays that send out numerous "pencil-like" search beams 360 degrees around the ship. When a beam encounters a target, AEGIS computers immediately divert additional beams to establish a target "track." The SPY-1 combines azimuth and height search, target acquisition, classification, and tracking functions, and provides command guidance to missiles. As a result, the AEGIS combat system eliminates the need for many different radars, thereby reducing the number of required system interfaces, and speeding up all combat system functions.[777]

The fleet introduction of AEGIS combat system in 1983 resulted in an impressive increase in fleet defensive firepower effectiveness.[778] In earlier missile ships, SAMs had to be guided from the time of launch to the time of target impact. The number of missiles a ship could fire and control was limited by the number of separate guidance radars carried by the ship. In contrast, the AEGIS is designed to work with missiles with "commandable autopilots." Once a missile's autopilot is set at launch, the AEGIS system upgrades it periodically during flight. Specific radar guidance is not required until the last seconds before a target intercept. This allows an AEGIS equipped ship to control up to five missiles per guidance channel—four more than previous missile defense ships.[779] Although the system has been in fleet service for over two decades, successive upgrades still allow the AEGIS combat system to claim the title as "the most advanced anti-air system in existence, land-based or naval."[780]

Consistent with the design imperatives of the Total Force Battle Network, the individual power of each shipboard AEGIS system is now being linked together and combined through a new cooperative engagement capability (CEC). The CEC is designed to integrate the data of all SPY-1 radars—as well as TFBN airborne radars such as those carried on E-2C air battle management aircraft—into a "single, real-time, fire-control-quality composite track picture."[781] When operating under a single designated commander, CEC-equipped surface combatants should allow a naval task force to operate as a single, integrated, defensive combat network. If it works as advertised, this network will extend the range at which any given ship can engage a target to well beyond its own radar horizon, thereby improving TFBN area and local air defense and terminal defense missile coverage.[782] Moreover, the CEC was designed from the beginning to be a jointly

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[777] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 134-35, 552-53; and "AN/SPY-1 Radar," at http://www. fas.org/man/dod-101/sys/ ship/weaps/ an-spy-1.htm.

[778] The first ship to carry the AEGIS to sea was the USS *Ticonderoga*, CG-47, commissioned in 1983.

[779] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 134-35, 552-53. For more information about AEGIS, see "AEGIS Weapons System Mk-7," at http://www.fas.org/man/dod-101/sys/ ship/weaps/aegis.htm.

[780] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 134.

[781] "Cooperative Engagement Capability," at http://www.fas.org/man/dod-101/sys/ship/weaps/cec.htm.

[782] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 136; and Daniel Busch and Conrad J. Grant, "Changing the Face of War—the Co-operative Engagement Capability," at http://www.ccii.co.za/company/ press_releases/face_of_war.html.

interoperable system, perhaps providing the foundation for a Joint Composite Tracking Network (JCTN), which would enable the creation of a single integrated air picture (SIAP)—the "holy grail" for Joint Multi-dimensional Battle Networks.[783]

The introduction of AEGIS and VLS in the CG-47, CG-52, DDG-51, and DDG-79 classes has blurred the traditional distinction between guided missile "cruisers" and "destroyers."[784] For example, look at the differences between the CG-47 with the DDG-79: both carry the AEGIS; both operate two helicopters; both carry 96 battle force missiles. Is the addition of a single missile director and an extra 5-inch gun sufficient to warrant a cruiser designation for the CG-47?[785] Moreover, the emerging CEC-network, which has the capability to fire and control missiles carried in VLS cells on non-AEGIS, CEC-equipped ships, blurs the distinction between guided missile cruisers and destroyers and "general-purpose destroyers."

Today, it is thus helpful to think of all US large, multi-mission combatants as being TFBN "ships of the line," and making up a powerful new networked "battle line." Similarly, the new networked battle line is best thought of as a high density, inter-connected, modular missile battery that can be tailored to any threat. As described earlier, the current 71 TFBN ships of the line carry no fewer than 7,539 large battle force missiles. Over 90 percent of these missiles are carried in 6,923 "strike" length VLS cells, each capable of carrying either a single *Tomahawk* land attack missile; a long-range area air defense SAM; a tactical ballistic missile defense SAM; a anti-submarine rocket; or four Evolved Sea Sparrow Missiles.[786] The large number and flexibility of VLS cells gives the 71 TFBN ships of the line a greater missile magazine capacity than that found on the 366 surface combatants operated by the 17 next largest navies, combined.

Indeed, the sheer cumulative size of the battle line's magazine represents a substantial weapons procurement challenge. For example, the costs of the Standard SM-2 medium-range SAM and the newest version of the *Tomahawk* land attack missile—two of the most common missiles found in ships' magazines—are $421,400 and $600,000, respectively. Just filling all of the TFBN's VLS "holes" is thus an expensive proposition. For the sake of comparison, a 2000-pound Joint Direct Attack Munition (JDAM) dropped by a carrier strike-fighter has nearly twice the explosive power of a *Tomahawk* but costs only $18,000. Recall from Chapter XI that a single

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[783] Rear Admiral Phil Balilse and Captain Tom Bush, USN, "CEC Provides Theater Air Dominance," *Proceedings*, May 2002, found online at http://www.military.com/ NewContent/0,13190,NI_Balisle,00. html; Captain Robert Kerno, USN, "CEC and the Interoperability Challenge," found at http://www.navyleague.org/seapower/cecandtheinteroperabilitycha.htm; and Richard C. Barnard, "Single Integrated Air Picture Holds the Key to Navy's Net Centric Plans," *Seapower*, March 2004, pp. 18-20. The question over whether the CEC will be a widely used Joint system still appears to be an open one. In 2002, John P. Stenbit, Assistant Secretary of Defense for Command, Control, Communications and Intelligence, said that CEC "…is a very difficult club to get into. That, by definition, in my world is not network-centric." See Robert Wall, "CEC Network to Grow in Capability, Usage," *Aviation Week and Space Technology*, October 7, 2002, p. 64.

[784] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 133.

[785] Indeed, the CG-47 carried the original designation as DDG-47.

[786] Recall that battle force missiles do not include terminal defense SAMs, such as the Rolling Airframe Missile, or RAM.

carrier air wing can attack 5,000 targets over a 30-day campaign. The weapon costs for hitting all these targets with 2,000-pound JDAMs would be $90 *million;* hitting these targets with 5,000 *Tomahawks* would cost $3 *billion* in weapon expenditures.[787] Because of the high costs associated with contemporary guided missiles, TFBN ships of the line will never be able to fully replace the heavy offensive firepower provided by aviation power-projection platforms. Instead, they will continue to complement and augment aviation strikes, especially early in a campaign during operations to roll-back enemy's air defenses, and against high-value, heavily guarded targets where the risks to manned aircraft are high.

## EXPANDING NUMBERS, EXPANDING COMBAT POWER

If filling the battle line's VLS cells is difficult to today, it will get more difficult in the future: the number of TFBN ships of the line continues to *grow*—as does the battle line's overall combat power. The DoN will soon decommission its last two non-VLS combatants (i.e., CG-47s) and last three non-AEGIS equipped ships (i.e., *Spruance* destroyers). However, the loss of these five ships will be more than offset by the addition of 18 DDG-79s now either under construction or authorized. When the last DDG-79 enters the fleet in 2011, the TFBN battle line will consist of 84 ships of the line: 22 CG-52s; 28 DDG-51s; 34 DDG-79s. Every ship will be equipped with AEGIS and VLS, completing the battle line transition started in 1983.

The total missile capacity for this 84-ship battle line will jump from 7,539 to 8,868 battle force missiles, a healthy 18 percent expansion in battle line missile capacity over the current 71-ship fleet. The number of battle line VLS cells will jump from 6,923 to 8,486. In addition, the ships will be able to hanger and operate 26 more MH-60 helicopters (112 versus the 86 today) and carry eight more 5-inch guns (106 versus 98). In exchange, the fleet will carry 40 ASCMs. Moreover, the fleet will be quite young, having been built over a period of 25 years at an average build rate of 3.36 ships per year, or approximately ten ships every three years. Indeed, the average age of the fleet will be only 12.5 years—younger than the average age of the TFBN aircraft fleet!

Of course, as the number of ships in the battle line expands, so too does the number of officers and Sailors assigned to man them. Indeed, by 2011, the number of personnel onboard the 84 ships in the battle line will climb to 29,772, an increase of 3,678 over the current fleet. This increase stands in stark contrast to all other TFBN components, which all see dramatic reductions.

Given the change in strategic circumstances, the size of this programmed fleet is quite impressive. The 600-ship Navy, designed to fight a global war against a naval near-peer, had a target of 100 guided missile cruisers and destroyers, 90 with AEGIS/VLS. In other words, the 2011 TFBN battle line will represent 84 percent of the 600-ship Navy requirement for guide missile cruisers and destroyers, and 93 percent of its requirement for AEGIS/VLS ships. Even

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[787] Costs for weapons were found at "Military Equipment Guide," found at http://www.military.com/Resources/EQG/EQGmain?file=EG_ordinance&cat=o&lev=1. For sustained sortie rates for carriers, see Perin, "Are Big Decks Still the Answer?" p. 32.

when expanding the comparison to all types of "battle force capable" combatants, the relative size of the 2011 fleet continues to impress. Altogether, the total 600-ship Navy requirement for battle force capable combatants included six nuclear-powered guided missile cruisers, 27 guided missile cruisers, 67 guided missile destroyers, and 37 general purpose destroyers, for a total of 137 combatants.[788] Seventeen of these ships were dedicated escorts for convoys and underway replenishment groups, a requirement that ended with the Garrison Era. The 84 ships in the 2011 battle line thus represent 70 percent of the 600-ship Navy's comparative requirement for large, multi-mission, "battle force capable" ships (84 of 120).[789]

Looked at in another way, the 600-ship Navy included 15 deployable carriers and four refurbished World War II battleships, resulting in a ratio of all "high value units" to large, multi-mission combatants of one-to-6.31 (19 to 120).[790] In contrast, according to current DoN plans, the 2011 TFBN will include 10 deployable carriers. With 84 major combatants, this will result in a comparative ratio of 8.4 major surface warships for every high value unit—a relative improvement of 33 percent. In a world in which the United States will be able to concentrate its strength in a single theater in support of one major Joint power-projection operation, these numbers appear at first glance to be more than sufficient.

## COMPARING THE TFBN BATTLE LINE WITH ROW NAVIES

The size and strength of the TFBN battle line appears even more impressive in comparison with the world's other navies and in light of the surface combatant design competition. At one time, such comparisons would involve matching the numbers of "battleships," battlecruisers," "cruisers," "destroyers," "frigates," and "corvettes" in the US fleet with those in competing navies. Today, however, as indicated by the previous discussion, such terms are simply no longer helpful in distinguishing relative warship capabilities. In a world where one navy's "guided missile frigate" is another navy's "guided missile destroyer," a different method of comparison is needed.

One such method involves using a contemporary combatant "rating system" modeled after the one developed by the Royal Navy during the age of sail and gun.[791] However, instead of being based on the number of guns a warship carries, it is based first on the number of vertical launch cells a combatant carries, and second by the total number and types of missiles in its magazines (which allows a comparison between VLS-equipped and non-VLS equipped "legacy"

[788] An additional 101 frigates were considered "non-battle force capable."

[789] Norman Polmar, *Ships and Aircraft of the US Fleet*, fourteenth edition (Annapolis, MD: Naval Institute Press, 1987), p. 110.

[790] Polmar, *Ships and Aircraft of the US Fleet*, fourteenth edition, p. 110.

[791] The British adopted a rating system in 1670 that included six classes: first-rate through sixth-rate. The rating system was based on the number of large naval cannon a ship carried. See "Third-rate," at http://www.absoluteastronomy.com/encyclopedia/T/Th/Third-rate.htm.

warships).[792] Using these criteria, one modern combatant rating system might include seven distinct ship classes. These classes are:

- ***First-rate battle force ships (battleships)***: Ships armed more than 100 battle force VLS cells, and/or more than 100 battle force missiles;

- ***Second-rate battleships***: Ships armed with 90-99 battle force VLS cells, and/or 90-99 battle force missiles;

- ***Third-rate battleships***: Ships armed with 60-89 battle force VLS cells, and/or 61-89 battle force missiles;

- ***Fourth-rate battleships/frigates***: Ships armed with 48-59 battle force VLS cells, and/or 48-60 battle force missiles;

- ***Fifth-rate battleships/frigates***: Ships armed with 20-47 battle force VLS cells, and/or 20-47 battle force missiles;

- ***Sixth-rate frigates***: Ships designed specifically for the protection of shipping role, armed with either VLS cells or legacy missile systems, and armed with local air defense SAMs and anti-submarine and anti-ship cruise missiles for convoy defense; and

- ***Seventh-rate frigates***: Warships optimized for a single role, usually either anti-submarine or anti-surface warfare, or for general-purpose naval missions. The distinguishing feature of these ships is that they carry only terminal missile defenses—either in the form of rapid fire guns or short-range terminal defense SAMs.[793]

By using this system and tracking the number of combatants planned in future navies, the crushing US dominance in surface combatants is clearly highlighted, as is the state of the surface combatant design competition.

On December 31, 2004, the world's navies operated a total of 574 surface combatants with FLDs greater than 2,000 tons. The DoN TFBN operated 101; its 17 closest competitors operated 366. The breakout of ships classes for the 467 ships in US and next 17 top navies was:

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[792] Some will object to a rating system focused on the number of VLS and/or battle force missiles carried. There are many other potential design criteria such as radar cross section, acoustical and magnetic silencing, and degree of armor protection that might plausibly be used to provide a more detailed picture. Unfortunately, this information is either very hard to come by or classified. Since the purpose of a surface warship is primarily to put ordnance on target, the number of VLS and battle force missiles carried is used to provide easily observable and straightforward comparisons between the potential combat power of different warships.

[793] Once again, for this report, the following range break points are used to distinguish between SAMs: area air defense SAMs have ranges greater than 48 kilometers (km; approximately 30 miles); local air defense SAMs have ranges between 16 and 48 km (10-30 miles); and a terminal defense SAM has an effective range of less than 16 km (10 miles).

| | |
|---|---|
| First-rate battleships | 23 |
| Second-rate battleships | 50 |
| Third-rate battleships | 7 |
| Fourth-rate battleships/frigates | 3 |
| Fifth-rate battleships/frigates | 35 |
| Sixth-rate frigates | 77 |
| Seventh-rate frigates | 272 |

The United States operated 22 of the 23 first-rate battleships in world navies (CG-52s); Russia operated one.[794] Only one navy besides that of the United States is building or contemplating building additional first-rates: the Japanese Maritime Self Defense Force (JMSDF). Once the two planned JMSDF first-rates are commissioned, the United States will operate 22 of the world's 25 first-rates (88 percent). All 25 ships will be equipped with VLS.[795]

The United States also dominated the second-rate battleship category. Of the 50 in commission, the United States operated 46 (two CG-47s; 28 DDG-51s; 16 DDG-79s) and the JMSDF operated four.[796] The United States is the only country currently building these ships, with an additional 18 under construction or authorized (DDG-79s). As was mentioned, the United States will soon decommission its last two legacy second-rates armed with above-deck rail launchers. In the mid-term, then, the United States will operate 62 of the world's 66 second-rate battleships (94 percent); all 66 ships will be VLS-equipped.

A short time ago, there were 32 third-rates in commission, all in the US and Russian navies.[797] However, this class of ship appears to be a dying breed. By December 31, 2004, there were only

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794 CG-52 class first-rates carry 128 strike length VLS cells (six non-operational) and eight *Harpoon* missile canisters, for a maximum magazine capacity of 130 battle force missiles. The single Russian first-rate is a *Kirov*-class nuclear-powered battle cruiser with twelve, eight-cell revolver VLS launchers, 20 long-range SS-N-19 ASCMs, and 20 SS-N-16 long-range ASW missiles, for a maximum magazine capacity of 136 battle force missiles.

795 The two Japanese ships under construction (Improved *Kongous*) are copies of the DDG-79 class. They will be armed with 96 strike length VLS cells and eight ASCMs (104 battle force missiles).

796 The two CG-47s are armed with 88 battle force missiles in their below-deck magazines, and eight *Harpoon*s, for a total of 96 battle force missiles; the 28 *Arleigh Burke*-class DDGs (DDG-51s) are armed with 90 strike-length VLS cells and eight *Harpoon*s (98 battle force missiles); and the 16 DDG-79s are armed with 96 strike-length VLS cells (96 battle force missiles). The four Japanese second-rates are from the *Kongou*-class, copies of the US DDG-51 with 98 battle force missiles.

797 At one time, the US operated 28 third-rates: 24 VLS-equipped *Spruance*-class "destroyers," and four *Kidd*-class "guided missile destroyers." The former were armed with a 61-cell VLS battery and eight *Harpoon* missiles, for a battle force missile capacity of 69 missiles. The latter were rail-armed combatants with 68 battle force missiles in their below deck magazines and eight *Harpoon*s, for a war load of 76 battle force missiles.

seven left in the world—three in the US Navy (*Spruance*-class destroyers), and four in the Russian Navy.[798] The three US ships will soon all be retired, and no Russian replacements are building or planned. The only two navies now pursuing third-rates are the Taiwanese Navy, which recently purchased four, second-hand, third-rates discarded by the United States, and the South Korean Navy, which is building three new construction VLS-equipped ships.[799] In the near- to mid-term, then, the four Russian, four Taiwanese, and three South Korean combatants will be the only third-rates in the world, with no further ships of this class on the horizon. Six of the ten ships will be equipped with VLS.

Third-rates are in the process being replaced by a new class of VLS-armed fourth-rate battleship/frigates, armed with at least 48 battle force VLS cells. The first of type is the Spanish *Alvaro de Bazan*, a "guided missile frigate" of 5,853 tons at full load, equipped with 48 Mk41 VLS cells, eight *Harpoon* canisters, and a helicopter. The versatility of its VLS system is highlighted by the *de Bazan's* planned air defense missile load: 32 SM-2 area air defense SAMs in 32 cells, and 64 local air defense Evolved Sea Sparrow Missiles "quad-packed" in the remaining 16 VLS cells. This total war load of 96 air defense missiles and eight ASCMs is a formidable armament for a 5,800-ton warship.[800]

On December 31, 2004, three *de Bazan*'s were the only ROW fourth-rates in commission. More are on the way. The Spanish Navy will soon commission its fourth *de Bazan*, and a fifth was recently authorized. The Royal Navy is building a class of eight Type 45 *Daring*-class fourth-rate "air defense destroyers," and the French and Italian Navies are planning to build four to eight fourth-rate *Horizon*-class" air defense frigates."[801] The South Koreans have begun building a second batch of three fourth-rate KDX-II "guided missile destroyers.[802] The PLAN currently

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[798] The four Russian third-rates included three *Slava*-class "guided missile cruisers" with eight, 8-round revolver VLS launchers and 16 ASCMs (80 battle force missiles), and one aging *Kara*-class "guided missile cruiser" with 72 area air defense SAMS and eight long-range ASW missiles (80 battle force missiles).

[799] The Taiwanese Navy is refurbishing four rail-armed ships of the US *Kidd* class. They will retain the same US armament of 76 battle force missiles. The South Korean KDX-III "guided missile destroyers" will carry 72 Mk-41 VLS cells (in two batteries of 32 and 40 cells, respectively) and eight ASCMs for a total war load of 80 missiles. (Note: the number of KDX-III Mk41 cells reported in naval reference guides ranges from a low of 32 to a high of 128. The number 72 was provided by the Lockheed Martin VLS Program Office, which is providing the Mk41 VLS cells for the South Korean Navy).

[800] For a description of this new fourth-rate, see "F100 *Alvarado de Bazan* Multi-purpose Frigate, Spain," at http://www.naval-technology.com/projects/f100/.

[801] The British Type 45 *Daring*, a 7,350-ton "anti-air warfare destroyer" carrying 48 Sylver VLS cells, up to 56 battle force missiles (48 Aster 30 area air defense SAMs in 48 cells and eight *Harpoon* ASCMs in above deck canisters), and an ASW helicopter. The *Horizon* "air-air warfare frigates" will carry 48 Sylver VLS cells, up to 56 battle force missiles (48 Aster 30 area air defense SAMs in 48 cells and eight Exocet ASCMs in above deck canisters), and an ASW helicopter. See "Type 45 *Daring* Class Anti-Air Warfare Destroyer, United Kingdom," at http://www.naval-technology.com/projects/horizon; and "*Horizon* Class Anti-Air Warfare Frigates, Italy/France," at http://www.naval-technology.com/projects/horizon2.

[802] The three, fourth-rate South Korean Batch II KDX-II DDGs will have the same 32-cell Mk-41 VLS battery and eight *Harpoon*s carried by the three fifth-rate Batch I KDX-II DDGs, but will add a ten-cell VLS battery for ASROC anti-submarine rockets, for a battle force missile load of 50 missiles. See Keith Jacobs, "South Korean Navy: Transformation to Provide New Capabilities," *Naval Forces*, No. V, 2005, pp. 46-48.

has two *Lanzhou*-class "guided missile destroyers" fitting out, with an unknown additional number planned.[803] While these and other navies may commission more of these ships in the future, because of their expense they likely will be relatively few in number; the total number of ROW fourth-rates in the mid-term will probably not exceed 30 ships, with the vast majority in navies allied with the United States.

As indicated by the types of missiles in their main batteries, these new fourth-rate battleship/frigates will provide area air defense for ROW naval task groups. They will be augmented by slightly less capable (and less expensive) fifth-rate battleships/frigates, typified by legacy British Type 42 "guided-missile destroyers," with FLDs ranging between 4,100 and 4,600 tons, and the newer German *Sachsens*, "guided missile frigates" of 5,600 FLD. The advantages of the VLS are demonstrated by a comparison of these similarly sized ships. The rail-equipped Type 42s are armed with just 22 *Sea Dart* area air defense missiles and a helicopter.[804] In contrast, the *Sachsens* are equipped with 32 Mk41 VLS cells, eight *Harpoon* ASCMs, and a helicopter. Like the Spanish *de Bazans*, a *Sachsen's* air defense battery will consist of a mixed load of 56 missiles (24 SM-2 area air defense SAMs in 24 cells, and 32 local air defense ESSMs quad-packed in the remaining eight cells). Along with its eight ASCMs, a *Sachsen* thus carries 64 battle force missiles to the Type 42's 22—or triple its combat punch.[805]

There were only 35 fifth-rates in commission on December 31, 2004. Twelve were legacy pre-VLS ships: 11 Royal Navy Type 42s, and one "guided missile destroyer" in the French Navy. All are to be replaced by new VLS-equipped fourth-rates.[806] The remaining fifth-rates were new VLS-armed ships: the Japanese Navy had 12; the Canadian Navy, four; the Royal Netherlands Navy, three; the German Navy, two; and the South Korean Navy, two.[807] These navies have an additional eight fifth-rates being built. In addition, the Australian Navy is "up-rating" four of its legacy sixth-rates to VLS fifth-rate status, and the Australian, Greek, and Turkish navies are also

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[803] The PLAN Type 052C *Lanzhou*, a 6,500-ton "guided missile destroyer," is equipped with eight, 6-cell VLS launchers, up to 56 battle force missiles (48 HQ-9 area air defense SAMs in 48 cells and eight C-803 ASCMs), and two helicopters. Bussert, "China Debuts 'AEGIS' Destroyers."

[804] The range of the *Sea Dart* is listed variously between 21.5 and 35 nautical miles. The British Royal Navy considers the *Sea Dart* an area air defense missile, so the higher range is assumed.

[805] See "*Sachsen* Air Defense Frigate, Germany," at http://www.naval-technology.com/projects/f124.

[806] The single French fourth-rate is the *Suffren* "guided missile destroyer," armed with 48 Mascura area air defense missiles, and four Exocet ASCMs, for a total of 52 battle force missiles.

[807] The two German fifth-rates are *Sachsens*. The three Japanese *Takanami*-class "destroyers" have a FLD of 5,300 tons, and carry 32 VLS cells, up to 32 VLS battle force missiles, eight *Harpoon*s, and one ASW helicopter. The Royal Netherlands Navy has three 6,048 ton FLD *De Zeven Provincien*, "guided missile frigates," each armed with 40 VLS cells (32 SM-2 SAMS, 32 ESSMs), eight *Harpoon*s, and one helicopter. The four Canadian *Iroquois* are 5,300-ton "guided missile destroyers" armed with 29 Mk41 VLS cells (carrying 29 SM-2 area air defense missiles), and two ASW helicopters. And the three South Korean KDX-II 4,800-ton "guided missile destroyers" are armed with 32 Mk41 VLS cells, up to 32 SM-2 area air defense missiles and vertically-launched anti-submarine rockets, eight *Harpoon* canisters, and a helicopter.

planning to build more new fifth-rates.[808] Over the mid-term, then, there will likely be between 35 and 45 fifth-rates in commission—all equipped with VLS, and all in allied navies.

As previously noted, sixth-rate frigates are generally designed for the protection of shipping role; they are armed primarily with local air defense SAMs and a small number of anti-submarine and anti-ship cruise missiles to provide for convoy defense. This group of 77 warships is dominated by aging Garrison Era vessels with legacy rail launchers. Over half of the ships—52 total—are armed with legacy missile launchers designed to fire the US SM-1 local air defense missile. The majority of these ships are equipped with an above-deck Mk13 single-rail missile launcher, serviced by a below-deck 40-round rotary missile magazine.[809] The PLAN, Russian, and Indian navies operate 21 ships with similar Russian-designed, above deck, single-rail launchers.[810] Only four Australian ships are armed with newer VLS launchers for the ESSM, and the combat systems to exploit their full potential in the local air defense role.[811]

At the end of 2004, fully 272 of the 467 surface combatants operated by the world's top 18 navies were seventh-rate frigates (58 percent). They also made up the majority of the 107 combatants operated by the remainder of the world's smaller navies. These ships—also dominated by aging Cold War designs—come in various sizes, but they have one thing in common: they are optimized for a single mission, usually either ASW or ASuW. As stated earlier, the key discriminator for this class of ships is that they can defend only themselves from air and missile attack, as they carry only terminal missile defenses, either in the form of radar-controlled, rapid-fire guns or short-range SAMs.[812]

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[808] The Australian Navy is replacing the 40 SM-1 *local* air defense missiles carried on four of its *Adelaide*-class sixth-rates—4,100-ton variants of the US *Oliver Hazard Perry* "guided missile frigate"—with 40 SM-2 *area* air defense SAMs. At the same time, they are adding eight Mk41 VLS cells "quad-packed" with ESSMs, giving the ship a total air defense war load of 40 battle force and 32 local air defense missiles. These modifications effectively "uprate" the ship to fifth-rate status. However, such a move is only a temporary measure; the Australian Navy plans to replace these four ships with three VLS-equipped fifth- or fourth-rate "air defense destroyers." See for example, Ian Bostock, "Progress on Australian Big Ship Projects," *Jane's Defence Weekly*, October 27, 2004, p. 16.

[809] No less than 28 of these are variants of *Oliver Hazard Perry* "guided missile frigates," a 4,000-ton FLD design built in numbers by the US and allied navies during the Garrison Era, and sold by the United States to a number of navies since. In the 17 top non-US navies, the Australian, Spanish, and Taiwanese navies built a total of 20 ships based on the *Perry* design; all remained in service on December 31, 2004. Turkey operated eight more *Perrys* transferred from the United States. The Japanese, French, Italian, and Royal Netherlands navies operated an additional 13 non-*Perry* warships armed with the Mk13 launcher. Other, smaller navies also are armed with the popular SM-1 missile. Altogether, 12 of the world's navies operate 66 ships armed with the SM-1. See "Raytheon Wins $11.2 Million Missile Support Pact," *Defense Today*, June 7, 2005, p. 3.

[810] Fifteen of these ships are armed with one or two Russian-built single-rail missile launchers designed to fire either the SA-N-7 *Gadfly/Shtil* or SA-N-12 *Grizzly* local air defense SAMs. Magazine capacities for these missiles are normally 22 to 24 missiles. The remainder carry aging Russian twin-rail launchers for the SA-N-3 *Goa* missile.

[811] These are the four most recent MEKO 200 ANZAC frigates, equipped with eight Mk41 VLS cells armed with 32 ESSM missiles.

[812] Terminal defense SAM launchers come in above deck trainable launchers; above deck vertical launch canisters or cells; or below deck VLS. Examples of SAMs fired from above deck, trainable SAM launchers include the NATO *Sea Sparrow*, US/German RAM, and Italian *Aspide*; the British *Seawolf* can be fired from either above deck

Over time, new missiles like the Evolved Sea Sparrow Missile and the Aster-15—equally capable in the protection of shipping and terminal defense roles—will blur the distinction between sixth- and seventh-rate combatants. For example, Germany, Australia, and Turkey operate 18 seventh-rates armed with eight Mk41 VLS cells, each filled with one older, *Sea Sparrow* terminal defense missile. However, with their combat systems upgraded and their VLS cells quad-packed with 32 of the newer, more capable ESSM, these ships will become sixth-rates, capable of escorting other ships. The distinction between these two lower combatant classes will increasingly be found in the ship's combat systems: those ships that have the combat systems that can exploit the full range of new missiles will be sixth-rates; those that cannot will be seventh-rates.

In the US Navy, seventh-rates are used to complement the "top rates," or ships of the line, focusing on special-purpose littoral combat missions. In these "narrow seas" there is a growing need for small, shallow-draft vessels designed to prosecute the global campaign against irregular maritime enemies, and to screen and protect the surface battle line when it operates in littoral waters. At the end of 2004, the United States operated 30 seventh-rates, all survivors of a class of 51 *Oliver Hazard Perry* warships built during the Cold War. The *Perrys* were originally commissioned as 4,000-ton, sixth-rate "guided missile frigates," armed with one Mk13 single-rail missile launcher; a 40-round circular missile magazine normally loaded with 36 local SM-1 local air defense missiles and four *Harpoons*; two ASW helicopters, ship-launched torpedoes, a 76mm cannon, and a rapid-fire gun for terminal SAM defense. However, by removing the Mk13 missile launcher, air defense missiles, and *Harpoons*, the DoN effectively "down-rated" the ships to a seventh-rate littoral ASW frigate.[813] As was discussed earlier, the DoN plans to replace these 30 seventh-rates (along with 26 mine warfare vessels and three small coastal patrol ships) with 63 to 100 new LCSs.[814]

As should be evident by the foregoing discussion, a world-wide conversion to VLS-equipped combatants is well underway. All new construction first-, second-, third-, fourth-, and fifth-rates now under construction or planned will have VLS main batteries. What is less evident is that none of the new generation of VLS-armed combatants comes cheap. In the words of one analyst:

> Even for larger navies, state-of-the-art major surface combatants have become difficult to afford…the solution has been to cut current forces to pay for future programs, to cut the number of ships programmed, to cut the capabilities in new ships, or to cut programs.[815]

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trainable launchers or above deck vertical launch canisters. Examples of SAMs fired from below deck VLSs include the South African *Umkhanto*; the Russian SA-N-9 *Gauntlet*, and the Israeli *Barak*.

[813] Freidman, "US Navy Scraps Frigate's Missiles," pp. 4-6. See also Scott Schonauer, "Frigates to Ditch Outdated Mark 13 Missile Launchers," *European Stars and Stripes*, November 12, 2003.

[814] The DoN's Interim 30-year Shipbuilding Report delivered to Congress earlier this year indicated a planned range of 63 to 82 LCSs. Recent remarks by Admiral Clark indicate the final number could reach as high as 100 ships. See Dave Ahearn, "CNO Clark Sees LCS Fleet of 75-100 Ships," *Defense Today*, June 3, 2005, p. 1.

[815] A.D. Baker III, "World Navies Are in Decline," p. 37.

As a result, the accelerating global transition to VLS-armed combatants is being accompanied by a concomitant reduction in the world-wide inventory of surface combatants. For example, the Japanese Navy recently announced its combatant fleet will shrink from 51 total warships to 48, and the British Royal Navy is reducing its fleet from 31 surface combatants to 25.[816] This trend is being repeated, in more dramatic ways, in less fiscally advantaged navies.[817]

Moreover, economic pressures on all but the most richly resourced navies have created a relatively static naval combatant design regime:

> …few [navies] have been successful in retaining or even expanding their overall combat potential through the exploitation of new technologies. This is not surprising, for it now takes upward of two decades before a new technology of any complexity can travel the route from conception to operational introduction, and few countries—and, increasingly, even groups of countries—can afford the costs to sustain the necessary political steadfastness to see complex and expensive programs through to their ends.[818]

Based on this discussion, as well as the earlier discussion in Chapter II, the following closely related observations can be made. First, the TFBN utterly dominates the current surface combatant picture. With "only" 101 combatants (71 first-, second- and third-rates and 30 seventh-rates), it already enjoys greater than a "two-navy" standard.[819] Even more impressive, however, is that it boasts *eight times* as many ships in the three top classes as the rest of the world's navies combined (71 US to 9 ROW top-rates). As discussed earlier, this allows the current 71-ship US battle line to carry more battle force missiles than the 366 warships operated by the 17 next largest navies. In other words, the US TFBN enjoys a "17-navy" firepower standard.

Second, even as the number of surface combatants in the rest of the world's navies decline in numbers, the size of the US surface combatant fleet continues to grow. If no more surface warships were authorized for the next five years, the TFBN battle line will still grow to 84 first- and second-rates by 2011. When combined with as many as 63-100 new seventh-rate Littoral Combat Ships, the resulting US surface combatant fleet of 147-184 ships will likely exceed a "four- or five-navy" standard in ship numbers, and will only extend its "17-navy" firepower standard.

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[816] The JMSDF reduced the number of destroyer divisions from ten to seven. The further reduction to 48 destroyers and frigates was made, in part, to defray costs for developing fleet missile defenses. The Royal Navy plans on retiring three Type 42 fourth-rates and three-Type 23 seventh rates. See Richard Scott, "UK Royal Navy Cutbacks Increase the Risk Factor," *Jane's Navy International,* September 1, 2004.

[817] For a good description of the general decline of world-wide navies, see Arthur D. Baker III, "2004 Worldwide Naval Developments," pp. 110-117.

[818] Arthur D. Baker III, "2004 Worldwide Naval Developments," p. 111.

[819] If counting the 42 Coast Guard cutters with FLDs greater than 2,000 tons, the picture is even better.

Third, over the mid-term, the United States will operate 84 of the world's 102 first-, second-, and third-rate combatants (82 percent). While this represents a slight decline in the *relative* US dominance in the three most powerful warship classes (the US now operates 71 of 80 top-rates, or 88 percent), it also reflects a welcome increase in *allied* capabilities; of the 18 ROW top-rates either in commission or under construction, 13 will sail in allied navies. Similarly, of the 60 to 70 new and more powerful fourth- and fifth-rates either in commission or building, all but two are found in allied navies. These allied ships will carry among them well over 2,000 additional VLS cells. While the United States might not be able to count on any of these ships or VLS cells in a potential naval confrontation, neither will they have to count against them.

Fourth, in contrast to the steadily increasing power of the US fleet, the combat power of its two potential rival navies is holding steady, at best. The 30-ship Russian surface combatant fleet consists of one first-rate; four third-rates; six sixth-rates; and 19 seventh-rates. Four of five Russian first- and third-rates were commissioned in the 1970s and 1980s, and all five ships suffered from lack of upkeep during the 1990s. One of the six Russian sixth-rates was commissioned in 1969; the rest are *Sovremenny*-class "guided- missile destroyers" commissioned in the late 1980s and early 1990s. However, these ships have a serious class-wide boiler problem; only five of the 17 originally built remain operational.[820] Of the 19 seventh-rates in commission, six were commissioned in the 1970s, ten in the 1980s, and the remainder in the 1990s. The newest surface combatant in the entire Russian surface combatant fleet was commissioned in 1999.

Despite having an aging fleet in increasing disrepair, the only Russian surface combatant currently under construction is a single, small, seventh-rate frigate that was laid down in 2001, and that will not run sea trials until 2006. Little work on the second ship of the class has been completed.[821] It thus seems certain that the number of total number of Russian combatants will shrink over the decade ahead—especially the number of top-rates—and the overall combat capability of the Russian surface combatant fleet will decline.[822]

In contrast, the Chinese surface fleet is enjoying a resurgence of sorts, with numerous classes of ships under construction. However, the PLAN war fleet has a long way to go before posing a credible threat. It currently operates no first-, second-, third, fourth-, or fifth-rate combatants, and only four of its 35 combatants classify as sixth-rates. These four ships include two Russian *Sovremennys* and two new Type 052B "guided-missile destroyers," armed with 16 ASCMs and a

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[820] I am indebted to Hank Gaffney, analyst at the Center for Naval Analysis, for the information about the *Sovremenny's* boiler problems.

[821] All commissioning dates were drawn from Jane's Fighting Ships, 2004-2005. Information on building programs comes from Arthur D. Baker III, "2004 Worldwide Naval Developments," p. 113.

[822] The difficulty the Russians are experiencing in keeping up their Navy is captured in Pavel Baev, "Vladamir Putin's Naval Rehabilitation Challenge," *Jane's Intelligence Review,* January 2005, pp. 46-47. Another indication of the Russian Navy's woes is the self-sinking of one of its last two operational *Krivak II* frigates, due to an explosion from a practice mine. "Russian Navy Sinks Flagship With Parade Mine," at http://mosnews.com/news/2005/08/01/flagship.shtml.

Russian-designed local air defense missile system. The remainder of the fleet consists of seventh-rate warships, armed with heavy ASCM batteries but protected only by the HQ-7 SAM, a Chinese-built terminal defense SAM with an effective range of 13 kilometers. Indeed, the magazine capacity for the entire PLAN surface fleet includes only 446 anti-ship cruise missiles, 176 local air defense missiles, and 480 terminal defense missiles.

The number of PLAN top-rates is sure to expand over time. There are two additional *Sovremenny* sixth-rates on order, and the PLAN recently launched two new fourth-rate battleship/frigates, equipped with phased array radars, and armed with eight, 6-cell vertical launch groups and eight ASCMs. However, these fourth-rates represent the *first* PRC warships to carry a long-range area air defense missile battery. The 96 SAMs and 16 ASCMs the two ships carry could fit onboard one CG-52 with magazine capacity to spare. Moreover, while the apparent replacement for the PLAN's many seventh-rate warships—the Type 054 "guided missile frigate"—represents a significant improvement over earlier PLAN ships, the first of the class will see no improvement in anti-air or anti-missile capabilities, carrying as it will the same short-range HQ-7 system as its predecessors. As a result, most analysts reckon the PLAN surface combatant fleet is at least one to two decades away from posing a serious naval threat.[823]

Finally, and perhaps most importantly, the United States dominates the current combatant design regime. The rest of the world's navies are struggling to catch up with the TFBN's two-decade lead in the VLS-combatant competition, and the designs they are pursuing do not improve on US combatant designs now in service. The large US fleet size, its commanding lead in the VLS competition, the high costs to build VLS-combatants of any size, and increasing economic pressure have all dampened the naval combatant design competition:

> Change dominates US warship design, while the rest of the world, where hugely expensive mistakes cannot be tolerated and the old adage "Better is the enemy of good enough" rules, continues to pursue balanced and affordable innovation, which in the long run is far more likely to result in useful fleets.[824]

From a historical perspective, such a lull in the naval combatant design competition is by no means unusual. Perhaps the most applicable example occurred during the latter stages of the age of sail. In 1748, at the second Battle of Finisterre, the British captured a revolutionary new French warship—a 74-gun, two-deck, third-rate. Despite the reluctance of the Admiralty to adopt a "foreign" design, the "74" was such a patently superior ship that the British immediately set about copying it. The arrival of the first British 74 in 1755 represented "the greatest breakthrough of British naval shipbuilding of the eighteenth century."[825] The ships were strong and powerful enough to be part of a line of battle, more maneuverable and faster than larger first-

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823 For a good overview of the PLAN, see Annati, "China's PLA Navy: The (R)Evolution," *Naval Forces,* No. VI 2004, pp. 66-75.

824 Baker III, "2004 Worldwide Naval Developments," p. 117.

825 Herman, *To Rule the Waves,* pp. 281-82.

and second-rates, and cheap enough to be built in numbers. The definitive design, the *HMS Bellona*, which introduced in 1757, formed the basis for nearly 24 ships of the line.[826]

More to the point, the introduction of the "74s" initiated a nearly century-long lull in the ship design competition for gun-toting top-rates. Innovation continued to occur in smaller navies and in their smaller rate classes, as evident by the US "super-frigates" developed toward the end of the 18th century. But the *Bellona's* design proved to be such an excellent, enduring one that "74s" formed the backbone of the British battle fleet throughout the war with Revolutionary France (the *Bellona* herself was not broken up until 1814—after a service life of 54 years). Indeed, the basic "74" was little improved upon until the general transition to the age of steam started in the 1840s.[827]

The foregoing review of the state of the naval competition in general and the surface combatant competition in particular suggests that the current US second-rates—DDG-51s and -79s—represent the contemporary *HMS Bellona*. The only country other than the United States now building first- or second-rates is the JMSDF, and these are copies of the US DDG-79 classes and DDG-51 classes, respectively. The only country building new VLS third-rates is South Korea, and its design is likewise heavily influenced by the US DDG-51/79 classes. The VLS-equipped fourth-, fifth-, and sixth-rate combatants now being built by allied navies are fine ships and great improvements over their predecessors, but none of them are superior to the basic design of the superb US "90s."

## ENTER THE DD(X)/CG(X)

It is in this light that current DoN plan for its surface combatant fleet must be judged. In FY 2007, the DoN is planning to start building the first of a class of powerful new first-rates called the DD(X) "destroyer." The ship is touted by the DoN as the first "clean sheet design" since the end of the Garrison Era.[828] It is designed to be the "nation's destroyer and future cruiser sea frame," meaning that its basic design will also form the basis for a follow-on "cruiser," called the CG(X). This design approach is consistent with the one followed during the Garrison Era, when the *Spruance*-class destroyer hull became the basis for both a guided missile destroyer and the CG-47 and CG-52 classes.[829]

DoN officials tout the DD(X)/CG(X) first-rates as "integrated warfighting system(s) *unconstrained by previous designs*" (emphasis added). They liken the ships' expected

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[826] See "HMS *Bellona* (1760)," at http://en.wikipedia.org/wiki/HMS_Bellona_(1760).

[827] Herman, *To Rule the Waves*, pp. 281-82; and "HMS *Bellona* (1760)."

[828] Captain C.H. Goddard and Commander C.B. Marks, USN, "DD(X) Navigates Uncharted Waters," *Proceedings*, January 2005, p. 31.

[829] John J. Young, Assistant Secretary of the Navy for Research, Development, and Acquisition, "Keep DD(X) on Track," *Defense News*, June 13, 2005, p. 60. The 31-ship *Spruance* class was followed by the four-ship *Kidd*-class (DDG), the five-ship CG-47 class, and the 22-ship CG-52 class.

revolutionary impact to that of the aforementioned *HMS Dreadnought*—"a ship that in one generation set the Royal Navy apart from its peers."[830] Unfortunately, they are right on the first point, and mischaracterize the second. And therein lays the flaw with the DoN's plans for the DD(X) and CG(X), and the potential seeds for disaster in its overall surface combatant transformation plan.

To the first point: the DD(X) and CG(X) are the direct result of a 1992 "21st Century Destroyer Technology Study," conducted during the unexpected transition between the Garrison and Joint Expeditionary Eras. At the time, although the future was clouded with uncertainty, it was clear to DoN planners that the future Battle Force operating environment would more often than not be found in littoral waters, which would make US ships increasingly vulnerable to mines and shore-based sensors and weapons. DoN planners therefore concluded they would need to start building stealthier ships with lower acoustic and magnetic signatures and radar cross sections.

However, planners were also well aware that stealth costs money, and of the expected block retirement of large numbers of Garrison Era third-rate destroyers and sixth/seventh-rate frigates in the early decades of the 21st century. Unless the future fleet consisted of a "high-low" mix of ships, it likely would be unaffordable. Planners therefore also concluded the future battle line would consist of a family of "SC-21s"—21st century surface combatants—with some more expensive than others. Eschewing the term "high-low" mix for political reasons, the Navy explained the hierarchy of future surface combatant ships in terms of "multi-mission" and "focused-mission" ships. Their original conception was to have a 70/30 split: 70 percent of the surface combatant fleet would consist of full-capability, multi-mission combatants; 30 percent of the fleet would consist of limited capability, focused-mission combatants.[831]

The SC-21 Mission Need Statement was approved by OSD in 1994, immediately after the completion of the Clinton Administration's Bottom Up Review. The timing was critical. Thinking in both the DoN and OSD was colored by the requirement to "rapidly halt" two, near-simultaneous, cross-border invasions by armored forces. A RAND Study called *The New Calculus* argued that by using massed guided weapon fire to destroy up to 20 percent of the enemies' forces, Joint forces could "rapidly halt" any future invasion and set the conditions for follow-on US counter-attacks. Spurred by this thinking—and to counter Air Force moves to stake out a larger share of the defense budget—DoN planners touted the advantage of having large floating batteries of guided missiles in forward theaters to provide the initial firepower needed to attack enemy forces while Joint airpower was being diverted to the theater. One option explored was to pursue an "Arsenal Ship"—a minimally-crewed missile "barge" carrying upwards of 512 VLS cells; the other was to pursue a more traditional, versatile combatant focused on the land attack mission.[832]

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[830] Goddard and Marks, "DD(X) Navigates Uncharted Waters," pp. 30-31.

[831] Friedman, *US Destroyers*, revised edition, pp. 434-35. For the DoN rationale behind the SC-21 family of ships, see Rear Admiral Daniel J. Murphy, USN, "Like Thunder and Lightning," *Proceedings*, June 1997, pp. 57- 60.

[832] Friedman, *US Destroyers*, revised edition, pp. 435-45.

The Arsenal Ship concept was the approach preferred by then-CNO Admiral Mike Boorda. However, after his tragic death in 1996, the Arsenal Ship became a "Maritime Fire Support Demonstrator Program," and the DoN—with OSD approval—pursued the DD-21 "Land Attack Destroyer," the first of the SC-21 combatants.[833] The Operational Requirements Document for the new ship was approved just as the 1997 QDR outlined a future surface combatant force target of 116 combatants. With 27 CG-47s and CG-52s in commission and 57 DDG-51s and DDG-79s either in service, building, or planned, the initial DoN plan was to replace 32 Garrison Era destroyers and frigates with new DD-21s. In the 70/30 fleet mix, then, *the 32 DD-21s were to represent the low-cost 30 percent component of the future surface combatant fleet.* The planned unit cost for the ship was $750 million (FY 96 dollars, by the fifth ship in the class).[834] The 32 DD-21s would be followed by a "full capability" CG-21—the replacement for the legacy "guided missile cruisers"—in the second decade of the 21st century.[835]

At this point, DoN's inability to sit comfortably on a huge naval lead combined with its two-century old preference for pursuing ever more capable warships. As a result, the modest plans for the DD-21 were infected by "requirements creep," and the DoN's surface combatant transition plan was completely changed. Instead of being a low-cost, limited capability ship, the DD-21 became a technological pathfinder "vital to the US Navy's future."[836] After the 2001 QDR, the SC-21 family of ships consisting of the DD-21 and the follow-on CG-21 disappeared. It was replaced by a new family of TFBN surface combatants with consisting of three, not two, new ships—the DD(X), the CG(X), and the aforementioned LCS.[837]

As outlined in a recent FY 2006 long-range plan for the construction of naval vessels, the DD(X) and CG(X) would be first-rates combatants, with 12 DD(X)s and 18 CG(X)s replacing the legacy fleet of 22 CG-52 first-rates.[838] The heart of the US surface battle line would remain 62 second-

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[833] For a good discussion of the Arsenal Ship program, see Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 645-46. The land attack focus of DD-21 is evident in Michael Lindemann, "DD-21 Brings Fundamental Changes to the Land Battle;" and "DD-21 and the Navy's Land Attack Renaissance," both in *Surface Warfare*, May/June, 2000.

[834] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 645-46; and Friedman, *US Destroyers*, revised edition, pp. 435-45.

[835] Murphy, USN, "Like Thunder and Lightning," p. 60.

[836] Young, "Keep DD(X) on Track;" Christopher P. Cavas, "'We Need DD(X)' Top Navy Leaders Say," *Defense News*, June 21, 2005; and Dave Ahearn, "Clark, Young Mount Strong Defense of DD(X) Destroyer," *Defense Today*, June 21, 2005.

[837] For the rationale behind moving to a new family of ships, as well as brief descriptions of them, see Rear Admiral Charles Hamilton and Rear Admiral Donald Loren, USN, "It's All in the Family," *Proceedings*, August 2002, pp. 68-70; Rear Admiral Mark Edwards, USN, "New Realities Mean the Navy Must Dominate in the Littoral," *Seapower*, April 4, 2004, pp. 42-45; and Rear Admiral Sam Locklear, "LCS and DD(X)," *Defense News*, August 30, 2004.

[838] Plans for the DD(X) have constantly shifted, starting out with 16 ships, expanding to 24, and now down 12. 12 DD(X)s and 18 CG(X)s represent the "325-ship Plan. In the "260-ship Plan," the number of DD(X)'s would fall further still, to eight. There is now talk of dropping the DD(X) buy to seven ships, and accelerateing the CG(X). See Christopher J. Castelli, "Navy May Buy Fewer DD(X) Destroyers, Accelerate Cruiser Program," *Inside the Navy*, May 24, 2004, p. 1.

rates, either modernized DDG-51/79s or their future replacement, a new, unspecified DDG(X).[839] The new modular, focused-mission LCS would become the "low cost" component of the surface combatant fleet, replacing legacy destroyers, frigates, mine warfare vessels, and coastal patrol craft.[840]

As one of two new "super first-rates" in the surface combatant hierarchy, and as the new technological pathfinder for the future TFBN, the new DD(X) is a far cry from the modest expectations for the early DD-21 program. Its design calls for a ship 600 feet long, with a beam of just over 79 feet, and a draft of 28 feet.[841] At a full load displacement 14,564 tons, it will be nearly 50 percent larger than either the CG-52 first-rates or DDG-51/79 second-rates, and the largest US surface combatant built since the USS *Long Beach*, a 17,100-ton nuclear-powered guided missile cruiser commissioned in 1961.[842] When commissioned, only one contemporary surface combatant—a 24,000-ton nuclear-powered Russian "guided missile cruiser"—will be larger. It will be three to four times the size of the fourth-, fifth-, and sixth-rate ships that are the typical "capital ships" in ROW navies.

As now envisioned, the DD(X) will be packed with new technologies and innovations. Among the more important are:

- An Integrated Power System (IPS), consisting of two main and two auxiliary gas turbines that will produce and distribute power for all of the ship's electric needs—including two new electric drive motors that propel the ship, the ship's combat systems, and all hotel loads. These four turbines will produce 78 megawatts of power—ten times the electrical power generation capacity on a DDG-51/79.[843] The dramatic increase in electrical power has two important implications for future TFBN combatants. First, it facilitates a move to

[839] Presumably, the DDG(X) would be the fourth ship in the DD(X) program. However, it was not mentioned in the November 1, 2001 DD(X) program announcement.

[840] The "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006" that was provided to Congress in Spring 2005 outlines two different future fleets. The "325-ship plan" generally assumes one crew per ship; the "260-ship plan" assumes that the aforementioned "Sea Swap" program is successful, and adopted widely throughout the fleet, allowing a reduction in the number of hulls built. As this report also assumes one crew per ship, it uses the "325-ship plan" as a basis for comparison. The 325-ship plan seeks to replace the 22 CG-52s with 12 DD(X)s and 18 CG(X)s by 2035. See Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[841] "DD(X) Media Roundtable," a PowerPoint presentation developed by the Program Executive Office of Ships and the Program Executive Office for Integrated Warfare Systems, dated June 30, 2005.

[842] Ronald O'Rourke, "Navy DD(X) and CG(X) Programs: Background and Issues for Congress," Congressional Research Service Report RS21059, dated May 9, 2005, p. 1. Ironically, the DD(X) is actually smaller than the final DD-21 design, which came in between 15,000 and 17,000 tons. Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 146.

[843] For two excellent and concise descriptions of the IPS, see Gordon I. Peterson, "The Future of Naval Warfare: the Integrated Power System and Revolution in Sea Warfare," *Naval Forces*, Vol. 6, 2004, pp. 46-52; and Rear Admiral Mark Edwards and Rear Admiral Charles Hamilton, "Destroyer That Creates Waves," *Armed Forces Journal*, October 2004, pp. 44-46.

electric drive propulsion, which eliminates the requirement for a ship's engine rooms be in line with the ship's propeller shafts—or even that the ship retain long propeller shafts.[844] It also simplifies the propulsion train in other ways, such as eliminating the need for complex reduction gears, resulting in a much reduced acoustical signature. TFBN planners liken the shift to IPS as important as the shift from sail to steam.[845] Second, the IPS will provide the power for a variety of new and exotic weapons, such as electrically-powered lasers or electromagnetic rail guns.[846]

- Full-spectrum stealth, including advances in acoustic signatures that will make the ship "as quiet as a submarine" (due primarily to the shift to electric motors), and reductions in magnetic and infrared signatures. Moreover, the ship's radar cross section will be greater than 50 times smaller than the DDG-51; its wave-piercing tumblehome hull disperses radar energy deflect incoming radar signals away from their source, and a composite deck house difficult to pick up on radar is with embedded sensors and antennae eliminates the numerous shipboard masts and exposed sensors that act as radar reflectors. These and other advances are designed to "complicate the enemy's detect-to-engage problem."[847]

- New automation techniques to dramatically reduce crew size. Despite being 50 percent larger than current first- and second-rates, the DD(X) aims for a crew size that is 37-44 percent smaller. The current target is for a crew of approximately 150, including the ship's aviation detachment.[848]

- New damage limitation features, including a peripheral vertical launch system (PVLS), designed to disperse the ships VLS cells along the deck edge and to vent sympathetic explosions of ship's missiles caused by battle damage up and away from the ship. The ship will also introduce a new "autonomic" fire suppression system. Along with the

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[844] For example, the long propeller shafts could be eliminated and replaced with propulsion pods outside the ships hull.

[845] Goddard and Marks, "DD(X) Navigates Uncharted Waters," pp. 32-33; Young, "Keep DD(X) on Track;" and "Why DD(X)?"—an undated PowerPoint presentation on the DD(X) presented by Northrop Grumman. The new electrical propulsion plant, once planned to be a permanent magnet motor, has recently be shifted to an advanced induction motor. See "US Navy Signal Intentions for Provision of DD(X) Propulsion," *Jane's International Defense Review*, June 2005, p. 12.

[846] Hunter Keeter, "Lasers, Rail Gun Could Be Ready For DD(X) By 2010," *Defense Daily*, April 16, 2003, p. 9. The DoN has selected the Free Electron Laser as its potential directed energy weapon of choice. See Dave Ahearn, "ONR Laser Power Jumps 10-Fold; Further 10-Fold Leaps Seen," *Defense Today*, August 4, 2004; and Christopher J. Castelli, "Navy Envisions Surface Combatants With Powerful Laser Guns," *Inside the Navy*, December 9, 2002, p. 1. For more information on rail guns, see Andrew Koch, "US Navy Sees the 'Light'," *Jane's Defence Weekly;* and Lieutenant Commander David Allan Adams, US Navy, "Naval Rail Guns Are Revolutionary," *Proceedings*, February 2003, pp. 34-37.

[847] "DD(X) Media Roundtable;" Goddard and Marks, "DD(X) Navigates Uncharted Waters," p. 32; and "Why DD(X)?" For an excellent discussion of what stealth provides to surface combatants, see James H. King, "Stealth Means Survivability," *Proceedings*, December 2001, pp. 80-82.

[848] Goddard and Haggerty, "DD(X) Program Overview for Defense Daily."

inherent protection afforded by its large displacement and its low signatures, these features will make the DD(X) the most survivable US combatant design since the armored battleships and heavy gun cruisers built just before and after World War II.[849]

- And various improvements to combat systems, weapon systems, and weapons, including: an open-architecture Total Ship Computing Environment to allow frequent cost-effective combat system upgrades throughout the life of the ship; a new dual- band radar consisting of an S-band Volume Search Radar (VSR) and X-band Multi-function Radar (MRF);[850] a new undersea warfighting system, including a dual-band bow array and a multi-function towed array; and 80 PVLS cells. In addition, the DD(X) will carry two new Advanced Gun Systems (AGSs). An AGS is, in essence, am automated, gun-launched missile system, propelling an 11-foot long, rocket-assisted, GPS-guided, 155mm Long Range Land Attack Projectile (LRLAP) out to ranges of 85 nautical miles (97 statute miles).[851]

If built, the DD(X) will be the most powerful first-rate on the seas, by far. Each of its 80, 28-inch square PVLS cells can carry either one, 21-inch diameter land attack missile or four quad-packed ESSMs. However, because the PVLS cells are larger than the Mk41 VLS cells they will replace (the MK 41 cell is 25 inches square), they can carry *two* 13-inch diameter area air defense SAMs or vertically launched anti-submarine rockets, giving the DD(X) an equivalent battle force missile load of 160 missiles.[852] Moreover, the ship's missiles will be augmented by two of the 155mm AGSs, served by an expandable LRLAP magazine that carries between 600-920 guided rounds. The ship will also have a flight deck big enough to support two MH-60 helicopters, and will carry no less than seven small RHIBs.[853]

The follow-on CG(X) first-rate is to be based on the DD(X) hull, although DoN officials are now uncertain if the DD(X) hull will be big enough for its combat systems. As a result, although DoN officials downplay the possibility, the DD(X) hull may have to be "stretched."[854] Under any

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[849] "DD(X) Media Roundtable;" and Dave Ahearn, "Down-sizing Won't Work on DD(X), Which Has Sound Technology," *Defense Today,* July 1, 2005, p. 1.

[850] The DD(X) was originally to have a lower cost L-band search radar to complement the X-band MFR. However, the more expensive S-band radar was chosen because of its enhanced ability to detect and track aircraft, missiles, and land-based artillery. See Malina Brown and Christopher J. Castelli, "Top Navy Officials Come to Agreement on Critical Dimensions of DD(X)," *Inside the Navy,* June 16, 2003, p. 1; and John T. Bennett, "DD(X) Radar Switch Made With Eye Toward CG(X) Missile Defense," *Inside the Pentagon*, August 7, 2003, p. 1.

[851] The LRLAP recently set a record for a gun-launched projectile, hitting its target after flying 59 nautical miles. See Richard Mullen, "DD(X) Bound Munition Sets New Record," *Defense Today*, July 6, 2005, p. 3. See also Goddard and Marks, "DD(X) Navigates Uncharted Waters," p. 32. Commander Russell Davis, USN (ret), and Lieutenant Colonel Darien Kearns, USMC (ret), "Advanced Gun System Is 'On the Way'," *Proceedings,* October 2002.

[852] The ability of each PVLS cell to carry two, 13-inch battle force missiles was confirmed to the author by Rear Admiral Charles Hamilton, USN, and ship designers at NAVSEA, during an early briefing of this report.

[853] "DD(X) Media Roundtable."

[854] Malina Brown, "Young: Navy May Back Away From Plans to Compete CG(X) Cruiser," *Inside the Navy,* April 12, 2004, p. 1.

circumstances, however, the CG(X) will introduce a new theater air and missile defense combat system into fleet service. The expectation is that the new first-rate will replace the DD(X)'s 155mm guns for additional VLS cells along its centerline, in effect trading the volume dedicated for land attack with improved TFBN theater air and missile defense capabilities, including perhaps new, larger, more powerful ballistic missile defense interceptors.[855] When viewed together, then, the aforementioned outdated distinctions of "destroyer" and "cruiser" appear even less applicable to the DD(X) and CG(X). Instead, they should be viewed simply as two closely related large, first-rate, battle network combatants—one that focuses on land attack, and one that focuses on theater air and missile defense.[856]

Of course, the eye-watering technological innovation packed into the DD(X) and CG(X) hulls will come at a steep price. Navy estimates for the first ship are now $3.3 billion, and these are the most *optimistic* of current estimates. OSD's Cost Analysis Improvement Group (CAIG) estimates the first ship's cost will be $4.4 billion, and CBO's figures are even higher; based on an historical average of construction cost per long ton, the CBO projects the cost of the first ship could reach $4.7 billion. Follow-on ships will also be quite expensive, and their estimates keep climbing. The original DoN cost projections for the fifth DD(X) were between $1.06 and $1.23 billion in FY 2007 dollars. In 2004, the DoN estimates for the fifth ship in the class jumped to $1.4 billion; in 2005, they jumped again to $2.1 billion. In comparison, the Congressional Budget Office estimates the fifth ship will cost $3.5 billion.[857]

Under the best case scenario (using DoN calculations), then, the fifth ship of the class will be nearly two-and-a-half times the original DD-21 target, in inflation-adjusted dollars. Moreover, the DD(X) will be the *cheaper* of the two planned first-rates; the CG(X), with its more complex and advanced radar and combat system, will undoubtedly be more expensive.[858] Even in an unconstrained budget environment, pursuing surface combatants with average procurement costs between $2.1 and $3.5 billion would place a heavy burden on any DoN shipbuilding budget. However, in the current budget environment, the pursuit of a ship "unconstrained by previous designs" is likely to be less of a virtue and more of a vice. In the words of one naval expert, the DoN's "*call for innovation for innovation's sake*…has resulted in a…grotesquely outsized new

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[855] One option for CG(X) ballistic missile interceptors is the larger, 36-inch diameter Kinetic Energy Interceptor (KEI), Sandra I. Erwin, "Navy Prepares to Put AEGIS Ships 'On Alert'," *National Defense,* March 2004, found online http://www.nationaldefensemagazine.org/issues/2004/Mar/Navy_Prepares.htm. Interestingly, trading the AGS for VLS cells would result in a cluster of VLS cells along the ship's centerline—the "vulnerable" design feature the switch to the PVLS was designed to correct.

[856] For naval purists, a DD(X) might be more accurately designated CBL, for large littoral cruiser, and the CG(X) as CBG, for large guided missile cruiser.

[857] Statement of J. Michael Gilmore, Assistant Director of National Security, Congressional Budget Office, in testimony before the House Armed Services Committee Projection Forces Subcommittee Hearing on the DD(X), July 19, 2005, found online at http://www.globalsecurity.org/military/library/congress/2005hr/050719-gilmore.pdf; Tony Capaccio, "Destroyer May Cost 33% More Than Navy Budgeted, Pentagon Says," *Bloomberg News,* May 4, 2005; and Christopher J. Castelli, "Pentagon Postpones DD(X) DAB Meeting to Resolve Cost Estimates," *Inside the Navy,* May 2, 2005.

[858] Ahearn, "Report on Cutting Ship Costs Says Capabilities May Suffer."

DD(X)" (emphasis added).[859] Indeed, the House Armed Services Committee, alarmed at the DD(X)'s spiraling costs, demanded that the DoN redesign its future destroyer so that the cost of the fifth and following ships would not exceed $1.7 billion per ship.[860]

## THE ARGUMENTS FOR AND AGAINST CURRENT BATTLE LINE RECAPITALIZATION PLANS

Proponents of the DD(X) complain that those who focus solely on the DD(X)'s procurement costs are missing the bigger picture. In response, they offer six key counter-arguments, three based on cost and three based on operational considerations. The first cost argument is that considering the time value of money, the cost of the DD(X) is not disproportionate to past ships. For example, the lead DDG-51 was authorized in FY 1985 at a price of $1.2 billion; in fiscally adjusted FY 2007 dollars, that amounts to $2.4 billion. Thus, the "$3.3 billion for [the lead DD(X)] vs. the $2.4 [for the lead DDG-51] is not outrageous."[861]

This argument, while technically true, ignores an important point. In FY 1985, the Battle Force was fighting off a concerted maritime challenge by the Soviet Navy. Accordingly, in addition to the single DDG-51 authorized that year, the DoN authorized one *Trident* SSBN; four *Los Angeles*-class SSNs; three CG-52 first-rates; two LSD-41 amphibious ships; four mine countermeasure ships; three fleet oilers; two ocean surveillance ships, and two oceanographic survey ships.[862] The $1.2 billion cost for the lead DDG-51 was perhaps 11 percent of the total SCN account.[863]

Now, the situation is completely different. The DoN faces no major naval challengers, operates the finest surface combatants in the world, and faces no externally-driven competitive design challenges. The relatively modest DoN projected shipbuilding budgets reflect these basic facts. In these circumstances, with a *best case* ship cost of $3.3 billion, the lead DD(X) would consume between 27.5 and 41 percent of expected yearly ship-building budgets between $8 and $12 billion. At the *worst case* ship cost of $4.7 billion, the lead ship DD(X) would consume between 39 and 59 percent of the shipbuilding budget. The relative burden that the lead DD(X) places on contemporary shipbuilding accounts is thus between 2.5 to 5.4 times higher than the lead DDG-51 placed on its budgets. *The key issue is not how the costs of the lead DD(X) compare with the*

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859 Baker III, "2004 Worldwide Naval Developments," p. 117.

860 Ahearn, "Report on Cutting Ship Costs Says Capabilities May Suffer."

861 Dave Ahearn, "Clark Says DD(X) Cost Not Fairly Weighted," *Defense Daily*, June 15, 2005; Christopher P. Cavas, "Retiring USN Leader Defends DD(X)," *Defense News*, June 6, 2005; and Young, "Keep DD(X) on Track."

862 Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 640.

863 Statement of J. Michael Gilmore, Assistant Director of National Security, Congressional Budget Office, in testimony before the House Armed Services Committee Projection Forces Subcommittee Hearing on the DD(X), July 19, 2005.

*lead DDG-51; it is whether or not the DD(X) is a sensible ship given the state of the global naval competition and the current budget environment.*

The second cost argument is that building one DDG-79 per year would cost S1.8 billion a year compared to the expected $2.1 billion cost of the fifth and later DD(X)s. With its greater capability, the DD(X) therefore "represent(s) reasonable value."[864] However, this argument compares *known* costs to *projected* costs, and fails to consider the impact that the DD(X) might have on the shipbuilding industrial base. With regard to the former, each DDG-79, a proven design still in production, could be built for *no more* than 1.2 to 1.3 ASEs, and perhaps even less with contractual incentives. Under the most optimistic circumstances, the cost of a new DD(X) will cost *at least* 1.6 ASEs, and possibly 2.5 ASEs or *more*.[865] Even if the DoN is lucky enough to hold the average costs of the ship to $2.1 billion and 1.6 ASEs, with only 5.7 to 8.6 ASEs to play with in expected shipbuilding budgets, this means the likelihood that the DoN will ever be able to build more than one DD(X) per year is very low. Incredibly, then, DoN planners are recreating the very same problem they face in the TFBN submarine fleet: *they are pursuing warships of unequalled power and capability that can be built at a rate of no more than one per year*.

Indeed, accepting this fact, and having no interest in repeating the submarine teaming arrangement in which two yards split the construction of one submarine per year, the DoN moved to kill one of the two remaining US combatant shipyards. In February 2005, DoN leaders abruptly announced an intended change to the previously announced DD(X) acquisition strategy. Under the old plan, the first DD(X) would be built by Northrop Grumman Ship Systems in Pascagoula, Mississippi, and the second by General Dynamics in Bath, Maine. Contracts for follow-on DD(X)s would be split between the two yards. The two yards would compete for the follow-on CG(X). Under the new plan, the DoN would seek OSD approval to pursue a one-time, winner-take-all competition for the entire DD(X) production run.[866] Moreover, the DoN simultaneously backed off from its stated goal to have each yard compete for follow-on CG(X) orders.[867] The unstated, but inevitable result of these moves would be to force the losing yard out of the surface combatant business. In effect, DoN leadership determined that the $300 million cost savings per ship that would result from consolidating DD(X) production in one yard was more important than maintaining two surface combatant yards.[868]

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[864] See Young, "Keep DD(X) on Track."

[865] Using the CBO projected cost for the fifth DD(X) of $3.5 billion, the fifth ship would cost 2.5 ASEs. And this estimate does not assume any construction problems, which could potentially drive the price higher. See for example, see Geoff Fein, "DD(X) Faces Challenges That Could Further Impact Cost, GAO Says," *Defense Daily*, June 16, 2005.

[866] O'Rourke, "Navy DD(X) and CG(X) Programs: Background and Issues for Congress," pp. 2-3.

[867] Brown, "Young: Navy May Back Away From Plans to Compete CG(X) Cruiser."

[868] Dave Ahearn, "England Says Congressional Strictures Could Reduce Ship Purchases," *Defense Today*, May 18, 2005, p. 1.

Interestingly, top DoN officials justified their decision by arguing that because the DD(X) was so much more capable than the originally planned DD-21, the required numbers could be drastically reduced, from the 24 ships originally planned to only eight to 12. This, in turn, would mean the original plan to build the ships at two yards simply no longer made sense.[869] However, this argument ignores the long-term implications of building one surface combatant per year for an extended period of time. The DoN's long-range shipbuilding plan calls for an ultimate battle line consisting of 30 DD(X)/CG(X) first-rates and 62 DDG/DDGX second-rates, for a total of 92 ships.[870] Assuming a nominal ship service life of 35 years, this would require a steady state build-rate of 2.6 ships per year. However, an extended period of building one first-rate per year will mean that future DDG(X) building rates might need to jump to three or four combatants per year to keep fleet numbers up. DoN officials are mute as to whether or not one yard will provide sufficient combatant shipbuilding capacity over the long term.

No matter: three of the seven Battle Force stakeholders—OSD, the Congress, and the shipbuilding industry—disagreed with the DoN plan. The Under Secretary of Defense for Acquisition, Technology, and Logistics denied the DoN's request to pursue a winner-take-all strategy, calling the move "premature."[871] The Congress was more pointed. On March 1, 2005, 20 Senators sent a letter to President Bush objecting to the change in strategy, since it would surely drive the loser out of the shipbuilding business. Subsequently, the conference report on the Emergency Supplemental Appropriations Act (H.R. 1268), dated may 3, 2005, effectively prohibited a winner-take-all strategy.[872] Leaders in the shipbuilding industry, wary of upsetting their sole business source, attacked the plan in an indirect way by demanding more "stability" be built into DoN shipbuilding plans.[873]

Not to be deterred, the DoN then announced it would award two DD(X) contracts in FY 2007, one to each yard, to determine which yard could build the DD(X) at the lowest cost. Although this new plan holds out the slim prospect that decreased unit costs might allow the DoN to increase the DD(X) build rate to two per year—thereby supporting two combatant yards—it also preserves the option to divert all remaining production to the one yard that demonstrates the greatest cost reductions. It remains to be seen whether Congress will agree with this new approach. One Congressional source called the new plan "insane;" a Congresswoman said, "we

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869 Dave Ahearn, "Clark, Young Mount Strong Defense of DD(X) Destroyer," *Defense Today,* June 21, 2005.

870 These numbers are drawn from the "325-ship plan" outlined in the "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006;" Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

871 See Reuters, "Pentagon Calls Bid to Change Contract Strategy Premature," *Los Angeles Times,* April 21, 2005; and Edmond Lococo and Tony Capaccio, "Pentagon Delays Navy Competition for New Destroyer," *Bloomberg News,* April 20, 2005.

872 Reuters, "Pentagon Calls Bid to Change Contract Strategy Premature;" and O'Rourke, "Navy DD(X) and CG(X) Programs: Background and Issues for Congress," p. 3.

873 See, for example, Jason Ma, "Northrop, GD Shipbuilders Call for More Stability in Navy Planning," *Inside the Navy,* April 18, 2005.

keep going backwards, not forward [on the DD(X) building strategy];" and a Senator rejected the new plan, saying that, "At the end of the day, this is still a winner-take-all strategy for the remainder of the DD(X) destroyers."[874] For now, it seems clear that the sense of the Congress is to avoid closing one of the two remaining surface combatant yards.[875]

A third cost argument that DoN leaders make in support of the ship is that it "is going to cost dramatically less to operate" than legacy combatants.[876] This is perhaps the most compelling argument made by proponents for the new ship. For example, they point out that the DD(X) will have a crew of 150 or less, compared to crews of 350 to 400 on legacy first- and second-rates. For this and other reasons, they claim ten DD(X) destroyers will cost $4.2 billion less to operate over 35 years than a similar number of DDGs.[877] Therefore, they urge that that the high cost of the DD(X) be viewed within the context of the "cost of the next navy." In this light, the bold technological steps taken on the DD(X), and their high associated costs, will make the future force far more affordable. Higher procurement costs now are therefore worth it.[878]

While this argument is attractive, it is based on assertions, not facts.[879] In any event, during the 30-year long transition to the "next navy," it seems certain that fleet-wide O&S costs will be much higher than they are today. The biggest reason for this is that *fleet-wide* crew savings associated with the introduction of the DD(X) and CG(X) are decades away. Unlike any other component in the TFBN, the manning requirement for the surface battle line is growing substantially. As discussed earlier, the 71 ships now in the battle line require an aggregate crew of 25,506 officers and Sailors. By 2011, the planned fleet of 84 ships will require 29,774 personnel—3,678 more than today. Then, because the CG-52 class will not be retired until the mid- to late 2020s, the near-term addition of DD(X)s and CG(X)s will actually expand the battle line to 101 first-and second-rates in 2024 (20 DD(X)/CG(X)s, 19 CG-52s, 62 DDG-51/79s) before starting a gradual fall to 92 ships in 2035 (30 DD(X)/CG(X), 62 DDG/DDG(X)s). As a result, in 2024, the aggregate crew requirement for the surface battle line will climb to nearly

[874] Christopher P. Cavas, "New DD(X) Plan: Build 2 Competing Ships in '07," *Defense News*, May 30, 2005; David Ahearn, "Navy May Award Two DD(X) Contracts in One Year," *Defense Today*, May 20, 2005, p. 1; and Dave Ahearn, "Sen. Collins Rejects DD(X) Plan as No Improvement," *Defense Today*, June 20, 2005, p. 1.

[875] For a thorough review of Congressional concerns for US Navy shipbuilding programs, see Ronald O'Rourke, "Navy DD(X), CG(X), and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress," Congressional Research Service Report RL32109, dated March 31, 2005.

[876] See Dave Ahearn, "Clark Says DD(X) Cost Not Fairly Weighted."

[877] "DD(X) Media Roundtable;" and Christopher P. Cavas, "US Navy Rises to Defend DD(X)," *Defense News*, June 27, 2005, p. 20.

[878] See Cavas, "Retiring USN Leader Defends DD(X)."

[879] Some analysts question DoN O&S assumptions. See the comments by Ron O'Rourke in Dave Ahearn, "Analyst: Some Pro-DD(X) Arguments Faulty," *Defense Today*, June 29, 2005.

31,000 officers and Sailors.[880] It therefore seems unlikely that the surface combatant fleet there see any aggregate crew savings until after 2030, when all the CG-52s have been retired and when many DDG-51s have been replaced by DDG(X)s. Additionally, the introduction of the new radars, propulsion plants, and combat and weapons systems associated with the DD(X) and CG(X) is sure to place additional training, maintenance, and logistics burdens on the fleet, resulting in even higher O&S costs. Indeed, CBO projects that 35-year life cycle costs for a DD(X) likely will be *higher* than the DDG-51/79 on a net-present-value basis.[881]

DD(X) proponents also make three key operational arguments in support of the new ship. The first is that it will result in a sharp increase in TFBN striking power, especially in naval surface gunfire support. In addition to the ship's ability to carry up to 80 large diameter land attack missiles, its two Advanced Gun Systems represent the most powerful US naval surface gunfire capability since the retirement of World War II era heavy cruisers and battleships armed with 8-inch and 16-inch guns.[882] In this regard, DD(X) supporters point out that 155mm LRLAP covers three times as much territory as does the planned 127mm Enhanced Ranged Munitions (ERM) fired from DDG-79s, and that two DD(X)s provide the equivalent firepower of one Marine 155mm howitzer battalion. According to DoN officials, this will result in a 65 percent reduction in the amount of Marine artillery taken ashore.[883] They also point out that the DD(X)'s 78 megawatt IPS system will set the stage for even more powerful land attack guns, such as electromagnetic rail guns.[884]

These arguments are powerful if viewed in isolation. However, the dramatic increase in TFBN strike power that comes with the DD(X) raises two important questions: First, does the TFBN really need—or can it afford—the dramatic increase in fleet strike power promised by the DD(X)? Second, can the improved strike systems designed for the DD(X) be pursued on platforms that are cheaper than an average price of $2.1 -$3.5 billion?

With regard to the first question, if there is one thing that the TFBN is *not* lacking in, it is strike power. Recall that by 2010, a single Carrier Air Wing will be able to strike over 1,000 targets a day, and a force of five aircraft carriers could attack 25,000 targets over a 30-day campaign. And

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[880] These calculations are based on the "325-ship plan" outlined in the DoN's own "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006." They assume a CG(X) crew size of 150.

[881] Statement of J. Michael Gilmore in testimony before the House Armed Services Committee Projection Forces Subcommittee Hearing on the DD(X), July 19, 2005.

[882] The *Salem*-class heavy gun cruisers that supported Marines and Army forces fighting in Vietnam were armed with nine semi-automatic 8-inch (203mm) naval guns. The four *New Jersey*-class battleships reactivated during the Cold War were armed with even larger 16-inch (606mm) naval guns. Until very recently, the TFBN retained two battleships on the Naval Vessel Register in a Mobilization Category B status, meaning they could be reactivated in an emergency. See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, Chapter 14.

[883] "DD(X) Media Roundtable."

[884] "DD(X) Media Roundtable." See also David Brown, "High-Tech Railgun Still Seen As Weapon on New Destroyer," *NavyTimes.com*, April 5, 2004.

these numbers do not include fires from other Joint platforms, such as Air Force long-range bombers or tactical aircraft operating from in-theater bases. These Joint aviation-delivered strikes will be reinforced by missile fires from the surface battle line and submarine force. As stated previously, the programmed battle line of 84 ships will already be able to carry nearly 9,000 battle force missiles, with 95 percent being carried in VLS cells (8,486 cells). Depending on the final number of TFBN SSGNs, the 2020 submarine fleet will add 1,108 to 1,416 more VLS cells. Even subtracting the VLS cells devoted to SAMs, anti-submarine rockets, and ballistic missiles, there will be hundreds, if not thousands of cells that could potentially carry land attack missiles. It thus seems unlikely the TFBN needs more land attack missile cells. After all, during Operation *Iraqi Freedom*, naval targeteers ran out of *Tomahawk* targets after firing "only" 750 missiles.[885]

The introduction of the DD(X) will simply add to this eye watering combat potential. Between 2014 and 2035, as the DD(X) and CG(X) enter the fleet, the number of fleet VLS cells will rise precipitously. By 2024, the 12 planned DD(X)s will increase the battle line missile capacity by 960-1,920 missiles.[886] Assuming a conservative missile capacity of 200 battle force missiles, eight CG(X)s might add a requirement for 1,600 more, for a total battle line capacity of nearly 12,000 missiles! After 2024, battle force missile capacity remains relatively constant through 2029, after which it falls gradually to a steady-state capacity of just over 11,000 missiles. Add to that the gun-launched missiles found in the DD(X) magazines; a 12-ship class would hold an additional 7,200 to 11,000 LRLAP rounds. When taken altogether, one has to question if these plans might represent a degree of strike overkill.

Indeed, one also has to question whether or not TFBN can afford the cost to fill the battle line's magazines. The additional requirement for 2,500-3,500 battle force missiles, even if the average cost for the missiles falls dramatically to $250,000, would impose weapons procurement costs of $625 to $875 million. Moreover, each LRLAP is projected to cost between $35,000 and $100,000 apiece.[887] The costs to completely fill 12 DD(X) gun magazines *just one time* will cost an addition $386 to $1.1 billion, and at maximum firing rates, the fleet could deplete their magazines in approximately 45 minutes. Even if the DD(X)/CG(X) operating costs prove lower than the legacy ships they replace, it seems quite likely that the increased costs associated with filling out the battle line magazine will offset to a great degree any expected savings from O&S accounts.

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[885] "Operation Iraqi Freedom Statistics," at http://www.globalsecurity.org/military/ops/iraqi_freedom-numbers.htm.

[886] The range is explained by the aforementioned fact that the larger PVLS cells found on the DD(X) can carry either two, 13.5-inch diameter battle force missiles like the SM-2 area air defense missile or Vertical Launch ASROC, or one 14-inch or larger missile.

[887] The company making the LRLAP considers $50,000 the "worst case" price for the round, with $35,000 being the cost target. See Mullen, "DD(X)-Bound Munition Sets New Record." The $100,000 estimate is found in LtCol. Tracy A. Ralphs, US Army Reserve, and Samuel Loring Morison, in response to Goddard and Marks, "DD(X) Navigates Uncharted Waters," *Proceedings*, July 2005, p. 72. Regardless of the cost of the round, it is important to note that the number of rounds indicated above represent just the basic load for a 12-ship DD(X) fleet. At maximum firing rates, the ships could deplete their magazines in just 30-45 minutes.

Setting the costs of the increase in strike weapons, what about the argument that the AGS is needed to fill a specific void in naval gunfire? When comparing the 155mm AGS with the 127mm 5-inch naval gun found on DDGs, it is not surprising that the AGS comes out on top. The larger shell packs three times the explosive punch and boasts a longer range. However, the 127mm ERM apparently will meet the range requirement for naval surface fire support established in a December 3, 1996 memorandum signed out by the Commanding General of the Marine Corps Combat Development Command. This memo assumed that the supporting gunfire ship would be operating 25 nm off the beach, and that as Marine surface and heliborne landings occurred, they would need the same level of fire support that would be provided if a Marine artillery battery were on the beach firing in support of the helicopter insertions. As Marine 155mm howitzers have a range of 16 nm, the minimum requirement for a supporting naval gun became 41 nm (25 nm offshore+16 nm inland). The objective range was an additional 22 nm farther, which would provide effective naval counter-fire against enemy general support artillery capable of ranging the initial helicopter landing zones located 16 nm inland. The threshold and objective ranges of 41 and 63 nm thus became the target for the 127mm Extended Range Guided Munition (ERGM) program, which is now know as the ERM.[888]

Without question, the DD(X)/AGS combination improves the range at which surface combatants would be able to support troops ashore. Assuming that the improved stealth of the DD(X) allows it to close to within five miles of the coast, and sticking to the logic that naval gunfire must range approximately 22 miles farther than the deepest aerial insertion, the AGS's greater range would allow initial Marine helicopter insertions to be made as deep as 58 nm inland.[889] This represents nearly a four-fold improvement in aerial insertion range. However, as impressive as this improvement is, it is still nowhere near the "full range requirement" of 200 nautical miles set out for naval surface fire support in the initial memo—a range necessary to support deeper insertions made by the higher speed, longer range MV-22 tilt-rotor aircraft, and a driving factor behind the pursuit of an electromagnetic gun.[890] An important question, then, is whether or not the *interim* range improvement provided by the AGS is worth the costs to introduce it into the fleet?

Said another way, given the fact that the 127mm gun and ERM will apparently meet the basic naval gunfire support requirements set by the Marine Corps, what would provide the most flexible level of TFBN fire support until the electromagnetic gun is developed and fielded: a fleet of eight to 12 DD(X)s with 16 to 24 155mm guns, or a 84-ship surface battle line carrying 106 upgraded 5-inch guns capable of firing ERM?

Even if the answer is that 16 to 24 AGS guns provides a valuable surface fire support capability that bridges the period before an electromagnetic gun is developed, it seems sensible to try to

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[888] Scott C. Truver, "Accurate, Precise, and Timely," *Sea Power* archives, found online at http://www.navyleague.org/seapower/accurate_precise_and%20timely.htm.

[889] When operating five miles off an enemy coast, and with a gun range of 85 nm, a DD(X) will be able to engage targets 80 miles inland. In order for the DD(X) to range all enemy general support artillery systems that can be targeted against a helicopter landing zone, the landing zone cannot be more than 58 miles inland.

[890] Truver, "Accurate, Precise, and Timely." See also "DD(X) Media Roundtable."

reduce the costs to get that interim capability to the greatest degree possible. If true, are there ways to get the AGS into the fleet at a lower cost? Of course; the AGS is not tied specifically to the DD(X) hull. The gun could easily be fitted onto a cheaper, made-to-purpose naval gunfire ship, perhaps a variant of a hull still in production, such as the LPD-17 or T-AKE. Indeed, the same holds true for the larger PVLS cells, which would give the TFBN the flexibility to design and build larger diameter and more capable land attack missiles, or for that matter, the electromagnetic rail gun, which has yet to be perfected, much less fielded.

DD(X) supporters would likley object to this approach, since they argue strongly that the DD(X) will be significantly more survivable than legacy surface combatants in the littoral battle environment. There is little to object about this argument, as far as it goes. By virtue of their size, stealthy design, and damage limitation features, the 8-12 DD(X)s planned for future TFBN service will surely be better protected than legacy CG-52s or DDG-51/79s, and would provide intriguing operational possibilities. As one admiral said, "I would not take the DDG into the littorals as I would the DD(X)."[891] However true this statement might be, it nevertheless obscures the basic fact that the programmed battle line of 84 ships of the line will operate daily in the littorals and in narrow seas, and it will continue to do so over the next four decades, in all access conditions. This will be especially true for the backbone of the line, the 62 programmed DDG-51/79s.[892]

Indeed, while they may suffer in comparison with the DD(X), the DDG-51 is likely the second toughest surface combatant in the world today, behind only the DDG-79. The design of the DDG-51s took into account the lessons learned from the naval battles fought during the 1982 Falklands War.[893] As a consequence, they were the first US combatant for which a concerted effort was made to reduce the ship's overall radar cross section. The result was a low observable warship that was 50 times more difficult to detect than a CG-52.[894] They were also built to take a hit and continue to fight. Constructed entirely of steel, the ship has special features to increase its resistance to blast, shock, fragmentation and fire damage, incorporates 130 tons of Kevlar armor over the ship's vital spaces, and is specially protected against nuclear electromagnetic pulse effects and blast overpressure. Additionally, the ship was given two wide passages on either side of the ship, providing additional standoff blast and fragment protection for internal ship compartments, its Combat Information Center was placed within the hull below the main deck, and its combat system was designed with a distributed architecture. Finally, the ship received a

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[891] Cavas, "US Navy Rises to Defend DD(X)."

[892] DDGs are said to be "an integral part of the Navy's Seapower 21 plan through 2047." See "Navy Study Projects Billions in Savings From DDG-51 Modernization," *Inside the Navy,* April 19, 2004.

[893] Secretary of the Navy John Lehman convened a special board to consider design revisions on the DDG-51 suggested by the naval battles off of the Falkland Islands in 1982. These battles saw a British naval task force at the end of a distant supply tether fighting off determined air attacks by Argentinean jet aircraft. Freidman, *US Destroyers,* revised edition, p. 419. For a description of the naval battles off the Falklands, see Hastings and Jenkins, *The Battle for the Falklands.*

[894] "DD(X) Media Roundtable."

full-time, full-coverage four-zone collective protective system (CPS), which protects the crew from chemical, biological, and radiological contamination.[895]

The DDG-79 class is even tougher than the DDG-51, having further benefited from combat experience gained during the 1990/91 Persian Gulf War. While the ship lost one CPS zone, it received five additional blast hardened bulkheads; four of them were placed fore and aft of each of the ship's two engine rooms. Additional damage control features and improvements were also added. Additionally, based on the experience of Navy ships operating in the confines of the northern Arabian Gulf in waters mined by the Iraqi Navy, the ships were given the Kingfisher mine avoidance sonar.[896]

In other words, the TFBN already has a fleet of 62 all-steel, low-observable, and extremely tough surface combatants—far tougher than any other combatants in the world today. Because of rising ship construction costs, many navies are building surface combatants to commercial standards; duplicating the damage limitation features of the US DDG-51s and -79s are simply beyond their means. The US ships will thus likely remain the toughest warships on the seas for the foreseeable future. Indeed, their design features for operating in a nuclear environment, from protection against nuclear blast overpressure and electromagnetic effects to the provision for radiological protection of the crew, are especially suited for power-projection operations against a regional adversary armed with nuclear weapons, and thus well matched for an important potential TFBN mission.

So, even though the DD(X) will certainly improve on the survivability and capability of the current DDGs, the simple question is: how much surface ship survivability and increased capability is enough, and at what cost? For example, the DD(X) will be have a radar cross section at least fifty times stealthier than the DDG-51/79s, which contributes in no small way to its large size and high costs. This increases the likelihood that the DD(X) might kill an inbound aircraft before it fires an ASCM ("shooting the archer"). It also allows the DD(X) to insert SOF forces at closer range than a DD(X). Similarly, its greater acoustic and magnetic signature allows it to initially operate in shallow waters in the presence of bottom mines, whereas a DDG-51/79 would have to operate in deeper waters until LCSs or allied minesweepers could create safe operating areas.[897]

In response to each of these points, by the Navy's own admission, although the DD(X) would be forced to expend more missiles than the DD(X), and would be less likley to shoot down the enemy aircraft, it would still survive the air attacks. Additionally, comparing the DD(X) with a DDG-51 for a SOF insertion mission is a false one. Better to compare the DD(X) with the platforms that would most likely perform the mission: SSNs, SSGNs, and LCSs. Would the answer be the same? And as for mines, this is an operational problem that good tactics, proper

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[895] Freidman, *US Destroyers,* revised edition, pp. 417-21.

[896] Freidman, *US Destroyers,* revised edition, pp. 426-27.

[897] "DD(X) Media Roundtable."

planning, and new "organic" mine countermeasures can account for. No wonder, then, that when asked if the DD(X)'s emphasis on stealth justified the greatly increased cost of the platform, 10 of 14 admirals replied that it did not.[898]

Similarly responses might be found when discussing other DD(X) improvements. For example, the DD(X) is touted as being 15 percent more effective against attacks by swarming boats, and having the same effectiveness in ASW as the DDG-51/79.[899] Is their greatly increased cost worth these incremental improvements, especially given that the LCS is designed as the primary TFBN anti-boat component, and that the DD(X), and the ship apparently offers no major improvement in littoral ASW capabilities? And what about the claim that the ship's greater signal processing capability and improved radars will allow them to engage more targets in the coastal regions than a DDG. However, this is also a false comparison. The real question is what will DD(X) *sensors* add to a CEC-enabled battle network? In the emerging Naval Battle Network Era, comparing ships with other ships is now far less revealing than trying to determine the incremental improvement that a unique battle network platform or sensor adds to the Total Force Battle Network.

This final point is a key one, and it points to the flaw in the final operational argument used to justify the DD(X). Top DoN officials see the ability to protect future Naval Battle Networks and sea bases from maneuvering ballistic missile warheads and high-speed ASCMs as "the brass ring" for the TFBN—its single most important operational capability. Since the DD(X) is the bridge to the CG(X), the future theater air dominance platform, they argue that the TFBN will never achieve this capability without the DD(X).[900] However, this line of thinking is incongruent with the emerging Naval Battle Network Era, where the power of the network, and not individual platforms, will determine the success of future naval combat, and presupposes the improvements offered by the DD(X) are somehow intrinsically tied to that specific ship.

For this reason, the argument that the TFBN will suffer catastrophic failure if the 8-12 DD(X)s are not built rings false. The fact of the matter is that TFBN defenses against the cruise missile threat will greatly improve with or without the DD(X). The new SPY-1D(V) version of AEGIS, known as the "Littoral Warfare Radar," has improved capabilities against low-altitude, reduced radar cross-section targets in the heavy "clutter" conditions characteristic of the littorals. The new radar is also built with an open architecture, to allow easy upgrades. [901] The inclusion of the E-2C airborne radar in the fleet's CEC network will increase the detection volume of future naval Battle Networks by 250 percent, and will provide a "look down" capability against

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[898] These results came from internal Navy QDR discussions in early 2005. While conducting interviews with DoN officials in preparation for this report, the author was provided the results.

[899] Cavas, "US Navy Rises to Defend DD(X);" and "DD(X) Media Roundtable."

[900] See remarks made by Vice Admiral Joseph Sestak, DCNO for Warfare Requirements and Programs, in Andrew Koch, "US Shipbuilding Plan Takes On Water," *Jane's Defence Weekly*, June 29, 2005.

[901] "AN/SPY-1 Radar;" and Ben Ames, "New AEGIS Radar Boosts Range With COTS," *Military and Aerospace Electronics*, undated.

inbound cruise missiles that hug the terrain or ocean surface.[902] Including E-2C data in CEC will allow legacy AEGIS/VLS combatants armed with the new SM-6 Extended Range Active Missile (ERAM) to engage cruise missiles well beyond their radar horizons.[903] Long-range ERAM engagements will be complemented by forward combat air patrols by F/A-18E/Fs and JSFs equipped with AESA radars and advanced versions of AMRAAM. Mid-range cruise missile defense will be improved by CEC data-sharing and the SM-2 Block IIIB semi-active missile with dual-mode infrared/radio frequency guidance.[904] And terminal defenses will be aided by the additions of the SPQ-9B radar, ESSM, the Rolling Airframe Missile, and the Close-in Weapon System.[905]

In fact, the only new capabilities the DD(X) will bring to the *TFBN* cruise missile defense problem will be its new Volume Search Radar and SPY-3 Multi-function Radar, which are designed to detect and track ballistic missiles and the most advanced low-observable ASCMs.[906] These radars are expected to provide 15 times better detection of sea-skimming targets, a 20 percent advance in tracking range of cruise missiles, and a 10-fold increase in the maximum missile track capacity.[907] However, as attractive as the VSR and MFR will be, as is the case for the AGS, these radars are not tied exclusively to the DD(X) hull. Indeed, the VSR and MFR will be found on future ships like the CVN-21, LHAR, and possibly the LPD-17. And while the radars may be too large for the DDG-51/79 hull, they could certainly go on newly designed—and far cheaper—combatants.[908]

Similarly, with regard to maneuvering ballistic missiles, by 2010 the TFBN will operate 18 AEGIS/VLS first- and second-rates capable of tracking long-range ballistic missiles and engaging them with the new SM-3 interceptor—courtesy of the Missile Defense Agency. Beyond that, Navy planners have already concluded the VSR and the MFR will not be

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[902] "Theater Missile Defense: The Cruise Missile Threat," a PowerPoint presentation presented by Northrop Grumman to CSBA on July 6, 2004.

[903] The SM-6 combines the SM-2 Block IV missile stack with advanced active seeker technology taken from the Advanced Medium Range Air-to-Air Missile (AMRAAM), which will allow a firing ship to take full advantage of the SM-2 kinematics and range. See Patricia Kime, "Navy Pursues SM-6 as Defense Against Cruise Missile Threats," *Seapower*, November 2004, p. 19.

[904] See Kime, "Navy Pursues SM-6 as Defense Against Cruise Missile Threats," p. 19.

[905] M.S. Frick, "RAM and Phalanx: System of Systems Testing," *Seapower*, September 2000, pp. 46-50.

[906] The S-band VSR is an "above-horizon detection and tracking" radar that will provide cueing for the X-band MFR. It will be an advanced phased array radar with the "revisit" time necessary to counter fast, low/very low observable, and high diving missiles, and will have a good ballistic missile detection and tracking capability. Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 552. The X-band radar is also an advanced phased array radar focused on horizon search and fire control functions. It is designed to detect low observable ASCMs and provide fire control to the ESSM and all SAMs. "AN/SPY-3 Multi-Function Radar," at http://www.globalsecurity.org/military/systems/ship/systems/mfr.htm.

[907] "DD(X) Media Roundtable" PowerPoint presentation.

[908] Ahearn, "Down-sizing Won't Work on DD(X), Which Has Sound Technology," p. 2.

sufficiently capable of handling the future threat. For this reason, while the ballistic missile sensors, combat systems, and weapons associated with the CG(X) have yet to fully take shape, the expectation is that their S- and X-band radars will be even larger, heavier, and require more power than the VSR and MFR. Indeed, as mentioned earlier, it remains uncertain if the DD(X)'s wave piercing tumblehome hull will be the best platform for these sensors, systems, or weapons.[909] Should the DD(X) be cancelled, the LCS's rapid requirements definition, design, and procurement schedule suggest a new dedicated TFBN ballistic missile platform based on a non-DD(X) solution could be in fleet service within a decade.

In the meantime, *TFBN* long-range ballistic missile and air and cruise missile defenses can be improved by more aggressively exploiting the 84 programmed 84 AEGIS/VLS combatants now either in service, in production, or authorized. For example, one option would be to equip every combatant with the AEGIS Ballistic Missile Signal Processor (BSP) developed under the auspices of the MDA. The BSP, as part of the AEGIS and VLS open architecture initiatives, would convert the entire legacy AEGIS/VLS fleet into ballistic missile radar trackers. The Block 2006 version of the AEGIS BSP gives the radar an ability to discriminate reentry vehicles from decoys, and would likely be the best candidate for early insertion into the AEGIS fleet.[910]

A second option would be to enhance the sensitivity of the fleet's proven and reliable AEGIS radars. Every 12 decibel (dB) increase in radar sensitivity results in a doubling of radar range. Using the solid-state S-band technologies developed for the Volume Search Radar, engineers believe AEGIS radar sensitivity might be increased by as much as 15 to 23 dBs.[911] This would allow future Naval Battle Networks to track and engage ballistic missiles and cruise missiles at far greater ranges than possible today. Importantly, these increased tracking and engagement ranges would allow a Battle Network to take multiple shots against inbound missiles, thereby increasing the likelihood that they can be destroyed.

A third option would be to improve the numbers and types of sea-based interceptors. For long-range air and cruise missile attacks, the aforementioned SM-6 active missile appears to be the best near-term solution. A likely candidate for improved ballistic missile interceptors would be an upgrade to the three-stage SM-3 ballistic missile, which was developed in conjunction with the MDA and is now entering the fleet. The current missile has a 21-inch diameter first stage and

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[909] The CG(X) will carry a new Solid State SPY (SS-SPY) S-band radar designed specifically to employ the SM-6 ERAM. Because the ERAM is itself actively guided, this means the SS-SPY will not be required to remain active during the intercept phase. It will also likely carry a large X-band radar for tracking and discrimination of ballistic missile reentry vehicles and warheads, and potentially very large ballistic missile interceptors such as the Kinetic Energy Interceptors. Importantly, the down select for these radars will not occur until 2008-2009. Until the size of the CG(X) radars and its weapons load outs are known, DoN officials are unsure that the DD(X) hull will be big enough. See Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, p. 552; Brown, "Young: Navy May Back Away From Plans to Compete CG(X) Cruiser;" and Malina Brown, "Navy Officials Back Off From Plans to Use Same Hull For DD(X) Family," *Inside the Navy,* June 23, 2003, p. 1.

[910] See "AEGIS Ballistic Missile Defense Flight Test Successful," found at http://www.comspacewatch.com/news/viewpr.html?pid=16234.

[911] Richard Burgess, "Lockheed Martin to Build Advanced AEGIS Radar," found online at http://www.navyleague.org/sea_ power/ april_02_07.php.

13.5-inch diameter second and third stages. By pursuing 21-inch diameter second and third stages, the missile's speed and range could be increased by nearly 50 percent, and its engagement envelope expanded accordingly. The Japanese are interested in pursuing this approach to arm their fleet of six first- and second-rates with a ballistic missile defense capability, and might help in its development.[912] Such a missile might also be attractive to other allies that now or will operate AEGIS/VLS combatants, such as the Spain, South Korea, Australia, and Norway.

DoN planners are certainly right in their assertion that these steps, while improving the TFBN's capabilities against long-range ballistic missiles over the near- to mid-term, will sooner or later need to be augmented by additional steps. Maneuvering ballistic missiles will severely stress future TFBN defenses. New sea-based sensors weapons, perhaps even directed energy weapons, will likely be required. However, none of these new capabilities are directly tied either to the DD(X)/CG(X)—or to any other particular hull solution. Networked solutions allow a variety of different approaches, many of them likely cheaper than the DD(X) and CG(X).

## THE STRATEGY OF THE SECOND MOVE SUGGESTS A NEW PATH

The foregoing discussion suggests that the six key arguments made in support of the DD(X) are tenuous, at best. Even worse, they are all based on a fundamentally flawed appreciation of the state of the naval competition. This is evident by the aforementioned comparison of the DD(X) to the *HMS Dreadnought*—a "ship that in one generation set the Royal Navy apart from its peers." The *Dreadnought,* like the *HMS Warrior* before it, represented disruptive combatant designs introduced by the British Royal Navy during times of intense naval competition. Both were made necessary because increasingly capable naval challengers were pressing the British Royal Navy for the lead in the global naval race, and they were introduced for the specific purpose of reopening the British lead.

In stark contrast, the ***US surface battle line is already a generation ahead of its peers.*** According to DoN officials, the current first- and second-rates will be capable through at least 2030, and the last DDG-79s will not retire until after 2045. If this is true, why introduce a very expensive, even more power first-rate, at this time? What is the incentive to do so? One DoN official said the DD(X) and CG(X) are designed to "project power and protect the sea lanes *in the 2020-2040 time frame*."[913] How can DoN officials be sure they fully understand the design drivers for new combatants two to four decades hence? Might it not be better to exploit the battle line's formidable lead and delay movement toward a new combatant design until the threats to surface ships and ship technologies are better known or perfected?

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[912] J.D. Williams, "The Future of AEGIS Ballistic Missile Defense," October 15, 2004, found at http://www.marshall.org/pdf/materials/259.pdf.

[913] Young, "Keep DD(X) on Track."

The logic of the Strategy of the Second Move suggests a new way ahead. The first step would be to build just one, and no more than two, DD(X) technology demonstrators. It is worth remembering that both the *Warrior* and the *Dreadnought*, as revolutionary as they were, were *one*-ship classes, pointing the way ahead for future naval combatants.[914] In this regard, the DD-21/DD(X) programs have already served two salutary purposes: they worked to maintain US combatant design expertise during a lull in the naval design competition; and they provided the impetus for new advances in hull design, machinery, propulsion, and combat systems. Building just one or two of the ships would serve a third: further reducing the technological risks associated with its many innovative systems, as well as the integration risks associated with packing so many new technologies into a single hull.[915] Moreover, by designating the DD(X) as a technology demonstrator, Congress might agree to authorize its construction using R&D, rather than SCN dollars.

The second step would be to initiate a DD(X) Technology Migration Program. This program would seek to inject as many cost-effective innovations as possible into current and future TFBN ship designs. For example, as is already planned, the VSR/MFR radars would continue to be forward-fitted on a variety of platforms, such as the CVN-21 and *Commencement Bay* J-CVEs. In addition, they might be back-fitted on other warships, like the LPD-17 or LHDs.

A priority would be to explore alternative ways to introduce the DD(X)'s AGS and 28-inch VLS cells into TFBN service. Both which provide attractive new capabilities: the lethality and increased range of the AGS will provide an interim step toward the objective electromagnetic gun; and the 28-inch square VLS cells will provide the means to launch larger diameter, more capable missiles. However, these plans should be designed to minimize costs. One approach would be to design a single Joint Fire Support Squadron, sized to support a single Joint power-projection operation, and to build a new generation of Inshore Fire Support Ships (IFSs) based on existing hulls.[916] There appear to be two likely candidates for the new IFSs. The first would be based on the hull of the LPD-17, an amphibious landing ship now in serial production. At 25,000 tons FLD, the ship is large and beamy enough to accept both the gun systems and large VLS cells. Moreover, as will be discussed in the next chapter, the LPD-17 is a tough ship, with warship survivability standards. The second potential candidate is the T-AKE, a combat logistics force ship also in series production. This is a large ship (35,400 tons FLD) with a large payload capacity; it is designed to carry nearly 6,000 tons of cargo. A T-AKE could quite likely carry

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[914] I am indebted to Dr. Andrew F. Krepinevich for pointing this out.

[915] Government Accountability Office, *Defense Acquisitions: Challenges Facing the DD(X) Destroyer Program* Washington, DC: Government Accountability Office, September 2004). An update to this report, released on June 14, 2005, warned that the "level of technological maturity demonstrated [in the DD(X) program] remains below what is recommended by best practices." See Christopher P. Cavas, "GAO Details DD(X) Problems," *Defense News*, June 20, 2005, p. 6.

[916] The USS *Carronade*, IFS-1, was commissioned too late to serve in the Korean War. She was a slow (15 kt), diesel-powered ship originally designed to provide close-in fire support for amphibious landings with one 5-inch naval gun, two twin 40mm cannon, and eight twin rocket launchers. She was decommissioned shortly after entering the fleet, but was recommissioned in 1965 to serve as the flagship of Inshore Force Support Division 93 in Vietnam. See "LFR-1 Carronade," at http://www.globalsecurity.org/military systems/ship/lfr-1.htm.

four AGSs, each supported by extremely large magazines, *and* 160, 28-inch VLS cells. Like the DD(X), the ship has an integrated electric power and propulsion system, also has a small crew of approximately 150-170.[917] Better yet, it is relatively cheap, costing approximately $380 million. Indeed, such an IFS conversion likley would provide the equivalent firepower of *two* DD(X)s for less than $1 billion, resulting in a shipbuilding savings of over $3 billion (assuming two DD(X)s cost the DoN estimate of $2.1 billion).

The third step would be to initiate a new design competition for the next *Large Battle Network Combatant* (LBNC). The LBNC would be designed to complement the capabilities of the *Small Battle Network Combatant* (SBNC) now known as the LCS. The design effort would shoot for true "clean sheet design," based on a far better appreciation of the nature and challenges of with the Joint Expeditionary Era, its associated Naval Battle Network Era, and the future budget environment. The effort would benefit from lessons learned from both the DD(X) and LCS programs. For example, one approach might try to design a LBNC "sea frame" with different mission modules for what are now referred to as "guided missile cruiser," "guided missiles destroyer," and "general purpose destroyer" missions. The upper size of the hull would be determined by the size, power, and cooling requirements associated with the "guided missile cruiser" module. Like the LCS program, an integral part of the effort should be a series of design and prototype competitions designed to maintain US combatant design expertise, and to test new approaches to LBNC design.[918]

Including designs with new, small modular nuclear power plants should be considered by TFBN planners. Rising fuel prices may make a new and more compelling business case for nuclear-powered surface combatants. In addition, every indication is that high-density electrically powered weapons such as lasers and electro-magnetic rail guns will be developed sometime in this century. The combination of nuclear power, permanent magnet electric motors, and integrated electric propulsion systems would likely power life cycle costs and pave the way for the systems long touted by advocates of the DD(X).

Assuming an expected service life of 35 years, the current 84-ship battle line will need to be replaced starting in 2021, at an average rate of 2.4 ships per year, or approximately five every two years. Assuming a construction period of three years for LBNCs, the LBNC competition would aim to have a solid design ready for introduction *no later than* 2018. To enable a 2.4 ship per year construction rate, LBNC sea frames would need to be designed-to-cost, as would their mission modules. The only variable in LBNC costs would be whether the ship carried a "guided missile cruiser," "guided missile destroyer," or "destroyer" combat system module, and whether they were configured as first-, second, or third-rate ships of the line. Shifting to a higher LBNC production in 2021 would be helped by the fact that LCS production is scheduled to cease after

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[917] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 267.

[918] Ronald O'Rourke, a specialist in naval affairs in the Foreign Affairs, Defense, and Trade Division of the Congressional Research Service, has recommended a conceptually similar approach. See his "Navy Ship Acquisition: Options for Lower-Cost Ship Designs—Issues for Congress," CRS Report RL32914, dated May 11, 2005.

2021, freeing up an additional $1.3 billion per year to support LBNC construction through the 2020s.[919]

Of course, such a path would require a fourth step in the surface combatant transformation plan: keeping the fleet of 84 first- and second-rate combatants fully up-to-date. Happily, such an effort is already in place. The soon-to-commence CG and DDG modernization programs represents a cost-effective and prudent way to maintain TFBN combat capability until the new LBNC is designed. These programs will include upgrades to ship's weapons and weapon systems, including the SPQ-9B X-band radar, the ESSM missile, new *Tomahawk* planning systems, upgraded terminal defense guns, and new electronic warfare systems.[920] The program also includes ship habitability and machinery upgrades, introducing all-electric ship auxiliaries and new integrated bridge systems. The introduction of "smart-ship" technologies may allow crew reductions of up to ten percent. These and other improvements are expected to extend the expected service lives of the ships from 35 to as much as 40 years, and reduce fleet-wide O&S costs by up to 39 percent.[921]

A key contributor to such impressive O&S savings, as well as a key means to keep the 84-ship battle line effective throughout its service life, is the introduction of open architecture standards for the AEGIS combat system, the CEC program, and the VLS.[922] In today's lexicon, the AEGIS combat system was designed from the start to be a "spiral development" program involving successive, progressively more capable software "baseline configurations." Unfortunately, each configuration represented a unique software product, which although interoperable with other baselines, required dedicated technical support, and led to high fleet-wide O&S costs. Worse, the proliferation of different baseline configurations resulted in a battle line of widely different capabilities. Drawing heavily from the lessons of the ARCI program developed by the TFBN submarine force, the AEGIS Open Architecture (AOA) program aims to move the entire 84-ship

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[919] Both the Lockheed Martin and General Dynamics versions of the LCS are designed for a 30 year service life. Assuming the 84th LCS is authorized in 2021, the first of class would not need to be replaced until the mid 2030s.

[920] The SPQ-9B, or "Spook 9B," is a slotted, phased array, X-band radar designed to detect and track low-altitude ASCMs in heavy sea clutter. The new Tactical Tomahawk Weapons Control System (TTWCS), fed by the space-based Tomahawk Strike Network (TSN), will allow strike planners to retarget the new "Tactical Tomahawk" in flight. The fleet's Close-in Weapons System (CIWS), a radar-controlled rapid-fire gatling gun, will be upgraded to the CIWS IB configuration. This configuration adds electro-optical and Forward Looking Infrared sensors and software upgrades, giving it an engagement capability against small fast-moving surface craft. See Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 140, 498, 528, 548. For more information on the new TTWC, see Lieutenant (JG) Christopher Byrnes, USN, "SEA POWER 21: The Impact of Tactical Tomahawks in the Joint Arena," *Proceedings,* July 2005, pp. 74-75. The legacy AN-SLQ32 electronic warfare systems are being upgraded through a new Surface Electronic Warfare Improvement Program (SEWIP), which switches the system over to a new open architecture. See "Surface Electronic Warfare Improvement Program (SEWIP)," at http://www.gd-ais.com/Capabilities/ Productpages/SEWIP.htm; "SEWIP: Restoring Tactical Usefulness to Legacy EW Systems," at http://www.gd-ais.com/ Capabilities/Datasheets/MDS/HM03-AIS-057%20SEWIP.pdf; and Edward J. Walsh, "Surface Ships to Receive Electronic-Warfare Upgrade," *Proceedings,* July 2003, p. 104.

[921] See "CG-47 *Ticonderoga*-class Modernization," at http://www.globalsecurity.org/military/systems/ship/cg-47-mod.htm; Andrew Koch, "US Navy's DDG-51 Destroyers to be Modernized," *Jane's Defence Weekly,* July 14, 2004, p. 8; and Christopher P. Cavas, "USN Lays Out DDG Upgrade Plan," *Defense News,* July 25, 2005, p. 48.

[922] Ed Walsh, "Open Architecture Takes Center Stage for Surface Warfare," *Proceedings,* January 2004, p. 89.

AEGIS fleet from military specification, Navy-unique "UYK" computer hardware and software to a flexible, open architecture based on commercial processors and interfaces. This will allow for a surface combatant fleet COTS-based Rapid Capability Insertion Process (RCIP) based on ARCI principles.[923]

The AOA program will update the entire combat system, to include its command and decision components, its weapons control systems, and the SPY-1 radar itself. The upgrades will include a new shipboard fiber optic local area network, commercial routers and switches, software modules written in flexible C++ programming language, new "middleware," and new display software and hardware. The AOA will result in a standardized fleet AEGIS baseline, providing all 84 ships of the line with common capabilities and allowing for easy fleet-wide combat system upgrades. The shift to the new AOA system began with its "forward fit" on the final three DDG-79s now under construction. The *USS Bunker Hill*, the first CG-52 and the oldest ship in the battle line, is expected to be the first ship to be back-fitted with the new open architecture in 2008. All remaining CG-52s and DDG-51/79s will receive the modification as part of their mid-life modernization.[924]

The shift to open architecture standards for the AEGIS combat system is being accompanied by a similar program for the CEC program. The original CEC system included a small, donut-shaped phased array antenna that clips onto a ship's mast and that receives radar data from other CEC-equipped ships. Because of topside clutter, larger ships like the CG-52 class required two antennae to achieve 360 degree coverage around the ship. Additionally, the system that integrated the ship's own radar data into network-derived composite tracks included a unique processor that used proprietary Navy programming language. The CEC open architecture program replaces the old antenna with a new four-face phased array antenna that can be distributed flexibly around a ship's superstructure to provide 360 degree coverage. It also replaces the 2,000-pound, legacy refrigerator-size data processing unit with a 55-pound, commercially designed processor using the same C++ language being used in the AOA program. Along with the AOA program, the CEC open architecture program will allow easier fleet-wide CEC upgrades, and help to resolve the nagging problem of non-interoperability or incompatibility among multiple, dissimilar combat systems.[925]

The VLS Open Architecture program is the final part of the battle line open architecture transition plan. There are currently four different VLS baseline configurations in the TFBN, and

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[923] Ed Walsh. "AEGIS Aims for Open Architecture by 2007," *Proceedings*, February 2005, p. 90; and Sandra I. Erwin, "Navy to Upgrade AEGIS Ships with Open Software Standards," *National Defense*, May 2003, found at http://www.nationaldefensemagazine.org/issues/2003/May/Navy_to_Upgrade.htm. See also Otto Kreischer, "COTS Technology Plays Increasing Role in Naval C3 Systems," *Naval Forces*, No. III, 2005, pp. 43-50.

[924] Walsh, "AEGIS Aims for Open Architecture by 2007," p. 90; and "US Navy Awards $208.7 Million to Lockheed Martin for Three AEGIS Weapon Systems," found at http://www.global-defence.com/2005/Utilities/news.php?cmd=View&id=261.

[925] Ed Walsh, "Surface Navy Transforming CEC for Current, Future Combatants," *Proceedings*, June 2005, p. 91; see also Scott Nance, "Raytheon Builds Smaller CEC System For Navy," *Defense Today*, July 19, 2005, p. 1.

two additional baseline configurations in allied navies. The VLA Open Architecture program introduces new launch control units, launch sequencers, processors, middleware, peripherals, C++ programming language, and communication protocols to allow easy introduction of new weapons into the VLS stable, and to allow rapid updating of fleet-wide weapons control and launch operations.[926] In the near-term, VLA Open Architecture will allow all ships of the line to fire all versions of *Tomahawk*s, all variants of the Standard SAM, vertical launch ASW rockets, and the new ESSM. In the far-term, it will allow all ships to easily incorporate new missiles in their magazines, such as the aforementioned SM-6 ERAM now in development; more powerful anti-ballistic missiles; and other guided weapons, such as advanced versions of the *Tomahawk* or navalized versions of the Army Tactical Missile System (ATACMS).[927]

The move toward a fleet-wide open architecture for AEGIS, CEC, VLS will make the programmed 84-ship battle line a much more powerful networked force than it is today, and allow it to make the rapid technological responses and rapid assimilation of new weapons required by a Strategy of the Second Move. The planned ship and habitability enhancements included in the modernization plans may also give TFBN planners even more latitude in planning for the bolder, more disruptive changes promised by the LBNC. Because the modernization program will increase the service lives of AEGIS/VLS combatants from 35 to up to 40 years, its expands the time window during which the DoN must introduce the follow-on LBNC to maintain battle line numbers. Given a 35-year expected service life, the first ship of the line needing to be replaced, CG-52, will retire in 2021. Extending its service life to 40 years will push back the replacement date to 2026. Assuming a three-year build period for future surface combatants, this means the construction date for the first LBNC could slip from 2018 to 2023. This will allow TFBN planners greater flexibility in choosing the time to trigger advantageous, disruptive change. For a price between $200 and $225 million ship in FY 2005 constant dollars, the battle line modernization plan thus looks to be a very wise investment.[928]

Building one or two DD(X) technology demonstrators, developing a DD(X) Technology Migration Plan, initiating a design competition for the next Large Battle Network Combatant, and modernizing the programmed 84-ship battle line will help to maintain and widen the dominance now enjoyed by the US surface combatant fleet. Together, these four steps will preserve surface combatant design expertise and position the United States to upend the naval

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926 Mark Zimmerman, "VLS Open Architecture," a PowerPoint presentation presented to CSBA on January 7, 2005.

927 See Hunter C. Keeter, "Multiwarhead Tomahawk Could Strike many Targets," *Seapower*, November 2003, pp. 10-11; and "M39 Army Tactical Missile System (Army TACMS)," at http://www.fas.org/man/dod-101/sys/land/atacms.htm.

928 In FY 2006 constant dollars. The costs for the battle line modernization plan are *not* paid for out of SCN or NSDF accounts. Instead, they are paid for through a combination of funds from the Other Procurement, Navy (OPN), Operations and Maintenance, Navy (OMN), and Weapons Procurement, Navy (WPN) accounts. Tracking just OPN and OMN expenditures (the majority of the money associated with modernization of the TFBN first- and second-rates), the average cost for cruiser modernization comes to $225 million per ship. The final cost for DDG modernizations is not yet firm. CBO uses a planning figure of $200 million per ship, which is the figure used in this report. I am indebted to Dr. Eric Labs, CBO, for helping me come up with these figures. Any mistakes in the projections are mine alone.

competition at a time of its choosing sometime over the next two decades. However, they will not help to maintain the US surface combatant industrial base, a clear concern of the Congress, and an important component of a Strategy of the Second Move. A fifth and final step, a sustaining industrial base strategy, is therefore needed.

A sustaining industrial base strategy need not result in an increase in the size of the battle line, as demonstrated by the model adopted by the Japanese Maritime Self Defense Force for its submarine fleet. The JMSDF submarine requirement calls for a fleet of 16 boats. Because the boats have much longer potential service lives than 16 years, one shipbuilding option would be to build a fleet of 16 boats, and halt production for ten years or so before building a replacement class. Unfortunately, in the interim, the Japanese design and shipbuilding base would whither away. Therefore, the Japanese generally authorize the building of one new submarine every year.[929] Every time a new submarine is commissioned, the oldest boat in the fleet is first transferred to training duties, and then retired. The oldest submarine in the fleet is thus 16 years old, and the average age of the fleet is only eight years. In this way, the fleet is continuously refreshed, and the submarine construction industrial base preserved. By starting periodic new classes, Japanese design expertise is also maintained.[930]

In a similar way, starting in FY 2007, the DoN could authorize one DDG-79 a year, *with the intention of keeping the AEGIS/VLS fleet at a steady state force of 84 ships.* As these ships enter the fleet in FY 2012 and beyond, they would replace the oldest non-modernized DDG in the force. Each new ship could be used as the basis for injecting new innovations into the fleet, such as AEGIS Ballistic Missile Processors, new solid-state S-band radars, or other technologies derived from the DD(X) program. Priority would be given to systems that could be back-fitted into other DDG-51/79s during the ongoing battle line modernization program.

The advantages to this approach are many. First, as the TFBN awaits the final design and production of new LBNCs, older DDG-51s would be replaced with more modern DDG-79s. As a consequence, the battle line would be constantly refreshed, and the aging of the fleet moderated. Second, the projected $1.8 billion cost for each new DDG-79 would be offset somewhat by the $200-$225 million that would have been spent to modernize the DDG-51s they would replace. Third, by freezing the battle line at 84 combatants, fleet-wide O&S expenditures would decline over the near-to mid-term due to expected manning savings in the legacy fleet and decreases in fleet-wide O&S savings associated with the AEGIS, VLS, and CEC open architecture programs. Fourth, the plan would establish a steady-state baseline for battle line weapons procurement. Fifth, building one or two DD(X) Technology Demonstrators, a small class of new Inshore Fire Support Ships, and one DDG-79 per year should provide more than enough work to sustain two

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[929] Between 1964 and 2004, the Japanese failed to lay down a submarine in only five years. They laid down two submarines in a single year only two times. The four-boat *Asashio*-class was laid down one per year from 1964-1967; the seven-boat *Uzushio*-class from 1968-1975 (gap year in 1974); the ten-boat *Yushio*-class from 1976-1986 (gap year in 1977); the seven ship *Harushio*-class from 1987-1992 (two in 1988, gap in 1989, two in 1990). The *Oyashio*-class now in serial production has been produced at a steady rate of one per year since 1994. See "JMSDF Submarines" at http://homepage2.nifty.com/nishidah/e/d_xt02.htm.

[930] Since 1964, the Japanese have introduced five submarine classes, an average of a new class every five years.

combatant construction yards.[931] Finally, by replacing the first eight DDG-51s, the replacement date for the oldest ship in class would slip from 2026 to 2031, adding further flexibility in surface combatant shipbuilding plans in the early 2020s.[932]

Of course, the above plan also could be modified to provide a low-cost option to expand the size of the battle line, if necessary: instead of retiring DDG-51s as new DDG-79s are commissioned, they could be modernized and placed into service. Indeed, one attractive variation of this option might be to replace the eight FF7s now in the Naval Reserve Force with six to eight modernized DDG-51s. This move would give the NRF an additional six to eight second-rates for a total conversion price of $1.2 to $1.8 billion, and minimize active duty manpower increases, saving O&S costs.

## BATTLE LINE REQUIREMENTS

In the end, the decision whether or not to expand the battle line beyond the 84 ships now programmed will depend on TFBN requirements. In this regard, the recommendations made so far suggest the need for 58 total first- and second-rate surface combatants, as indicated below:

| | CG<br>First Rate | DDG<br>Second Rate | Total<br>Combatants |
|---|---|---|---|
| 1 Forward-based CSG | 1 | 2 | 3 |
| 1 Forward-based TAMD SAG | 1 | 2 | 3 |
| 8 Deployable CSGs | 8 | 16 | 24 |
| 8 Ballistic Missile Defense Groups | 8 | 8 | 16 |
| 4 Deployable CVESGs | 4 | 8 | 12 |
| **Total** | **22** | **36** | **58** |

Six combatants would support the single Carrier Strike Group and a three-ship Theater Air and Missile Defense (TAMD) Surface Action Group (SAG) forward-based in Japan. Providing a full three-ship SAG with an air and cruise missile "shotgun" would allow the task unit to deploy

[931] This appears to be the thinking behind recent House Armed Services Committee and the House Appropriations Committee moves to limit the cost for future destroyers to $1.7 billion and to direct the building of more DDG-79s. The former would effectively kill the DD(X) program, and the latter would keep a second combatant shipbuilding yard open. See Geoff Fein, "Cost Cap and Eliminating Capabilities Could Diminish DD(X), Navy Says," *Defense Daily*, June 24, 2005; Dave Ahearn, "Deep DD(X) Destroyer Cuts Seen Difficult," *Defense Today*, June 24, 2005, p. 1; Megan Scully, "House Pushes Navy to Buy More Ships in 2006," *GovExec.com*, June 22 2005; Ahearn, "Sen. Collins Rejects DD(X) Plan as No Improvement;" and O'Rourke, "Navy Ship Acquisition: Options for Lower-Cost Ship Designs—Issues for Congress."

[932] DDGs 51-58 were commissioned between 1991 and 1995. With expected service lives of 35 years, DDG-59 would not need to be replaced until 2031. This would give TFBN planners the flexibility to delay the production of the DDG(X) for five years, if necessary.

independently. Each of the deployable aircraft carriers and escort carriers would also rate three multi-mission escorts. Eight 2-ship Ballistic Missile Firing Units could deploy either as part of a CSG or CVESG, or as part of future expeditionary maneuver groups.

Note that the above requirements do *not* include LBNCs operating in support of amphibious task groups. These requirements will be discussed in the next chapter.

## RECOMMENDATIONS FOR THE SURFACE BATTLE LINE

In summary, then, the DD(X) would set the world standard in surface combatant design. It would be a technological marvel, and be by far the most powerful surface combatant in the world. However, this is not the issue. Instead, DoN planners must honestly answer the following four questions:

- Given the overwhelming lead the United States now enjoys in the global naval competition, and particularly in the surface combatant design competition, is this the right time to be introducing an even more powerful first-rate surface combatant?

- Is the very expensive DD(X) attuned to likely US shipbuilding budgets? Would its introduction cause unfavorable tradeoffs among competing Navy platform requirements, or lead to unwanted reductions in US shipbuilding capacity?

- Could the DD(X)'s warfighting capabilities be pursued at a more reasonable, lower price?

- Are there viable near-term alternatives that would maintain US fleet combat capabilities until these lower-priced alternatives could be pursued?

The answers to these questions appear to be, in order: no, no, yes, and yes. They, in turn, inform the recommendations below. Consistent with a Strategy of the Second Move, this report recommends that:

- A single DD(X) technology demonstrator be built by Northrop Grumman Ship Systems in FY 2007.[933] Subject to Congressional approval, the costs for the ship would be paid for out of DoN R&D accounts.

- TFBN planners commence a design competition for a Joint Fire Support squadron, which would be designed to support a single major Joint power-projection operation. The intent of the competition would be to quickly introduce a relatively inexpensive Inshore Fire Support Ship (IFS) armed with the AGS and large cells developed for the DD(X). To

[933] April 2002, Northrop Grumman Ship Systems, Ingalls was selected as the lead design agent for DD(X). Northrop Grumman led the "Gold Team" which included Raytheon Systems Company as the systems integrator. Bath Iron Works lead the losing "Blue Team." See "DD(X) Multimission Destroyer, USA," at http://www.naval-technology.com/projects/dd21.

minimize costs, the ships should take advantage of hulls currently in production, such as the LPD-17 or T-AKE. The final number of ships in the squadron would depend on ship armament and operational support requirements. A minimum squadron of four ships, assuming 85 percent force availability, would provide at least three ships for a major power-projection operation—two brigade direct support ships and one general support ship. For planning purposes, the ships would be built at a rate of one per year from FY 09 through FY 12.

- As part of a wider DD(X) Technology Migration Program, the DoN explore alternative TFBN platforms for the VSR/MFR and other DD(X)-related technologies. Consistent with a Strategy of the Second Move, TFBN planners immediately commence a new design competition for the next generation of modular Large Battle Network Combatants. The competition, patterned after the LCS program, would include a series of design and interim prototype competitions, including the aforementioned IFS competition. Given rapidly escalating fuel prices, a nuclear-powered LBNC sea frame should be considered.

    - The overall aim would be to have a modular LBNC sea frame design and associated mission modules ready for production sometime between FY 2015 and FY 2023. First priority for LBNC mission modules would be on the development of a first-rate "guided missile cruiser module," in order to replace the CG-52s in the early- to mid-2020s. A modernized CG-52 will have an expected service life between 35 and 40 years, meaning the first CG-52 will need to be replaced sometime between 2021 and 2026. After the CG-52s are replaced, the LBNCs would be equipped with a second-rate "guided missile destroyer module," and begin replacing DDG-51/79s in the late 2020s or early 2030s.

- To maintain the industrial base until shifting to LBNC production, the DoN procure a minimum of eight DDG-79s, at a rate of one per year, between FY 2007 and FY 2014. The ships would either replace the eight oldest DDG-51s on a one-for-one basis, maintaining the active surface battle line at 84 ships, or would allow the transfer of up to eight DDG-51s to the Naval Reserve Force, as replacements for the eight FF7s now in the NRF. The TFBN would continue producing DDG-79s until the first LBNC was ready for production, sometime between 2015 and 2023.

    - For tentative planning purposes, this report assumes the first-rate LBNC will be ready for production in 2015, and will be built at a rate of one per year from FY 15 through FY 20.

- The CG and DDG-modernization program be fully funded, if not expanded. Two additional improvements should be considered to the already well-thought-out plans. First, all legacy ships should be equipped with the AEGIS BSP. This would give the entire fleet an engagement capability against ballistic missiles. Second, all naval guns in the 84-ship fleet should be upgraded to 5-inch/62 standard, and priority given to introducing an affordable and effective 127mm (5-in) extended range guided projectile. This would provide the TFBN with 106 naval guns capable of firing extended range guided munitions to ranges of 63 nm, providing powerful supporting fires for the Joint Fire Support Squadron.[934]

- TFBN planners devise a plan to maintain two surface combatant yards. A combination of a single DD(X) technology demonstrator, a design competition for a small class of new IFSs, and an industrial base sustaining rate of one DDG-79 per year should provide enough work to maintain two combatant yards over the near- to mid-term.

### Associated Annual Shipbuilding Costs

The following outlines the annual ship building costs through 2020 associated with the above recommendations.

- Subject to Congressional approval, the costs for the single DD(X) technology demonstrator would be paid for out of R&D accounts. This will be an expensive R&D prototype, likely in the range of $4-$5 billion. However, the DD(X) has a large number of engineering development modules which are important for other TFBN ships and future surface combatants. Moreover, valuable lessons will be learned actually integrating these modules on an actual vessel—lessons that can be readily applied to the LBNC design competition. For this reason, the high costs appear to be worth it.

- $1.1 billion per year (.75 ASEs, FY 2005 dollars) from FY 09 through FY 12, for four Inshore Fire Support Ships. This relatively low cost will demand that the IFSs be variants of hulls currently in production.

- $1.8 billion a year from FY 07 through FY 14 (1.3 ASEs, FY 05 dollars) for eight DDG-79s. This is a conservative price; if procured in a multi-year contract it seems likely this cost could be reduced. In any event, as these ships are properly viewed as a means to maintain industrial base capacity, they are an elective addition to the shipbuilding program, and will be annotated as such in the report's final shipbuilding tally.[935]

- $2 billion per year from FY 15 through FY 20 (1.4 ASEs, FY 05 dollars) for six first-rate LBNCs.

- The costs for the CG and DDG modernization program are to be paid for out of TFBN OPN accounts, per current plans.

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[934] The "5-inch/62", now on DDGs 81 and above, was designed to fire extended range, rocket-assisted, guided rounds to a range of 40-60 nautical miles. See Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, p. 488. However, the development of extended range 127mm rounds has been especially troublesome. See Sandra I. Erwin, "Elusive Targets," *National Defense,* April 2005; and Geoff Fein, "Navy Need Viable Acquisition Plan for ERGM, Inspector General Says," *Defense Daily,* July 5, 2005.

[935] This is the DoN-derived estimated price for one DDG-79 per year. It seems possible that through incentives and competition this price might be driven down.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

For the moment, assume that the surface battle line remains fixed at 84 ships, that eight DDG-79s would replace eight DDG-51s on a one-for-one basis, and that the LBNC would enter production in 2015 at a rate of one per year. One 2020 battle line would consist of three LBNC first-rates, 19 modernized CG-52s, 20 modernized DDG-51s, and 42 modernized or new DDG-79s.[936] Assuming each LBNC first-rate carries 200 battle force missiles, the combined battle line magazine capacity would be 9,062 battle force missiles, essentially the same as the 2011 programmed capacity of 8,868 missiles. After that, magazine capacity numbers would depend upon number of VLS cells carried on the LBNCs, and the replacement schedule for legacy ships of the line.

Overall TFBN weapons capacity would rise depending on the size of the Joint Fire Support Squadron, and the armament carried on each IFS. For planning purposes, each IFS is assumed to carry between 80 and 160 28-inch square VLS cells, and two to four AGS systems (one to two DD(X) equivalents). The costs to develop new 22 to 27-inch diameter missiles could be substantial. Accordingly, whenever possible, Joint munitions such as the JASSM or the Army ATACMs missiles should be modified for VLS-firing.

This plan would result in substantial near- to mid-term O&S savings over the current plan. It would limit the active surface combatant manning requirement at close to the 29,184 officers and Sailors needed to operate the programmed 2011 battle line. The number will climb somewhat due to the addition of the four IFSs. It will climb further still if the TFBN elects to shift six to eight DDG-51s into the reserve. Hopefully, any increase in manning would be offset by manning reductions associated with the battle line modernization program. A savings of just 12 billets per ship would result in a fleet-wide manning reduction of 1,008 personnel.

By maintaining a standardized, common fleet of first- and second-rates through the next decade, fleet training, maintenance, and logistics costs will be kept at a minimum. The broad move to open architectures will also limit costs associated with fleet-wide combat system upgrades. Recall that the modernization program is expected to result in O&S savings of nearly 40 percent. The DDG modernization plan alone is expected to save more than $5 billion in future operating costs for the DDG-51/79 fleet.[937] This plan is therefore limits O&S costs at the very time that the TFBN is designing the UWS(X) and the LBNC, offsetting to some degree the non-recurring engineering costs associated with these efforts.

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[936] There are other options. For example, should the TFBN decide to increase the number of first-rates, it could replace DDG-51s with LBNCs.

[937] "Navy Study Projects Billions in Savings From DDG-51 Modernization."

# XIII. THE SEA AS BASE EXPEDITIONARY MANEUVER FLEET

> In the 19th Century, whenever there was a crisis in some remote part of the world the response was to send a gunboat. And now, in the 21st Century, the popular response is to send an amphibious battle group.[938]
>
> E.R. Hooton
> "Send an Amphib, the Future Cry"

## THE CONTEMPORARY SEA-BASED TRANSPORT FLEET

As discussed in Chapter IX, the current Sea-based Transport Fleet is a legacy of the Garrison Era's general conditions of assured access and the development of reliable and rapid transoceanic air transport. It includes three major components, backed up by a modernized, albeit much smaller, version of the World War II Transoceanic Cargo Fleet.

The Sea-based Transport Fleet's first component is the 36-ship ***Sea-based Prepositioning Fleet,*** which is optimized for rapid response missions in conditions of assured access conditions, including rapid reinforcement of forward based or deployed Joint forces.[939] This fleet includes:

- *The Maritime Prepositioning Force, or MPF*. The MPF consists of 16 ships organized into three squadrons. Each squadron is pre-loaded with the equipment, supplies, ammunition, and fuel to support a single Marine Expeditionary Brigade in sustained combat for 30 days. With squadrons located in the Mediterranean, on Diego Garcia, and on Guam, MPF ships are within 10-14 days steaming time from any port in Europe, the Indian Ocean, or the Western Pacific.[940]

- *The Combat Prepositioning Force, or CPF*. The CPF, known in the Army as Army Prepositioning Afloat or Army Prepositioned Stock 3 (APS-3), resulted from a 1995 Congressionally-mandated Mobility Requirements Study carried out by the Joint Staff just after the Operations *Desert Shield/Storm*.[941] This study recommended that the Army

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[938] E.R. Hooton, "Send an Amphib, the Future Cry," *Armada International*, 1/2005, Supplement, p. 10.

[939] See "Afloat Prepositioning Force," at http://www.msc.navy.mil/factsheet/apf.asp.

[940] See "Maritime Prepositioning Force," at http://www.msc.navy.mil/PM3/mpf.asp; and Major Henry B. Cook, USANG, "Sea-basing and the Maritime Pre-positioning Force (Future), *Military Review,* July-August 2004, pp. 54-55.

[941] This study is known as the Mobility Requirements Study Bottom Up Review Update. See Statement of General Robert T. Robertson, US Air Force, Before the Senate Armed Services Sea Power Subcommittee on Strategic and Tactical Lift in the 21st Century, March 10, 1999, found online at http://armed-Services.senate.gov/statemnt/1999/990310cr.pdf.

develop the means to transport a heavy combat brigade anywhere in the world within 15 days. The resulting APS-3 is patterned after the successful MPF program; it consists of ships pre-loaded with equipment, supplies, ammunition, and fuel associated with an Army “2x2” mechanized brigade (i.e., a brigade with two armored and two mechanized infantry battalions); an artillery battalion; an engineer battalion; a combat support battalion; and a theater army logistics package designed to support heavy army forces until a theater logistics infrastructure can be developed. The CPF currently consists of eight Large Medium- Speed Roll-on/Roll-off (RO/RO) ships (LMSRs), and two container ships filled with ammunition, for a total of ten ships. [942]

- The Logistics Prepositioning Force, or LPF. The LPF consists also of ten ships. Two of the ships are tankers converted by the Defense Logistics Agency into offshore petroleum distribution platforms—sea-based fuel farms. Four ships carry weapons and supplies to support US Air Force operations, and one logistics support ship carries Navy ordnance. These ships are all stationed at Diego Garcia in the Indian Ocean. An additional three ships support the Marine Corps. Two Aviation Logistics Ships (T-AVBs) each carry an Intermediate Maintenance Activity (IMA) for Marine Expeditionary Brigade aviation squadrons. The ships are berthed on the east and west coasts of the continental United States. The third ship is a high-speed transport that supports the Marine forces forward-based on Okinawa.[943]

All 36 ships in the Maritime Prepositioning Fleet are operated by the Military Sealift Command (MSC) and are manned by civilian contract mariners. The MSC will be discussed in more detail in the next chapter.

The second component of the Sea-based Transport Fleet is the 19-ship **Surge Sealift Fleet,** which is optimized for the rapid transoceanic transport of Joint ground combat equipment from CONUS. Like the Maritime Prepositioning Force, these ships are operated by the MSC and maintained at a high state of readiness in US ports (with activation times within 96 hours). They are designed to load and transport the heavy vehicles associated with mechanized and armored combat units. Eight of the ships are former high-speed merchants built for the SeaLand Corporation in the early 1970s. Although relatively old, they remain the world’s fastest ocean-going cargo ships, with speeds in excess of 30 knots. Together, these eight *fast sealift ships* (FSSs) are capable of lifting nearly all the equipment associated with a legacy Army mechanized division.[944]

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[942] See “Combat Prepositioning Force,” at http://www.msc.navy.mil/pm3/cpf.asp; “Army Prepositioned Stock (APS-3),” at http://www.globalsecurity.org/military/agency/army/aps-3.htm; and Robert A. Chilcoat and David S. Henderson, “Army Prepositioning Afloat,” *Joint Force Quarterly,* Spring 1994, pp. 51-57.

[943] See “Logistics Prepositioning Force,” at http://www.msc.navy.mil/pm3/lps.asp.

[944] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 305-06. For the purposes of this report, the eight FSSs are considered capable of transporting the equipment for three Army heavy Units of Action (UAs).

The remainder of the fleet consists of 11 LMSRs. These 11 ships—along with eight sisters in the CPF and one in the MPF—are the largest, most capable military RO/RO ships in the world. They were built upon the recommendation of the aforementioned post-First Gulf War Mobility Requirements Study. Each ship is capable of lifting over 390,000 square feet of vehicles and cargo at speeds of 24-25 knots. Their large capacity allows them to carry every type and size of vehicle in the Joint force, and an armored battalion task force that is approximately 75 percent the size of a new Army brigade-sized Unit of Action (UA). It would require 38 to 52 C-17 transport sorties to carry a similar sized load.[945]

The ships assigned to the Sea-based Prepositioning and Surge Sealift Fleets all require a deep water port or anchorage to discharge their cargos. They are optimized for cargo unloading operations pier-side, using their roll-on/roll-off ramps. However, they all have cranes, and can offload their cargos "in stream"—at distances up to four miles from the shore—albeit at much slower rates than pierside operations.[946] Importantly, the personnel associated with the equipment carried by the MPF, CPF, and the Surge Sealift Fleet are flown to a nearby airfield to marry up with the equipment and prepare for combat in a procedure known as reception, staging, onward movement, and integration (RSOI). This process can take up to a week or longer. *In other words, the forces associated with these ships are not ready to fight when delivered to a distant theater*.[947]

The Sea-based Transport Fleet's final component, the vestigial remnants of the large World War II ***Amphibious Landing Fleet,*** are designed to carry *intact combat units*—including their personnel, equipment, and cargo—and to land them ashore in a ready-to- fight condition. The fleet consists of 35 active Navy amphibious ships, manned by 21,345 officers and Sailors. These ships were all developed during the Garrison Era, and are capable of sustained speeds of 20-22 knots (nearly a 100 percent increase over First Expeditionary Era amphibious ships). They include:

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[945] See "Surge Project Office," at http://www.msc.navy.mil/pm5/surge.asp. Each LMSR can carry an entire US Army Task Force, including 58 tanks, 48 other tracked vehicles, as well as more than 900 trucks and other wheeled vehicles. An Army armored UA has 58 M1 tanks, 82 tracked Bradley Fighting vehicles, and 16 tracked self-propelled howitzers. This report will therefore assume that an LMSR can lift approximately 75 percent of a UA equivalent. See the LMSR Fact Sheet at http://www.msc.navy.mil/N00P/Savannah/fact-lmsr.htm. See also Andre Maraoui, "A New Dimension of Strength," *Sea Power,* May 2003, pp. 29-31.

[946] After a decade of lessons learned and logistics innovations, during Operation Iraqi Freedom, 11 MPF ships carrying two Marine brigade equipment sets were completely offloaded pierside between January 16 and February 4, 2003. The ships were each offloaded in an average of 48 hours—a total of five days less than planned. In-stream offloads would take far longer. David Vergun, "Outfitting the Operating Force," *Sea Power,* May 2003, pp. 36-38.

[947] RSOI encompasses all of the activities needed to receive a unit's equipment and personnel at air and sea ports of debarkation; activities necessary to reorganize personnel and equipment into cohesive units following strategic airlift and sealift; their movement forward to marshaling, staging, and tactical assembly areas; and their integration into the Combatant Commander's command and control and logistics structures. Details can be found in Joint Pub 4-01.8, *Joint Tactics Techniques, and Procedures for Joint Reception, Staging, Onward Movement, and Integration* available on the JDTC homepage at www.jdtc.transcom.mil. See also "RSOI" at http://www.jdtc.jfcom.mil/DeploymentFAQ/faqpage11.htm.

- 12 “big-deck” amphibious assault ships. As described earlier, these large ships (40,000 ton FLD) ships are the largest, most capable amphibious warships ever built. They have a large well deck and expansive aviation facilities, and can carry up to 1,700 Marines and a considerable amount of landing force equipment. Five of the ships are aging *Tarawa*-class LHAs, commissioned between 1976 and 1980. Seven of the ships belong to the newer *Wasp*-class LHDs, commissioned since 1989. An eighth LHD will be commissioned in 2007 to replace the oldest of the LHAs, maintaining the big-deck amphibious force—at least in the near term—at 12 ships.[948]

- 12 relatively young dock landing ships, or LSDs. The first LSDs were developed during World War II, and were one of the most innovative amphibious ships of that war. They introduced the floodable *well deck*, from which a number of landing craft can be pre-loaded, stored, transported, launched, and recovered. Today, the eight ships of the LSD-41 and four ships of the LSD-49 class are the primary carriers of the high-speed Landing Craft Air Cushion (LCAC) that deliver heavy Marine equipment from ship to shore. All 12 LSDs were commissioned after 1985. With nominal 40-year service lives, the ships were not expected to be replaced until the late 2020s. However, because the ships were not maintained well in the 1990s, they are in relatively poor shape for their age and increasingly expensive to operate.[949]

- 11 aging *Austin*-class amphibious transport docks, or LPDs. The LPD is a further development of the World War II LSD concept, in effect trading well deck space for improved helicopter support facilities. These 11 ships are the oldest in the amphibious landing fleet, having been commissioned between 1965 and 1971. They are to be replaced by the new *San Antonio* LPD-17 class.[950]

As mentioned earlier, during the Garrison Era, the Battle Force began to man mobile “naval garrisons” along the periphery of Europe and Asia. As part of these garrisons, three- to five-ship Amphibious Ready Groups began routinely to carry a Marine Corps Battalion Landing Team (BLT) on six-month patrols. Over time, the standard amphibious patrolling unit became a three-ship ARG consisting of one big-deck, one LPD, and one LSD, and a Marine Expeditionary Unit (Special Operations Capable) (MEU(SOC)), consisting of an infantry battalion, a composite air group with helicopters and later VTOL aircraft, a logistics group, and other attachments. Supporting rotational patrols of ARG/MEU(SOC)s became the most important task of the Garrison Era Amphibious Landing Fleet.

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[948] See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 182-89.

[949] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition,, pp. 194-98. Several interviewees commented on the Navy’s failure to adequately budget for LSD maintenance in the 1990s. One interviewee referred to the ships as the “*amphibious Spru-can*,” a reference to the *Spruance*-class destroyers. The 31 *Spruances* were commissioned between 1975 and 1983. With 35-year service lives, the ships were expected to be in fleet service through 2017. However, the ships were “ridden hard” and not properly maintained; all but three have been retired, and those three will also soon be gone.

[950] See Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 190-93.

A major development in the early years of the Joint Expeditionary Era was the partial integration of the Amphibious Landing Fleet into the Sea-Based Strike Fleet. Consistent with the TFBN's strategic goal of *Get Distributed*, a key goal of the aforementioned Global ConOps Navy was to create a more dispersed naval global strike network. As discussed earlier in the report, this led to the development of Expeditionary Strike Groups, the combination of a three-ship Amphibious Ready Group and its embarked MEU(SOC) with three first- or second-rate combatants, an SSN, and other forces. In addition to distributing TFBN strike capabilities, the combination of platforms also had the salutary effect of providing the routinely deployed amphibious ships with defenses—for the first time since World War II. Given their balanced strike and maneuver capabilities, the TFBN's 12 ESGs rapidly became the DoN's preferred quick-response force for the "global war on terror."[951]

For major power projection operations, the ESGs would combine to form an amphibious task force. The total lift requirement for an amphibious task force is expressed in terms of five lift "fingerprints:" number of troops carried; vehicle storage area, expressed in thousands of square feet ("vehicle square"); cargo stowage area, expressed in thousands of cubic feet ("cargo cube"); number of aircraft parking and operating spots, expressed in CH-46 helicopter parking spot equivalents ("deck spots"); and the number of LCACs carried.[952] Today, the combined 35-ship Amphibious Landing Fleet can carry 3.0 Marine Expeditionary Brigade equivalents in cargo cube, helicopter spots, and LCAC spots, 2.5 MEB equivalents in troops carried, but only 1.9 MEB equivalents in vehicle square. As the *force* lift is limited by the smallest of these five fingerprints, the Amphibious Landing Fleet can technically carry only 1.9 MEB equivalents.[953] Based on an 85 percent force-wide ship availability rate (to account for ships in maintenance and overhaul), Marine planners consider the fleet capable of carrying one two-brigade MEF, or two independent MEBs.[954]

The combined 90-ship Sea-based Transport Fleet (36 prepositioning ships, 19 surge sealift ships, and 35 amphibious ships) is backed up a 58-ship ***Ready Reserve Fleet (RRF)***. The RRF, the modern day version of the World War II Transoceanic Cargo Fleet, is maintained and operated by the Military Sealift Command and optimized to provide sustained logistical support for US expeditionary operations. RRF ships are maintained in a reduced operating status in US ports and can be activated in four, five, 10 or 20 days. The RRF includes government-owned tankers, auxiliary crane ships, roll-on/roll-off ships, and heavy lift ships. Because of their configurations,

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[951] Captain Howard Petrea, USN (Ret), et al, "Expeditionary Strike Group Becomes Reality," *Proceedings*, October 2003, pp. 44-47; Greg Tyler, "ESG Touted as Future of the Navy," *Pacific Stars and Stripes*, April 23, 2004; and Jason Ma, "Admiral Touts ESG's Quick-Response Capability For War on Terror," *Inside the Navy*, October 11, 2004, p. 1.

[952] Congressional Budget Office, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces* (Washington, DC: The Congressional Budget Office, November 2004), pp. 7-9.

[953] CBO, *The Future of the Navy's Amphibious and Maritime Prepositioning*, pp. 7-9.

[954] "MPF(F) Concept of Employment," a PowerPoint presentation found at https://www.mccdc.usmc.mil/FeatureTopics/POM-08-FEA/Briefs/Mobility/MPF(F)%20Hill%20Brief%20v1.6.ppt.

these ships are especially suitable for transporting and off-loading bulky, oversized military equipment.[955]

The RRF's transoceanic cargo capacity provides the essential sustained logistic support for all Joint power-projection operations. For example, between January 1 and May 1, 2003, in support of Operation *Iraqi Freedom*, the combined force—augmented by ships from the Prepositioning and Surge Sealift Fleets—delivered 25.9 million square feet of combat cargo, including nearly 200,000 pallets of munitions and food to US forces in the Persian Gulf. The force also delivered 261 million gallons of fuel for use by Joint, land-based ground and air forces.[956]

## A Question of Deployment and Employment

As is readily evident from the foregoing discussion, unlike the contemporary Sea-based Strike Fleet, the contemporary Sea-based Transport Fleet is an "access-sensitive" force *optimized for unimpeded and guarded access scenarios, and heavily dependent on the availability of deep water ports and airfields in a forward theater*. This is a far cry from the World War II Sea-based Operational Maneuver Fleet, which was designed primarily for conditions of contested or uncertain access.

The distinction between the Sea-based Transport and a Sea-based Operational Maneuver Fleets is best explained by envisioning expeditionary maneuver operations as involving three basic steps: the *deployment* of combat units; the *employment* of combat units; and the *sustainment* of combat units.[957] A force designed for uncertain access considers the first two steps—the deployment and employment of combat *units*—as one seamless step, requiring that the units be transported and inserted in ready-to-fight condition. In other words, the units are capable of conducting a long-range operational maneuver over and from the sea—transitioning from deployment to direct combat operations with little pause. In contrast, a force designed primarily for assured access considers the deployment and employment steps as being separate and distinct. This allows units to be broken up and deployed as separate packets of personnel, equipment, and supplies, and then reassembled for employment in a forward theater. Only after the units are reassembled are they then ready for combat.

With this in mind, compare the World War II Sea-based Operational Maneuver Fleet with the contemporary Sea-based Transport Fleet. The primary World War II ground combat unit of action was the *division*. By the end of World War II, the Army had assembled 67 infantry, 16 armored, two cavalry, and five airborne divisions; the Marines had assembled an additional six amphibious assault divisions.[958] The Sea-based Operational Maneuver Fleet consisted of 2,547

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[955] See "Ready Reserve Force Ships," at http://www.msc.navy.mil/inventory/inventory.asp?var=RRF.

[956] Frank Randall, "Military Sealift Command Maintains an Accelerated Pace," *Seapower,* July 2004, p. 32.

[957] A fourth step, *reconstitution* of forces, occurs after the power-projection operation has been completed.

[958] See http://www.army.mil/cmh/lineage/cc/inf.htm.

amphibious landing ships of all types. This was over three times the total number of surface combatants in the 1945 TSBF, and fully 38 percent of the entire Battle Force.[959] This large Sea-based Operational Maneuver Fleet could transport and support the attack from the sea of 13 full combat divisions, or 14 percent of 91 non-airborne divisions.[960] Viewed another way, nearly one-fifth of the entire World War II division-based ground force could be projected into a distant theater without any access to forward land bases (13 by sea, five by air).

In comparison, the basic ground unit of action in the Joint Expeditionary Era and mature Guided Weapons Warfare Regime is the *brigade*. Assuming the ongoing modular Army reorganization results in 43 active and 34 reserve brigade units of action—including six airborne UAs—and that the Marines can field a total of eight active and three reserve regimental combat teams, the current Sea-Based Transport force can lift just less than 2.0 intact brigade equivalents (personnel and equipment, in ready-to-fight condition) out of a Joint brigade-based ground force structure of 82 non-airborne brigades.[961] This represents only 2.4 percent of the entire force. Moreover, there are only eight forcible entry brigades out of a total Joint ground force structure of 88 brigades (two by amphibious lift, six by strategic or tactical airlift)—or only nine percent of the force. Assuming that a port or protected anchorage and a nearby airfield are available, the force can quickly transport and deliver another 15 or so complete brigade *sets of equipment*—an impressive 18 percent of Joint ground force equipment sets—to a distant theater. The *personnel* assigned to the equipment would need to be transported via either strategic or commercial airlift to the theater, where they would go through the RSOI process before they could be employed as combat *units.*

The shift in emphasis from a sea-based operational maneuver force focused on power-projection under conditions of contested access to one focused on the delivery of troops and equipment under conditions of assured access is apparent. The question for Joint and DoN planners, then, is this: ***is the current access sensitive Sea-based Transport Force, which was constructed primarily to aid the deployment and not employment of forces, an appropriate one for the Joint Expeditionary Era***?

## IMPETUS FOR CHANGE: THE ROAD TO SEA BASING

As the conditions of the Joint Expeditionary Era became clearer, an ever-increasing number of analysts and strategists concluded that the answer to the foregoing question was "no." As a consequence, they believed that the DoN needed to reshape its sea-based maneuver capabilities so as to provide the evolving Joint Multidimensional Battle Network with much greater global freedom of action. In essence, they argued that future TFBN sea-based maneuver forces must be

[959] "Ship Force Levels, 8/14/45," at http://www.history.navy.mil/branches/org9-4.htm#1945.

[960] Lieutenant Commander John P. Higgins, USN, "Gators: An Endangered Species?" found at http://www.Globalsecurity.org/military/library/report/1995/HJP.htm.

[961] The Army modular reorganization aimed to create 43 to 48 brigade UAs. It appears the plan has settled on 43 brigades. See Joshua Kucera, "The US Army Aims to Upgrade Entire Bradley Fleet," *Jane's Defence Weekly*, July 20, 2005, p. 8.

better able to exploit the sea as maneuver space; be better capable of creating Joint access, even if confronted by a determined adversary; and be better able to support Joint power-projection operations without reliance on land bases.

The first step taken toward these new capabilities involved the conceptual and analytical studies of the aforementioned Mobile Offshore Bases. Because the concept's strongest proponent held such an influential position—Vice Chairman of the Joint Chiefs of Staff—the concept was subject to intense scrutiny by both the Joint Staff and industry throughout the mid-1990s.[962] Technical uncertainties and high costs (up to $8 billion) ultimately scuttled plans for large MOBs. However, the mere fact that the concept received such high level scrutiny was evidence of both the great change in the strategic environment, as well as the undeniable conceptual attraction of performing "as far as practical the functions now performed on land at sea bases."[963]

It is important to note that the MOB suffered from Garrison Era thinking that separated the deployment and employment steps. It envisioned separate MOB modules, stuffed with equipment, being transported to a JOA and being assembled into a complete MOB once there. US combat forces would be then flown to the base, where they would marry up with their equipment and prepare for combat. In other words, the concept merely moved the port and airfield necessary to conduct a lengthy RSOI function to sea, close off an enemy's coast.

As the Joint Staff was reviewing the MOB concept, the Marines were thinking about the new strategic conditions of the Joint Expeditionary Era. Marine planners concluded they should begin to concentrate less on the rapid reinforcement of forward garrisons and allies, and more on having to arrive in theater ready to either seize access for follow-on Joint forces or to inject ready-to-fight combat forces into a rapidly developing fight. The initial result of Marine thinking was reflected in *Operational Maneuver From the Sea (OMFTS)* and *Ship-to-Objective Maneuver (STOM)*, concepts published in 1996 and 1997, respectively. These two "new" concepts were built explicitly on launching intact combat units directly from ships at sea toward objectives ashore, and on creating Joint force access were it wasn't. Importantly, however, both concepts explicitly rejected the idea of conducting amphibious *assaults* directly across defended beaches, and instead embraced the model espoused and practiced by the Army during the World War II Southwest Pacific campaign: that is, to land where the enemy wasn't, and then to expand access for follow-on friendly forces and operations from there.

Soon after the publishing of these concepts, the 1997 National Defense Panel (NDP) wrote about the increasing threats to land bases:

> Even if we retain the necessary bases and port infrastructure to support forward deployed forces, they will be vulnerable to strike that could reduce or neutralize their utility. Precision strikes, weapons of mass destruction, and cruise and ballistic missiles all represent threats to our

[962] See "Mobile Offshore Base," at http://www.globalsecurity.org/military/systems/ship/mob.htm.

[963] See Pat Towell, "'Mobile Offshore Base' Proposal Has Slew of Powerful Opponents," *Congressional Quarterly Weekly*, February 15, 2003, p. 382

> forward presence, particularly at stand off ranges. So, too, do they threaten access to strategic geographic areas [of importance to the United States].[964]

The NDP's key point was that the US monopoly or dominant lead in the Guided Weapons Warfare Regime would undoubtedly diminish over time, making *all* future US power-projection operations more difficult and costly. However, emphasizing the vulnerabilities of land bases was an opportunity too tempting to pass up for naval officers and their allies, who began to assert that "…for the most part, sea basing will likely prove more…operationally useful in the emerging strategic environment than land bases."[965]

Accordingly, just as the NDP published its final report in December 1997, the Marines followed up both OMFTS and STOM with *Maritime Prepositioning Force (MPF) 2010 and Beyond*. The leases on the three MPF squadrons were scheduled to expire starting in 2009. The Marines—fully aware of NDP deliberations—were anxious to make the follow-on MPF squadrons less dependent on existing theater deep water ports and airfields. One way to do this would be for MPF units to conduct their RSOI process onboard ships *while they made their way to a JOA*, thereby combining the deployment/employment phases. This thinking, known as *at-sea arrival and assembly* of MPF forces, was spurred, no doubt, by plans to use MPF squadrons in support of amphibious landings during Operation *Desert Storm*—the first major war of the Joint Expeditionary Era.[966] However, it was also in line with both NDP thinking as well as the Marines' broader thinking on improving their ability to conduct operational maneuver from the sea.

However, *MPF 2010 and Beyond* described a concept much more expansive than just "RSOI at sea" and the immediate employment of MPF units upon their arrival in a JOA. Once the forces were employed ashore, the MPF ships would logistically support them directly from sea, rather than dumping their cargo ashore and creating vulnerable "iron mountains" of supplies. This would require that the ships be capable of "selective offload" of equipment and supplies. Finally, once the mission was complete they would serve as an off-shore base to *reconstitute and prepare forces* for follow-on operations.[967] In other words, *MPF 2010 and Beyond* aimed for a combination of the deployment, employment, and sustainment steps that had previously been possible only through the Amphibious Landing Fleet. Additionally, in contrast to the larger,

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[964] National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington DC: National Defense Panel, 1997), p. 12.

[965] Williamson Murray, Professor Emeritus, The Ohio State University, in Under Secretary of Defense for Acquisition, Technology, and Logistics, *Defense Science Task Force on Sea Basing* (Washington DC: Office of the Secretary of Defense, August 2003), Appendix E, p. 137. The full report can be found at http://www.acq.osd.mil/dsb/reports/seabasing.pdf.

[966] For a nice overview of this planning, see Major Charles M. Herndon, USMC, "Amphibious Forces: The Gulf War (A Study in Quick Response and the Versatility of Amphibious Forces)," US Marine Corps Command and Staff College, 1992, found online at http://www.globalsecurity.org/military/library/report/ 1992/HCM.htm.

[967] Headquarters, US Marine Corps, *Maritime Prepositioning Force 2010 and Beyond*, December 30, 1997, found at http:// www.fas.org/man/dod-101/sys/ship/docs/mpf-2010.htm.

monolithic MOB, the *MPF 2010 and Beyond* concept described a more flexible, distributed approach to sea basing.

Importantly, the Marines viewed this new MPF capability as *additive* to the existing Amphibious Landing Fleet, which would retain the mission of supporting Joint Forcible Entry Operations. It would allow the "assault follow-on echelon" to transition more quickly from deployment to employment, thereby rapidly reinforcing the assault echelon deployed from amphibious assault ships, and then support both logistically until the follow-on Joint force was established ashore.[968] Indeed, because the capabilities outlined in *MPF 2010 and Beyond* were portrayed as additive capabilities by Marine planners, the Navy, concerned over their potential costs, stonewalled the concept. Six months after being delivered for review, it remained buried in the Navy's staffing process.

As the Marine recommendations for improved sea-based maneuver capabilities languished in bowels of the Navy staff, the Army was making another push for new sea-based *operational* maneuver capabilities. Through the 1990s, Army thinkers engaged in a broad experimental and conceptual development process referred to as the "Army After Next" Project.[969] The essential purpose of the project was to develop new ways of thinking about projecting ready-to-fight Army combat units over long ranges, a concept known as "operational maneuver from strategic distances."[970]

The Army After Next Project explored both the air and sea-based technological requirements needed to support operational maneuver from strategic distances. And while new air maneuver transports that could land small, mobile combat units were considered a valuable asset Army planners and concept developers were cognizant of the lessons of the First Expeditionary Era, when many Army units—like Marine units—were carried to the fight *as intact combat units* aboard amphibious ships. It is not surprising, then, that Army planners conceived of a new type of Shallow Draft High Speed Ship, or SDHSS, as a key means to enable operational maneuver from strategic distances:

> Of all air and sea, current and future, lift capabilities, shallow draft high-speed ships (SDHSS)—because of their speed, throughput capability, and capacity—most significantly impacted force closure. Air deployment remains the only way to rapidly establish the initial crisis-response presence of air expeditionary forces and a division equivalent of ground forces needed to preclude enemy forces' early success. But after a few

[968] This is a key point, driven home by all those interviewed who took part in the development of *MPF 2010 and Beyond*.

[969] There is a rich source of materials on the Army After Next project on the web. For a summary overview of the project, see "Army After Next," at http://www.sourcewatch.org/index.php?title=Army_After_Next.

[970] "…the purpose of operational maneuver from strategic distance is to achieve a deployment momentum that not only permits rapid seizure of the initiative but also never relinquishes it." It is often defined by Army officers as the direct injection of combat forces into a JOA from outside the theater. Brigadier General Huba Wass de Czege and Lieutenant Colonel Zbigniew M. Majchrzak, US Army (ret), "Operational Maneuver From Strategic Distances," *Combined Arms Center Military Review*, May-June 2002.

> days, SDHSS had a distinct advantage. It was the only strategic platform that *could deliver troops and equipment together in sufficient size to bring immediate combat power to bear. While in transit, commanders could conduct en route planning and receive intelligence updates*. Moreover, the SDHSS did not require a fixed port because it could discharge its combat power wherever there was at least a 10-foot draft and an acceptable beach gradient or discharge site. *Troops drove the future combat system (FCS) from the ship ready to fight onward to the tactical assembly area* (emphasis added).[971]

In addition to the larger SDHSSs with transoceanic ranges, Army After Next planners also espoused the virtues of smaller, intra-theater range, high-speed Theater Support Vessels (TSVs). Like the SDHSSs, the TSVs were envisioned as ships able to discharge their cargos through austere ports or possibly even over beaches, providing Army and Joint force commanders with enormous flexibility in deploying and employing intact combat units.[972]

Needless to say, the Army's (re)embrace of sea-based maneuver and development of new sea-based maneuver options nettled some Marines, who saw this province as theirs' alone. However, by championing the idea of the SDHSS and TSVs, the Army provided indirect support to the Marines' own calls for improved sea-based maneuver capabilities.

### Reinforcing Fires

The general concept of improving Joint sea-based maneuver capabilities was further reinforced by follow-on studies as well as growing operational experiences in the Joint Expeditionary Era. First, in response to continued queries about the MOB concept, the Institute for Defense Analysis (IDA), a Pentagon-sponsored think tank, conducted a cost-effectiveness evaluation of the MOB and other potential operational alternatives. In 2001, IDA concluded that a MOB would be less cost-effective than a distributed sea base made up of a combination of nuclear-powered carriers and high-speed cargo ships. While the MPF was not specifically included as a part of this mix, it benefited from the explicit endorsement of a *distributed sea-based "system-of-systems"* composed of a heterogeneous mix of platforms.[973]

Soon thereafter, DoD plans for offensive operations in distant land-locked Afghanistan were complicated by the fact that the United States did not enjoy immediate and ready access to nearby Central Asian bases. Although substantial access to land bases was subsequently negotiated, sea-based strike and maneuver forces provided critical early access and support operations during Operation *Enduring Freedom*.[974] The nuclear-powered aircraft carriers

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[971] Wass de Czege and. Majchrzak, "Operational Maneuver From Strategic Distances."

[972] Wass de Czege and. Majchrzak, "Operational Maneuver From Strategic Distances."

[973] Towell, "'Mobile Offshore Base' Proposal Has Slew of Powerful Opponents," p. 382; and Andrew Koch, "Boost for Sea-Basing Concept," *Jane's Defence Weekly,* August 13, 2003.

[974] Andrew Koch, "USA Looks to Enhance Sea-basing Capabilities," *Jane's Defence Weekly*, May 22, 2002.

*Enterprise* and *Carl Vinson* supported tactical aviation strikes from operating areas in the Arabian Sea.[975] Moreover, the first conventional ground combat unit projected into Afghanistan was a Marine unit that originated from TF 58—a hastily assembled sea base off the coast of Pakistan.[976] Then, in early 2003, Turkey refused to allow the US 4th Infantry Division the use of Turkish territory to launch attacks into Iraq, denying the United States a northern axis of attack. Although it appears unlikely that a 4th Division attack from the north would have materially affected the outcome of Operation Iraqi Freedom and the subsequent occupation, the Turkish refusal did complicate US war planning.[977]

Operations *Enduring Freedom* and *Iraqi Freedom* helped underscore the three basic strategic realities of the Joint Expeditionary Era. First, the United States would be forever uncertain over where its next fight would be. Second, future US power-projection operations would normally require the projection of Joint air, ground, and naval forces over great transoceanic distances. And third, the United States would have to work harder to get both political and operational access to bases in distant theaters. One implication of these three strategic realities was that the Joint force needed to increase its number of access insensitive forces in the Joint Multidimensional Battle Network inventory, and to retain a forcible entry capability in order to be able to create access, if necessary.

Some might object to this observation, pointing out that despite well-publicized events such as Turkey's refusal to allow the 4th Division's entry, the United States has been able to consistently negotiate land-based access during the Joint Expeditionary Era. In this view, political access has always been an issue.[978] While the negotiation process for political access now appears to be more difficult and time-consuming than the relatively speedy access approval process associated with the Garrison Era,[979] neither the process nor the lack of land-based access has ever threatened the outcome of any US expeditionary operation.

Unquestionably, however, political and operational uncertainty over the early availability of bases was on the minds of the members of the Defense Science Board Task Force on Sea Basing. This Task Force, assembled at the request of the Undersecretary of Defense for Acquisition,

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[975] See "Operation Enduring Freedom—Deployments," at http://www.globalsecurity.org/military/ops/ enduring-freedom_deploy.htm.

[976] For a good synopsis of initial Marine operations in Afghanistan, see Captain Jay M. Holtermann, "The 15th Marine Expeditionary Unit's Seizure of Camp Rhino," *Marine Corps Gazette,* June 2002, pp. 41-43.

[977] For a thorough discussion on the impact of Turkey's refusal to allow the 4th ID to launch attacks from its soil, see *On Point: The United States Army in Operation Iraqi Freedom,* found online at http://www.globalsecurity.org/ military/library/report/2004/onpoint/index.html.

[978] For example, In 1986, the French and Spanish governments denied US aircraft overflight rights for the US punitive raids against Libya. See "Operation *El Dorado Canyon*," found online at http://www.globalsecurity.org/ military/ops/el_dorado_canyon.htm.

[979] Ironically, it is the spread of democracy that ensures this is so. In any event, access approval was by no means automatic in the Garrison Era. In 1986, the French denied US aircraft overflight rights for the US punitive raids against Libya in 1986.

delivered its final report on August, 2003. In this report, the DSB worried that both political *and* operational access would be more difficult to get in the future:

> ...scenarios of future war rest on having intermediate staging in or near the theater of operations to support troops, logistics, and combat fire support.
>
> Recent events in Kosovo, Afghanistan, and Iraq have underlined, however, that availability of these bases, more often than not, is uncertain due to political factors that delay, limit, or prevent their use. Moreover, modern weaponry, such as precision cruise and ballistic missiles which will become widely available in the future, threaten to make fixed bases vulnerable to attack. The assumption of readily available, secure land bases is now open to serious question.[980]

Following this line of reasoning, the DSB concluded that a bedrock requirement for future Joint forces would be forces capable of creating operational access, especially in contested theaters. They therefore focused on how "sea bases," functioning as a mobile theater intermediate staging bases for future Joint maneuver forces, would facilitate *forcible entry operations* in the Joint Expeditionary Era. In this regard, DSB members were clearly aware of the operational limitations of the Sea-based Transport Fleet, and clearly influenced by new concepts such as *OMFTS, STOM, MPF 2010 and Beyond*, and the Army After Next project. In their final report, the DSB wrote that, "Today's amphibious operations focus on *assaults over the shore and into seaports*, to establish footholds ashore permitting the build-up of sufficient combat power to conduct operations against inland objectives" (emphasis added). In contrast, "Operations from a future sea base focus on *direct assault of inland objectives* (with no operational pause) followed by moves to capture seaports or safe shore lodgments for heavier follow-on forces."[981]

To make this concept a reality, the DSB argued that future sea-based maneuver forces would need to be prepared and able to contend with the "vulnerability gap" associated with any power-projection operation in a defended or contested theater (see Figure Seven). This gap was explained by their development of a notional "expeditionary operations profile," in which initial landing forces are placed into battle quickly to limit or shorten the conflict, and to "capture and render useful in-theater seaports and airports of debarkation" for the introduction of follow-on forces. The delay in time between the introduction of initial landing forces and follow-on forces, during which the initial entry force is suffering losses, creates the vulnerability gap.[982]

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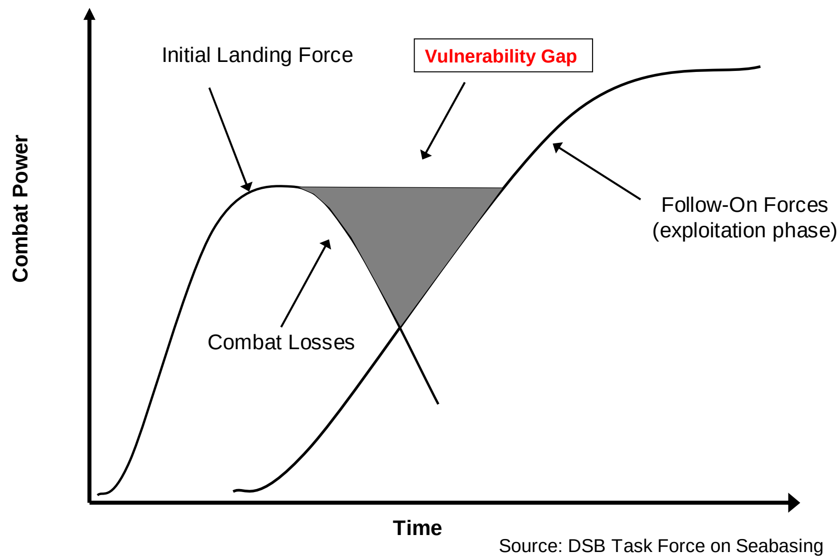
[980] Under Secretary of Defense for Acquisition, Technology, and Logistics, *Defense Science Task Force on Sea Basing* (Washington DC: Office of the Secretary of Defense, August 2003), pp. 111-iv. The report can be found at http://www.acq.osd.mil/dsb/reports/seabasing.pdf.

[981] *Defense Science Task Force on Sea Basing*, pp. 14-18.

[982] *Defense Science Task Force on Sea Basing*, p. 29.

**Figure Seven: The DSB "Expeditionary Operations Profile"**




Although a number of factors woukd influence the magnitude and duration of the postulated vulnerability gap, one way to reduce it would be to limit the losses incurred during the initial insertion operations by the landing force. Key to the DSB's thinking was the assumption that over time, "assaults over the shore" (e.g., surface maneuver over the shore with amphibious landing craft) would be increasingly at risk due to the threat of mines and precision-guided weapons fire. Moreover, future enemy A2/AD defenses would push the Naval Battle Network much farther offshore, perhaps as much as 100 miles to seaward. Accordingly, the DSB concluded these conditions would make "amphibious operations a subset of sea-borne power-projection operations," and that the initial insertion of forces would be conducted, first and foremost, by the vertical maneuver of ground forces from the sea base.[983] This was consistent with DSB thinking developed over the course of the Joint Expeditionary Era, which was heavily influenced by the maturation of the Guided Weapons Warfare Regime, and which emphasized "light, rapidly deployable, maneuver forces" that were inserted into a theater by air and supported by remote guided weapon fires."[984]

Amphibious operations are defined as "a military operation launched from the sea by an amphibious force, embarked in ships or craft with the primary purpose of introducing a landing

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[983] This assumption was made explicit in a presentation by Dr. William Howard, member of the DSB Task Force on Seabasing, entitled "The Seabasing Dirty Dozen: Issues to be Addressed to Enable Seabasing," given at a Seabasing Conference sponsored by Raytheon, February 16-18, 2005.

[984] *Defense Science Task Force on Sea Basing,* p. iii.

force ashore to accomplish the assigned mission."[985] The DSB's conflation of amphibious operations with *surface*-borne assaults, as well as its implicit assumption that in the future aerial maneuvers would be inherently less risky than surface assaults, is a clear indication of its bias toward air landing and air assault operations. The DSB never made clear, for example, how an enemy A2/AD network strong enough to force a Naval Battle Network 100 miles to seaward, or one capable of smothering a surface littoral penetration point with precision fire, would be incapable of detecting large-scale aerial maneuvers or shifting its fires to blanket suspected landing zones. In any event, their new "transformational" conception of "sea basing" was nothing more than a new expression of the idea of vertical envelopment, a concept pioneered by the Marine Corps over 50 years ago.[986]

In the early years of the Garrison Era, when all of the services were trying to come to grips with the operational and tactical impact of battlefield atomic weapons, Marine planners were well aware that their surface assault forces could not rapidly cross a beach and immediately transition to high-tempo maneuver toward inland objectives. Faced with the prospect of nuclear attacks against forces stacked up on a defended beach, amphibious planners looked to the helicopter to create the conditions for the rapid movement of surface forces deep inland with little pause at the beach. The initial Marine thinking was that air-landed assault forces would envelop the enemy forces defending the beaches *from the rear*, landing so close to them that they could not employ atomic weapons. Once the enemy forces were destroyed, heavy surface assault forces could traverse rapidly through an uncontested littoral penetration point and disperse inland before being targeted with nuclear strikes.[987] This was the very same thought expressed by the DSB, except that they substituted a defended sea port for a defended beach. As they said, the goal of aerial forcible entry operations was "to support the early stages of combat and to provide sustainment until, *with the seizure of ports*, heavier forces [could] arrive" (emphasis added).[988]

The DSB's emphasis on sea-based aerial maneuver and support did not stop with the assault phase. The need to provide logistics support to deep-landed aerial assault forces was also central to the DSB's thinking. Task force members believed the logistics vulnerability gap would be especially acute in future sea-based forcible entry operations (see Figure Eight). It concluded that "sea-based sustainment" of the initial landing force from the sea base, primarily by aerial resupply, would give the sea-based force the staying power to persist until heavier forces arrived.[989]

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[985] See "DoD Dictionary of Military Terms," found online at http://www.dtic.mil/doctrine/jel/doddict.

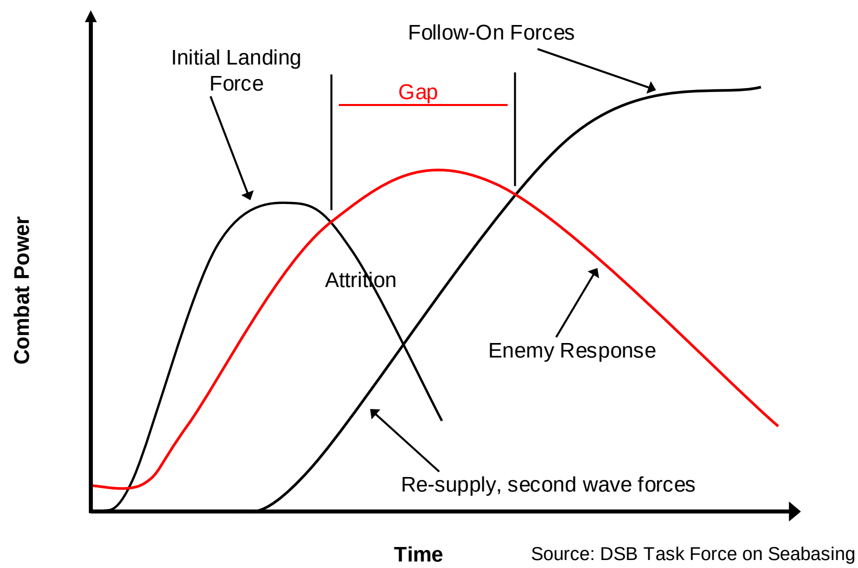
[986] For a contemporary explanation of the thinking behind Marine vertical envelopment, see Lynn Montross, *Cavalry of the Sky: The Story of US Marine Combat Helicopters* (New York, NY: Harper & Brothers, 1954).

[987] See Amphibious Warfare: Cold War Era," at http://www.exwar.org/Htm/8000PopE7.htm; and Freidman, *US Amphibious Ships and Craft,* Chapter 12.

[988] *Defense Science Task Force on Sea Basing*, p. 21.

[989] *Defense Science Task Force on Sea Basing*, pp. 29-32.

**Figure Eight: The Vulnerability Gap in Sea-based Operations**




While DSB's vision may have been an update of an old concept, its ultimate expression was breathtaking in its scope. It was based on the assumption that there would be no land-based intermediate staging bases (ISBs) within 2,000 miles of a Joint Operations Area (JOA). Due to likely anti-access threats inside the JOA, the DSB believed the sea base had to be able to support operational aerial maneuver from the sea *from ranges beyond 100 miles from an enemy's coast, and to ranges perhaps 250-300 miles inland.* The sea base also had to be continuously resupplied with all of the cargo and supplies necessary to sustain deep, air-landed force forces, meaning that the sea base needed to be replenished at sea. Moreover, it had to do be able to do all of this in Sea State 4.[990] Upon hearing these ambitious requirements, one British brigadier remarked dryly, "Now that would be *real* sea control."[991]

For this reason, the DSB judged the future sea basing "system of systems" to be "well beyond" current Navy and Marine Corps operational capabilities. It therefore recommended the formation

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[990] Sea states describe ocean and environmental conditions. They are measured by the Pierson-Moskowitz Sea Spectrum Table or the Beaufort Scale, which define nine sea state levels (0 to 8). The higher the sea state, the more extreme the ocean conditions. Sea State 4, in the middle of the scale, is described as a "fresh breeze," with many white caps and a chance of sea spray: winds speeds of 17-21 knots; average wave heights of 3.8-5 feet. See "Military Weather" at http://www.globalsecurity.org/military/systems/ship/ weather.htm. The DSB believed that the current amphibious landing force was capable of operations only in sea states 1 and 2.

[991] Comment made by Major General J.B. Dutton, CBE, Commander of the United Kingdom Amphibious Forces, Royal Marines, at a Conference on Seabasing, sponsored by Raytheon, February 16-18, 2005.

of a Joint Sea Basing Office, to oversee the development of a coordinated, spiral development effort based on the *realistic testing* of the technologies and concepts needed to make sea basing work. To guide this testing, the DSB identified 12 key issues which required attention before their vision could be realized, referring to them as sea basing's "Dirty Dozen." Of these 12 issues, DSB members believed three required capabilities stood out: new ships designed as part of a sea base system-of-systems; a sea-based heavy lift aircraft capable of lifting more than 20 tons over theater-wide ranges; and an ability to handle and transfer between ships heavy equipment and 20,000 pound Twenty-foot Equivalent Unit containers (TEUs) in Sea State 4.[992]

Given the grand scope of the DSB's vision, it perhaps is best compared to the DoN's early conceptual musings about the Advance Base Force in 1901, or, perhaps even better yet, Pete Ellis's conceptual development of the need for advanced amphibious landing techniques in 1911. In other words, it seems clear that the DSB considered its vision achievable only after a decade or two of experimentation and technological development. The DSB thought the earliest a sea base with the desired operational characteristics could be constructed would be after 2020. As one DSB member wrote, the Joint Multidimensional Battle Network should aspire to the goals laid out by the DSB by the "*third decade of the twenty-first century*" (emphasis added).[993]

### The Need for Speed

The DSB's recommendation for an extended experimental period focused on further developing maneuver sea base technologies and concepts of operations was derailed, in large part, by a DoD emphasis on improved strategic reaction times. In 2002, the Joint Staff began a planning effort called Operational Availability 2003 (OA 2003). OA 2003 resulted from the Secretary of Defense challenging the planning metrics used by Joint war planners for rapidly defeating two near-simultaneous major combat operations (MCOs)—the basis of force structure and sizing assumptions since the 1993 Bottom Up Review. In the event, OA 2003 reexamined the planning metrics for near simultaneous MCOs in the Middle East and the Northeast Asian theaters, in light of new mobility improvements and dominant US lead in the Guided Weapons Warfare Regime. This review occurred in late 2002 and early 2003, after Operation *Enduring Freedom* (operations in Afghanistan), but before Operation *Iraqi Freedom* (the invasion of Iraq).[994]

One of the original planning metrics developed for these near-simultaneous major combat operations was a 45-day delay between the first MCO and the second. This delay was caused primarily by the need to "swing" sea lift forces from one theater to another to shift ground maneuver forces, equipment, and supplies. During OA 2003, allocation planning models suggested that the transition timing between the two MCOs could be reduced from 45 to 30 days, primarily because of the to improvements to the strategic sealift fleet made since the first Gulf

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[992] *Defense Science Task Force on Sea Basing,* pp. ix-x.

[993] Williamson Murray, Professor Emeritus, The Ohio State University, "The Operational Issues of Sea Basing in the Twenty-First Century," *Defense Science Task Force on Sea Basing.*

[994] The information in this and the following paragraphs comes from a series of interviews the author conducted with participants of OA 2003 in preparation for this report.

War—particularly the construction of the 19 Large Medium Speed Roll-on/Roll-Off ships (LMSRs) discussed earlier as well as the improved aerial throughput provided by the Air Force's new C-17 transport aircraft.

However, OA 2003 also considered the timing associated with the first of two major theater wars. Starting with the US invasion of Panama in 1989, and throughout the 1990s, Joint military planners have increasingly emphasized the importance of rapidly applying overwhelming force against any potential adversary and achieving a quick victory. As explained in a Joint concept paper entitled *Rapid Decisive Operations (RDO):*

> The essence of the concept emphasizes situational understanding, immediate response capability, speed, and massing of effects rather than forces. Distinguished from traditional operations, this approach usually will not focus on seizing and occupying territory in the battlespace except for a limited purpose, such as to generate an otherwise unobtainable opportunity for precision engagement, to secure a key decisive point, or to protect the civilian populace. Forces inserted for these purposes would have the capability to be quickly withdrawn and employed elsewhere. An RDO campaign typically will be characterized by immediate, continuous, and overwhelming operations to shock and paralyze the adversary, destroy their ability to coordinate offensive and defensive operations, fragment their capabilities, and foreclose their most dangerous options.[995]

For rapid decisive operations in defended or contested access scenarios, Joint Forcible Entry Operations would become just the first step of a set of "immediate, continuous, and overwhelming" operations designed to achieve decisive battlefield results and quick victory. They would be part of a series of actions designed to seize the initiative early in a campaign so that an enemy would never be able to consolidate his military gains. However, "If the circumstances are right, the entry and combat operations stages could combine in a coup de main, achieving the strategic objectives in a single major operation."[996]

In effect, OA 2003 developed planning metrics for the RDO concept. Action officers concluded that US Joint forces should strive to "seize the initiative" *within ten days*, and to achieve all "swift defeat objectives" *within 30 days*. This thinking was based on professional judgment and "gut feel," backed up by decade-old analyses of war plans against potential opponents in Southwest Asia, the Western Pacific, and Northeast Asia. In any event, the Office of the Secretary of Defense subsequently endorsed this thinking by approving and inserting what is now known as the "10-30-30" metric in Defense Planning Guidance. The metric, described as a "stretch goal" by senior OSD officials, required that future US Joint forces be able to seize the

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[995] See "Rapid Decisive Operations," found at http://www.globalsecurity.org/military/ops/rdo.htm.

[996] "Rapid Decisive Operations."

initiative in any potential MCO within 10 days; swiftly defeat the enemy in 30 days; and then repeat the process in a different theater 30 days after that.[997]

The "10-30-30" metric represented the culmination of the force sizing and planning construct first adopted by the Bottom Up Review in 1993. In essence, it called for a military force that was light, lethal, and nimble—and capable of achieving two, rapid successive victories over traditional opponents over a span of 90 short days. This goal was adopted after the most cursory of analyses and accepted without debate. Apparently, no one on the Joint Chiefs of Staff or the Office of the Secretary of Defense questioned the wisdom of a planning metric that counted on the US always winning short, 30-day wars, or two wars in 90 days. In any event, the "10-30-30" metric was to have a major influence on the direction of Joint sea basing plans.

### The Fox in the Henhouse

By January 2004, the concept of sea basing was becoming more widely accepted within OSD, the Joint Staff, and the DoN. As discussed above, the concept was shaped and focused by two key goals: to provide Joint forces with increasing operational independence from foreign bases; and to generate higher strategic and operational speeds.[998] Plans were to stand up the Joint Sea Basing Office recommended by the DSB.[999] However, these plans were soon modified, with fateful consequences.

In July 2004, after heavy lobbying by the services, the Joint Requirements Oversight Council (JROC) decided to forego the establishment of the Joint Project Office and to instead pursue the sea basing within the new Joint Capabilities and Integration and Development System (JCIDS) process. In the arcane jargon associated with the new process, the first step was to develop a "Joint Integrating Concept," or JIC. The JIC, in turn, would guide a follow-on "Capabilities-Based Assessment" (CBA). In the event, no doubt guided by the "10-30-30" metric adopted in Defense Planning Guidance, the JROC decided that the focus of the JIC should be the *"seize the initiative phase of a major combat operation around the 2015-2025 timeframe*," and that the Navy should be the lead service for the effort.[1000]

The impact of these two JROC decisions was profound. First, by focusing on a *near-term* operational goal (i.e., seizing the initiative within ten days of a major combat operation as soon

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[997] See Greg Jaffe, "Battle Lines: Rumsfeld's Push For Speed Fuels Pentagon Dissent," *Wall Street Journal,* May 16, 2005.

[998] See for example Vice Admiral Charles W. Moore, Jr., USN, and Lieutenant General Edward Hanlon, Jr., USMC, "Sea Basing: Operational Independence for a New Century," *Proceedings,* January 2003.

[999] "Dawson: OSD to Create New Joint Seabasing Concept Office," *Inside the Navy*, January 19, 2004. For a good overview of how sea basing fits into the JCIDS process, see Colonel Greg Cook, USAF, "Joint Seabasing and the JCIDS Process," a PowerPoint presentation found at http://www.dtic.mil/ndia/ 2004expwarfare/cook.ppt#1.

[1000] "JROC Green Lights Effort To Integrate Joint Seabasing Concepts," *Inside the Pentagon*, July 29, 2004, p. 3; and John T. Bennett, "Fusing Concepts Will Culminate in Joint Seabasing Capability Plan," *Inside the Pentagon*, August 12, 2004, p. 1.

as 2015), the JROC diverted the sea basing effort away from the long-term experimental and technological focus recommended by the DSB. By so doing, the JROC consigned the sea basing effort to a search for quick material solutions rather than a more measured and broader examination of how to exploit more fully the base-characteristics of the world's oceans and to convert the sea into a vast Joint base. Second, by assigning the JIC to the Navy, the JROC converted the JCIDS process into nothing more than the Joint validation of DoN plans to recapitalize key components of its Sea-based Transport Fleet.

Predictably, then, the subsequent Joint Integrating Concept for Sea Basing plowed little new ground. It simply integrated some concept work conducted by the Joint Forces Command with two updated DoN concepts called *Enhanced Networked Seabasing* and *Maritime Prepositioning Force (Future)*.[1001] As a result, the definition of sea basing outlined in the JIC was nothing more than a restatement of concepts outlined in *MPF 2010 and Beyond*:

> Sea basing is the rapid deployment, assembly, command, projection, reconstitution, and re-employment of joint combat power from the sea, while providing continuous support, sustainment, and force protection to select expeditionary joint forces without reliance on land bases within the [joint operational area].[1002]

Not that it would have mattered. By making the Navy the lead service on the JIC, the JROC had guaranteed the sea basing effort would become more and more DoN-centric and less and less Joint-centric, as was concisely captured by a remarkably candid statement made by a retired Marine officer before a large audience in 2003:

> It has unfortunately—in my opinion—become vogue to talk about the Seabase in Joint terms. Seabase is not a Joint requirement. Seabase is a Joint force enabler, and there is a critical difference. Seabasing is a [naval] core competency and we need to keep it one.[1003]

An increased emphasis on strategic speed, the shortened timeline and narrow focus of the Sea Basing JIC, and the failure of the JROC to establish a Joint Planning Office meant a decade or more of thinking about the strategic and operational implications of uncertain access and the need to improve Joint sea-based maneuver options had come down to this: a single-minded TFBN pursuit for an ability to conduct a brigade-sized forcible entry operation in approximately ten days.

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[1001] Lieutenant General Edward Hanlon, Jr., USMC, and Rear Admiral R.A. Route, USN, "Enhanced Networked Seabasing," undated Marine Corps Combat Development Command and the Navy Warfare Development Command concept paper, found at http://www.nwdc.navy.mil/Concepts/Sea_Basing/ENSeabasing.aspx; Cook, "Sea-Basing and the Maritime Pre-Positioning Force (Future);" and Major John M. Curatola, USMC, and Lieutenant Commander Robert Bovey, Jr., USN (ret), "The Future Maritime Prepositioning Force," *Proceedings*, November 2001.

[1002] Hone, "Seabasing: Poised For Takeoff."

[1003] Colonel Vince Goulding, US Marine Corps, as cited in Malina Brown, "Navy Marine Officials Argue Iraq War Validates Need For Seabasing," *Inside the Navy*, April 14, 2003, p. 1.

## All Ahead, Flank: Pursuing the MPF(F) Solution

Given the Joint top cover necessary for the development of any new major force capability, DoN planners began to look for appropriate material solutions for the new sea base. And in this regard, the only plausible way to reach the timelines called for by the "10-30-30" metric was to build a forcible entry capability into the MPF fleet. The Battle Force already had a demonstrated ability to assemble and employ an amphibious task force using a combination of forward deployed and CONUS-based amphibious landing ships in just less than 30 days. However, cutting the employment timeline by two-thirds using amphibious landing ships was not practical. There simply was no way to load and sail the bulk of the amphibious fleet, which was located in the United States, and to assemble the force over transoceanic distances, in much less than four weeks.

In contrast, with three MPF squadrons anchored in the Mediterranean, Diego Garcia, and Guam, at least one squadron could steam to any point in Europe, Africa, and Southwest, Central, Southeast, and Northeast Asia within ten to 14 days, allowing the DoN to get close to the ten-day arrival and employment benchmark called for by "10-30-30."[1004] Therefore, despite the Marines' initial hesitation about using MPF ships as a *substitute* for amphibious ships in forcible entry operations, and earlier Navy misgivings about the high potential costs of advanced MPF ships, DoN planners began to fashion a new Future Maritime Prepositioning Force (MPF(F)) that could conduct rapid "sea-based" forcible entry operations.[1005]

Indeed, any DoN hesitation and misgivings about using the MPF(F) in forcible entry operations were swept aside as the promise of total independence from land bases left naval officers, especially Marines, positively giddy. Two Marine officers wrote, "*Even when secure ports and airfields are available*…Sea Basing [will be] the preferred means of engagement" (emphasis added).[1006] Indeed, General Michael Hagee, Commandant of the Marine Corps, thought that future sea bases would allow the Marines to launch a 2020 Operation *Iraqi Freedom* without using Kuwait as a staging base.[1007] Because of its operational independence from land bases, one Navy Admiral mused that the sea base would present an "infinite number of problems for the enemy."[1008]

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[1004] Marine Corps Combat Development Command, "Power Projection From the Seabase: Issues, Challenges, Opportunities," an undated PowerPoint briefing presentation; and Andrew Koch, "Seabases Key to Speed," *Jane's Defence Weekly*, June 11, 2004.

[1005] Andrew Koch, "USA Looks to Enhanced Sea-Basing Capabilities;" Cook, "Sea-Basing and the Maritime Pre-Positioning Force (Future);" and Curatola and Bovey, Jr., "The Future Maritime Prepositioning Force."

[1006] Colonel Art Corbett, USMC, and Colonel Vince Goulding, USMC (ret), "Sea Basing: What's New," *Proceedings*, November 2002.

[1007] "JROC Green Lights Effort To Integrate Joint Seabasing Concepts;" and "Sea Basing Would Speed US Marines to Trouble Spots," *DefenseNews.com*, August 2004.

[1008] "Kelly: Sea Basing Presents 'Infinite Number of Problem's For The Enemy," *Sea Power*, June 2004, p. 22.

Without question, however, being able to respond quickly was the key DoN motivation behind support for the new MPF(F) concept. Admiral Clark, the former CNO, said that the key to the future was "to [size] the force for speed of response,"[1009] and that sea basing would allow the Battle Force to "deliver more combat capacity to the fight much faster, [with] much more lethality and much more agility."[1010] General Hagee agreed, saying, "when you are able to respond that fast, it is going to change the calculus of the battlefield…You might be able to get there so quickly that you may not need large follow-on forces."[1011]

The rare shared Navy and Marine enthusiasm for the sea basing concept caused a rapid thaw in the normally glacial inter-service planning process, and the MPF(F) concept began to move forward quickly within the DoN. An analysis of alternatives for the future MPF force was completed by the Center for Naval Analysis, outlining several options for the way ahead. These options ranged from a replacement-in-kind of current MPF ships with LMSRs, to an eight-ship squadron with ships capable of supporting a MEB, all of its 30 JSFs, and all of its rotary-wing and LCAC requirements. Inevitably, DoN planners—especially Marine planners—opted for the widest array of capabilities possible, firm in their conviction that requirements, not budget, should drive the development cycle.[1012]

By the summer of 2004, however, it was becoming clear that the sheer enthusiasm for the program, coupled with the DoN proclivity to seek ever-more-capable (and expensive) ships, was threatening to break the DoN's entire shipbuilding budget. Total operating costs for squadron options including full tactical aviation support capabilities (i.e., JSF runways) were estimated at $28 billion, clearly far more than the expected budgets could support. Estimated costs for individual ships rose to between $2 and $4 billion apiece.[1013] As General Hagee wryly noted, "You design the perfect ship, then all of a sudden you get sticker shock as to what the ship could cost."[1014] The sea basing dream was becoming a programmer's nightmare; the DoN needed a "wake up call."[1015]

That wake up call came in July 2004, when 25 top DoN officials met to try to de-scope the ever-expanding capabilities of MPF(F) squadrons and ships. During the meeting, the participants

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[1009] Cavas, "New Missions Will Rely on Sea Basing," p. 4.

[1010] Jason Sherman, "A Cargo Ship With a JSF Runway?" *Defense News,* March 15, 2004, p. 8.

[1011] Donna Miles, "Seabasing to Transform Marine Deployments, Commandant Says," *American Forces Press Service*, June 9, 2005.

[1012] Sherman, "A Cargo Ship With a JSF Runway?"

[1013] Squadron costs are found in Sherman, "A Cargo Ship With a JSF Runway?" Ship estimates are found in Jason Ma, "Navy Aims to Balance Industrial Base Needs In New Seabasing Plan," *Inside the Navy,* May 2, 2005.

[1014] "Washington Report," *Seapower,* June 2005, p. 8.

[1015] For one critic's analysis of sea basing, see Commander John P. Patch, US Navy, "Chasing the Dream," *Proceedings*, May 2005.

agreed, among other things, to remove JSF runways from the squadron; to remove the ability of MPF(F) ships to arm or de-arm helicopters; to limit the ships' ability to withstand damage by building them to enhanced commercial rather than combatant standards; and to lower the sea state in which the ships could externally load and unload cargo from the Sea State 4 to Sea State 3.[1016]

Despite these moves, projected costs for the new MPF(F) squadrons continued to remain high. The Congressional Budget office estimated that DoN plans for its future expeditionary maneuver fleet would would cost more than twice as much per year, on average, that the DoN spent on the Sea-based Transport Fleet between 1980 and 2003.[1017] While this goal was perhaps perfectly defendable given the emerging conditions of the Joint Expeditionary Era, it was not welcome given likely $8-12 billion yearly shipbuilding budgets. It thus became increasingly evident that any moves to enhance the MPF(F) would require important trade-offs within the overall TFBN naval fleet platform architecture.

Understandably, Navy officers argued these tradeoffs should be reflected in the Amphibious Landing Fleet.[1018] Even before the July 2004 meeting, Navy officials started to float the idea that the number of ESGs needed to be reduced in order to fund the MPF(F). These reductions were defended by explaining that the smaller amphibious fleet would see no decrease in forward presence; "Sea Swaps" of entire ESGs—to include their embarked Marine Expeditionary Units—would allow the smaller force to maintain the same number of ships routinely deployed.[1019]

Navy moves to cut the amphibious fleet appear to have taken Marine leaders by surprise. From the very beginning, they believed—perhaps naively—that the dramatic enhancements to their MPF fleet they were recommending would be additive to the capabilities of the Amphibious Landing Fleet. They apparently never anticipated that the MPF(F) program would compete for scarce DoN budget dollars with amphibious ships, or result in a 33-50 percent reduction in the number of purpose-built amphibious ships.[1020] While Navy officials justified the cuts in order to

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[1016] Christopher J. Castelli, "Meeting of Top Navy Officials Sheds Light on Prepositioning Ships," *Inside the Navy,* September 6, 2004, p. 1.

[1017] CBO, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces*; for a concise summary of the report, see John T. Bennett, "CBO Study: Navy Amphibious Ship, MPF(F) Plans May Prove Too Costly," *Inside the Pentagon,* November 11, 2004, pp. 3-4.

[1018] Andrew Koch, "US Considers Overhaul of Amphibious Forces," *Jane's Defence Weekly,* May 5, 2004.

[1019] Trading amphibious ships for the MPF(F) has been a constant Navy position. See Christopher J. Castelli, "Navy Wants to Cut the Number of Strike Groups, Slash LPD-17 Shipbuilding," *Inside the Navy,* April 26, 2004, p. 1; Christopher J. Castelli, "ESG Cut Would Be Gradual; Carrier Group Cut Possible, But Harder," *Inside the Navy,* May 3, 2004, p. 1; John T. Bennett, "Navy May Cut Number of Expeditionary Strike Groups to Fund MPF(F)," *Inside the Pentagon,* July 12, 2004, p. 1; and Roxana Tiron, "Ship's Costs Could Sink Plans For Floating Military Bases," *National Defense,* January 2005.

[1020] This is evident by reviewing the PowerPoint presentation entitled "MPF(F) Concept of Employment." In this presentation, Marine planners argue for a 36-ship Amphibious Landing Fleet *plus* three $14.2 billion MPF squadrons.

"transform [the Marine Corps] to the next level of speed"—a direct reflection of the importance the Navy placed on achieving the "10-30-30" goal—these reductions caused serious unrest among senior Marine officers, and increased tension between the Navy and Marine Corps.[1021]

The sea basing concept also caused some confusion and unease among the other services and Departments. Although touted as a transformational *Joint* capability, the DoN's transformation plans appeared to primarily support Marines. For this reason, Navy and Marine officials found it initially difficult to sell the merits of sea basing in the Joint arena. Rather than changing their plans, however, they simply tried to do a better job explaining sea basing to the other services. Key to their approach was a renewed emphasis on the Joint "enabling" function of the concept:

> Putting a [Marine Expeditionary Brigade] ashore is extremely important to our nation, but Marines and the Navy don't win wars. Armies and air forces with their eventual mass—and effects, increasingly in the future—really need to be brought forward, if they're not already there.[1022]

Despite their new "sales approach" explaining sea basing in terms such as using the sea as maneuver space, leveraging forward presence, and expanding access options, and despite the addition of a logistics support capability for a single Army combat brigade, the current DoN sea basing vision remains very focused on closing a single Marine JFEO brigade within ten to fourteen days; conducting at-sea RSOI and mission preparation in two to three days; conducting initial entry operations under the cover of darkness; and sustaining at least two Joint brigades (either Army or Marine) ashore.[1023]

To accomplish these tasks, the new MPF(F) squadron will consist of 14 ships: two LHARs with MEB command and control suites; one LHD with a MEB ACE command and control suite; three LMSR variants, three T-AKE variants; three new "mobile landing platforms;" and two "dense-packed" legacy MPF ships. The total cost for the squadron is estimated to be $14.5 billion.[1024] Each squadron would also be supported by a single Rapid Strategic Lift Ship (RSLS), which would deliver non-deployable helicopters to the squadron's three big-deck amphibious ships. At an estimated $1.3 billion per copy, this would result in a total squadron cost of $15.8 billion, not

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[1021] Christopher J. Castelli, "Navy May Cut Number of Expeditionary Strike Groups to Fund MPF(F)," *Inside the Pentagon*, July 12, 2004, p. 1.

[1022] Christopher J. Castelli, "Admiral Sees Need For More Dialogue Between Services on Seabasing," *Inside the Navy*, April 18, 2005.

[1023] "Seabasing Joint Integrating Concept" (Washington, DC: Joint Staff, August 1, 2005).

[1024] Information on the MPF(F) squadron is found in John J. Young, Assistant Secretary of the Navy for Research, Development, and Acquisition, "Report to Congress, Maritime Prepositioning Force, Future, MPF(F)," prepared by Program Executive Officer for Ships, Washington, DC, June 2005. See also "Naval Leaders Finalize Plan for Maritime Prepositioning Ships," *Inside the Navy*, June 7, 2005; and Christopher P. Cavas, "Big Changes for Sea Base: Large-Deck Amphibious Ships Added to Pre-Positioning Squadron," *Navy Times*, August 1, 2005. Squadron costs are found "Maritime Prepositioning Force (Future) Shipbuilding Requirements," a PowerPoint presentation to Hill staffers by the Marine Corps Combat Development Center, dated June 2005.

counting the equipment stored inside the ships.[1025] The Marines appear to want two squadrons of ships; the Navy only one.

To help pay for these "sea basing" ships, the current 35-ship amphibious force falls to no more than 24 ships by 2035, with a lift capability of no more than 1.9 MEBs.[1026] Under the best of circumstances, then, it appears that the total number of Marine Expeditionary Brigade equivalents that can be lifted by TFBN assets will fall from the current 4.9 MEBs (1.9 brigades on amphibious ships plus three brigades on MPF ships) to 3.9 MEBs (1.9 brigades on amphibious ships and 2.0 MEBs on MPF(F) ships)—and this in an era where access is far more uncertain and sea-based maneuver likely to be far more important than it has been in the recent past.

What does the fleet get in exchange for its substantial reduction in sea-based maneuver lift? Not much. With the exception of being able to claim faster closure times and an expanded selective cargo discharge capability, a new MPF(F) squadron offers no great improvement over the capabilities of the current Amphibious Landing Fleet in forcible entry operations. It will have the same aviation support ships and aerial maneuver platforms, which will operate at the same distances offshore and have the same throughput. It will be able to insert one battalion by air and one battalion by surface means under one eight-to-ten hour period of darkness—operational capabilities well within that of the current Amphibious Landing Fleet. Additionally, because there is only one well deck in the entire squadron, conducting surface assaults with the MPF(F) ships will be far less efficient than conducting them the Amphibious Landing Fleet. The current squadron concept of operations requires that heavy equipment be removed from the LMSRs and transferred—in Sea State 3—to the Mobile Logistics Platforms, which would in turn transfer the equipment to a landing craft, which would in turn deliver the equipment to the beach.[1027] Finally, selective discharge cargo ships is not a capability tied solely to a MPF(F) squadron; indeed, it is a desirable capability for amphibious landing ships and Combat Logistics Force ships. Given the squadron's $15.8 billion price tag, one has to wonder if the TFBN opportunity costs for these so-called "transformational" capabilities are worth it.

Similarly, what does this "transformational" sea basing plan give to the Joint Multidimensional Battle Network? Again, not much. The sea basing plan will give Joint commanders an option to assemble a single reinforced JFEO brigade in 12 to 17 days rather than the 28 days now required, and an improved ability to resupply Joint ground forces ashore. However, a single brigade is will often be too large for most irregular warfare tasks, and too small for most power-projection operations, especially those in defended access scenarios. The improved time lines are also

[1025] Andrew Koch, "US Navy Explores Joint High-Speed Cargo Ship," *Jane's Defence Weekly,* August 10, 2005. This ship will be discussed in the later section on intertheater connectors.

[1026] Interestingly, the "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006" separates amphibious ships from sea basing ships. The numbers of amphibs are drawn from "325-ship plan;" the "260-ship plan" includes only 17 amphibs. Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged."

[1027] Andrew Koch, "US Navy Shipbuilding Plan Takes on Water," *Jane's Defence Weekly,* June 29, 2005.

mostly irrelevant: they are still too slow for the most immediate irregular warfare tasks such as prompt strikes against a fleeting terrorist target or a prompt counter-proliferation raid that aims to nab a weapon of mass destruction; they are too fast for any stressing forcible entry scenario, which would likely never see the insertion of a single brigade deep into enemy territory before a powerful Joint Multidimensional Battle Network was assembled and the enemy's A2/AD defenses thoroughly suppressed; and they make no difference in irregular counter-sanctuary or stability operations, which are most often elective operations.

## PENTOMIC REDUX

Upon reflection, the evolution of the thinking about sea basing appears is not unlike the thinking which led to the Army's Pentomic Division in the 1950s. During this unsettling transition period between the First Expeditionary Era and the Garrison Era, Army war planners, responding to the development of nuclear weapons, and acting to preserve their shrinking budget DoD share, developed a conceptual framework that justified a wide-ranging, force-wide, Army "transformation." They envisioned a world in which tactical nuclear warfare was not only a possibility, but a certainty.[1028] As a consequence, Army planners forecast that future Army Corps would employ over 400 nuclear weapons *per day*.[1029] Lieutenant colonel battalion commanders would need nuclear release authority, and small nuclear-tipped rockets to exercise it.[1030]

In this world, the proven Army division was deemed to be too slow and too ponderous. After all, "words like 'fast,' 'quick,' 'speed,' and 'now' [would] inevitably dominate the language describing the techniques of conducting atomic warfare."[1031] The triangular division structure division had to become more nimble, with larger numbers of "self-contained" and "self-sustaining" organic units. Therefore, the division's three regiments would be broken up; in their place would be five smaller battle groups that would be like "amorphous biological cells" whose loss would not impair the rest of the division from fighting on.[1032] Of course, to be operationally effective, the new division organization would depend on dramatic future improvements in tactical air and ground mobility, and much more responsive logistics. But why wait? Change the

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[1028] For a thorough treatment of the Pentomic Division and Army thinking on battlefield nuclear operations in the 1950s, see A.J. Bacevich, *The Pentomic Era* (Washington, DC: National Defense University Press, 1986); and John J. Midgley, Jr., *Deadly Illusions: Army Policy for the Nuclear Battlefield* (Boulder, CO: Westview Special Studies in National Security and Defense Policy, 1986). For a more detailed and fascinating look at the Pentomic Division, see Major John H. Cushman, "Pentomic Infantry Division in Combat," *Military Review*, January 1958, pp. 19-30.

[1029] See "Tactical Nuclear Warfare on Land," Strategic Studies lecture notes from Political Science 419, Concordia University, found online at http://artsandscience.concordia.ca/poli419n/pdf_word_excel/lecture16/P_419n Lect_16_Mar_4_04_Tac_Nukes_Land_student.doc. These notes provide a fascinating discussion about the use of tactical nuclear weapons in Europe.

[1030] The *Davy Crockett* missile was designed for direct-fire nuclear warfare *at the battalion level*. It was a stubby, 150-pound rocket that looked like a large mortar. See Bacevich, *The Pentomic Era*, pp. 95-96.

[1031] Colonel Edward L. Rowny, "Ground Tactics in and Atomic War," *The Army Combat Forces*, August 1954, p. 19.

[1032] Bacevich, *The Pentomic Era, pp*. 103-08.

organization and the technology would surely follow the concepts championed by the Pentomic Division.

Of course, the enthusiastic pursuit of the new division proved to be premature. The world envisioned by Army leaders did not come about; the assumptions upon which they based their transformation plans were utterly wrong. Even so, many of the design goals for the Pentomic Division were sound and enduring; they were simply too far ahead of the available technologies. Indeed, after comparing the desired organization and structure of the Pentomic Division with the modern Army's newly planned "modular division" with it four "units of action" equipped with the Future Combat System, one must conclude that the designers of the Pentomic Division had it about right—they were simply seven decades ahead of the technology curve. In the intervening period, with improvements to equipment, training, and tactics, it turned out the triangular division structure had a lot of life left in it, after all.

It may indeed turn out that the United States will find a future in which its ability to seize the strategic initiative within 10-14 days will be decisive. In this future, the goal to project a single combat brigade deep into an enemy's territory according to that rapid timeline, with little preparation of the battle space or suppression of the enemy's A2/AD network, will be a valid TFBN goal, and the MPF force will provide the logical means to achieve it. In this future, any base on land within 2,000 miles of the JOA will be more vulnerable than large commercial ships steaming 100 off the enemy's coast, and enemies with maritime anti-access capabilities formidable enough to push the Joint sea base 100 miles seaward will be incapable of sensing, much less stopping, long-range aerial insertions of ground forces deep into their own territory.

In this world, the proven, legacy Amphibious Landing Fleet will be far too slow and ponderous. After all, "[w]ords like 'fast,' 'quick,' 'speed,' and 'now' will inevitably dominate the language describing the techniques" of rapid decisive operations and sea-based maneuver operations. The operational requirements of being able to lift 2.5 to 3.0 MEBs on amphibious landing ships and the equipment of an additional 3.0 MEBs on MPF ships will be replaced by the requirement for speed and an ability to sea base less than 4.0 brigades. Of course, the sea base will require transportation and logistics capabilities well beyond those of the current force—such as the transferring of 20,000-pound TEUs from ship-to-ship in Sea State 3; improved techniques for underway replenishment, such as skin-to-skin transfer of heavy equipment; and stabilized, motion-compensating cargo cranes—which are "*at least* ten years away from system development" (emphasis added).[1033] But why wait for technology to catch up? Change the organization and the technology will surely follow the concept.

## THINKING ABOUT AN EXPEDITIONARY MANEUVER FLEET FOR THE JOINT EXPEDITIONARY ERA

Of course, this line of thinking is likely to prove to be as faulty as it was five decades ago. It is therefore far past time for OSD, the Joint Staff, and the DoN to stop and to restart a vigorous

[1033] Vergun, "Outfitting the Operating Force," p. 37.

institutional debate over the current trajectory of "sea basing." A good basis for debate would be determining which of the eight base-characteristics of the world's oceans developed earlier would provide the biggest payoff for the Joint force. While this list is not exhaustive, it provides a useful start point for a critique of the DoN's current sea basing plans. And in this regard, twelve observations stand out.

***First,*** thinking about exploiting the sea as a Joint base is a critically important endeavor. In an era where access is increasingly uncertain due to both political and operational challenges, being able to exploit the sea as a secure avenue of maneuver, an operational sanctuary, and an advanced assembly base for operations ashore will provide the US military with enormous benefits at the strategic, operational, and tactical levels of war. It seems certain that US power-projection operations in the Joint Expeditionary Era will rely on improved capabilities to support strike, maneuver, and logistics on and from the sea to a degree not seen in over five decades. Admiral Vern Clark had the right of it when, in July 2004, he said:

> We need to think about sea basing in a very Joint context and what it does for the entire military structure. And we need to figure out how to invest properly [and] focus our investment stream, so that we can maximize that advantage.[1034]

***Second,*** "sea basing" is not an end in itself, it is a means to an end: to provide US Joint military operations with global freedom of action and operational independence. As two senior naval officers wrote:

> Twenty-first century Sea Basing will be our nation's asymmetric military advantage, contributing immeasurably to global peace, international stability, and warfighting effectiveness. *It is the key to operational independence in the dangerous decades before us* (emphasis added).[1035]

In keeping with this thinking, TFBN transformation plans for its Sea-based Transport Fleet should be guided by the broad strategic goal to develop the base-characteristics of the world's oceans to a greater degree than that seen during the Garrison Era, in order to achieve global freedom of action and maneuver.[1036]

***Third,*** improving strategic closure times is a *subordinate goal* to achieving operational independence and improving TFBN expeditionary maneuver capabilities. The "stretch goal" to seize the initiative in ten days and plans for two successive month-long wars is the end result of a decade-long defense planning and shaping strategy that is increasingly out of touch with the conditions of the Joint Expeditionary Era. The four assumptions upon which "10-30-30" is based—that the primary future threat will be traditional military challengers; that the primary

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[1034] Dr. Scott C. Truver, "Transformation: A Bridge Too Far?" *Jane's Navy International,* March 2005, p. 31.

[1035] Moore, Jr., USN, and Hanlon, Jr., "Sea Basing: Operational Independence for a New Century."

[1036] Admiral Vern Clark, as cited in Truver, "Transformation: A Bridge Too Far?" p. 31.

force structure and planning scenario should be for two near-simultaneous traditional combat operations; that US dominance in guided weapons warfare will remain unchallenged; and that US adversaries will not adapt to this dominance—are all questionable.[1037] Far less questionable is the assumption that in future Joint power-projection operations, political and operational access will be more difficult to negotiate or to take for granted, especially during their early phases.

Regardless, the desirability of chasing the timelines set in "10-30-30" should be reassessed. The US armed forces already are the most agile, responsive military force in history: after the surprise attacks on September 11, 2001, they initiated a military counter-attack in a land-locked country located halfway around the world in less than four weeks; in preparation for Operational *Iraqi Freedom*, the DoN was able to "put 60-70,000 Marine and Sailors into Kuwait, with all their equipment, ready to cross the line of departure in less than 60 days."[1038] There appears to be little logic behind increasing these already impressive strategic timelines other that "faster is better," and a growing faith that "early measures" and quick action will help to "rapidly alter initial conditions" and "lock out" enemy options and strategies.[1039]

Speed is often vitally important in tactical encounters, and operating at a faster force tempo has enormous benefits at the operational level of war.[1040] However, the value of speed at the strategic level of war is far less clear. Why? Because the distinction between speed and time is much different at the strategic level, and prescribing *rapidity of action* as the best way to leverage time in war is often a recipe for strategic disaster.[1041] An emphasis on strategic speed contributed to the tragedy of World War I; doomed Japanese and German war planning for World War II; and likely contributed greatly to the lack of post-war planning for Operation *Iraqi Freedom*. All three examples provide evidence that an:

> Obsession with speed denies the fundamental truth that in strategy, everything is contextual, and circumstance is paramount…In the end, the

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[1037] Interestingly, OSD leaders are well aware that the "10-30-30" planning metric refers to traditional military challenges—a domain that the US already dominates. See "A Framework for Strategic Thinking: Building Top-Level Capabilities," PowerPoint brief to the DoD Senior Level Review Group, August 19, 2004, found at http://www.fas.org/irp/agency/dod/framework.pdf.

[1038] Donna Miles, "Seabasing to Transform Marine Deployments, Commandant Says," *American Forces Press Service*, June 9, 2005.

[1039] See, for example, comments by Admiral Joseph Sestak, in Sharon Weinberger, "Navy Officials Outline Changing QDR Focus," *Defense Daily*, January 12, 2005; and comments made by Ryan Henry, Principal Deputy Undersecretary of Defense for Policy, in Jaffe, "Battle Lines: Rumsfeld's Push For Speed Fuels Pentagon Dissent." The ideas of "rapidly changing initial conditions" and "lock out" of enemy strategies are central to network-centric warfare theory. See Cebrowski and Garstka, "Network Centric Warfare: Its Origins and Future."

[1040] As just one contemporary example, see Arthur P. Brill, Jr., "Corp Combat Assessment Team Cites Need for Speed in Iraq," *Seapower*, February 2004, pp. 22-26.

[1041] Dr. Thomas Hughes, "The Cult of the Quick," *Aerospace Power Journal*, Winter 2001, found at http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/win01/hughes.html.

> current thinking about speed mistakes an important and expensive capacity for an inherent and intrinsic advantage.[1042]

Interestingly, this thought was explicitly captured in the Army's decade-long Army After Next project. As described by two of the project's leading thinkers:

> One consistent study finding in the Army's series of war games has been that the crucial measure of successful force projection *is not the speed with which the first combat element engages*. Rather, it is the rate at which the United States and its allies achieve decisive operational superiority, depriving an enemy of freedom of action and making its ultimate defeat both inevitable and irreversible (emphasis added).[1043]

This statement seems especially apt considering the likelihood that future Joint Multidimensional Battle Networks may have to confront a regional power armed with nuclear weapons, or hardened, redundant A2/AD networks. In both instances, speed of the initial combat response will likely be less important than the pace of deliberate counter-force and counter-network operations designed to achieve "decisive operational superiority."

Even more importantly, there is no evidence whatsoever that improved strategic speed will be decisive against irregular challengers, which often rely on strategies that try to expand the strategic timeline in order to outlast the United States. As one official said, "I hate '10-30-30' because it forces us to get better at the things we are already good at and prevents us from dealing with irregular warfare where we are weak."[1044] Moreover, as one strategist presciently wrote before Operation *Iraqi Freedom*:

> …the fast, overwhelming and decisive application of maximum force in minimum time…may produce effective short term results [but it may] be irrelevant, probably even counterproductive, when matched against the very difficult internal problems that form the underlying problems in target countries.[1045]

***Fourth,*** improving strategic closure timelines should also be subordinate to improving the TFBN's ability to conduct forcible entry operations or operational maneuver from the sea—the foundation for transoceanic expeditionary maneuver. For the next several decades, regardless of any moves made now, the majority of *equipment* for Joint ground forces will get to distant theaters on ships that are optimized for unloading in deep water ports or anchorages in a benign environment, and the majority of Joint force *personnel* arrive on commercial airliners through air ports provided by host governments. As the DSB concluded, the Joint Expeditionary Era may require that the TFBN work with other Joint forces to seize and create access before equipment

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[1042] Hughes, "The Cult of the Quick."

[1043] Wass de Czege and Majchrzak, "Operational Maneuver From Strategic Distances."

[1044] Jaffe, "Battle Lines: Rumsfeld's Push For Speed Fuels Pentagon Dissent."

[1045] Hughes, "The Cult of the Quick."

sets and the people assigned to them can arrive in theater. Therefore, for the foreseeable future, the Joint force's ability to seize a *sea and air points of debarkation* (SPODs and APODs) in hostile or potentially hostile territory will be a fundamental Joint requirement.[1046]

All too often, one hears that because the Battle Force has not conducted a large-scale forcible entry from the sea since 1950, amphibious forcible entry operations are a thing of the past, and amphibious landing capabilities a wasteful expenditure of resources. Such thinking is absurd. Using similar logic, the Battle Force should decommission its entire submarine force, since the last time a US submarine fired a torpedo in anger was in 1945. While transformation plans can and should be based on the lessons of the past, they should be guided by an expectation of future, not past utility.

It bears remembering that by the end of the (first) Expeditionary Era when access was uncertain, and often contested, amphibious landing ships made up nearly 40 percent of the entire TSBF. Even during the Garrison Era, the logic of "flexible response" dictated that the nation maintain a hedge against the possible requirement to seize access, even though the likelihood of having to do so was extremely remote. As a result, the requirement for amphibious landing lift during that era was never less than 3.0 MEBs, and often more. Given that future access looks far more uncertain than at any time since 1950, should not the TFBN retain a viable forcible entry capability, and perhaps improve the priority afforded to the Amphibious Landing Fleet? Both logic and prudence suggest that the answer to this question to be yes—a judgment implicitly endorsed by the DSB. If so, a logical follow-on question comes quickly to mind: is there any evidence to suggest that MPF(F) squadrons *as currently envisioned* will be able to support forcible entry operations better than purpose-built amphibious assault ships? And the answer to this question, if not clearly no, is certainly not yet.

One reason why this is so is that amphibious ships are routinely "combat loaded," with every truck, tank, EFV or vehicle loaded with its own collateral equipment and in the order called for in the expected landing plan—which is tailored specifically for the expected mission. Landing plans are normally rehearsed, and the unit and combat loads readjusted. Moreover, amphibious assault ships all have purpose-built interfaces for both air and surface assault connectors, allowing smooth and efficient offloading of personnel and their equipment in the Joint Operations Area.

Compare an amphibious operation launched from amphibious ships designed with both flight and well decks with one envisioned in the MPF(F) plan. Since the MPF ships are anchored forward in theater without prior knowledge of the mission, its cargo normally will be packed by major subordinate unit, such as the MAGTF air combat element, ground combat element, or combat service support element. In theory, units arriving on MPF(F) ships will retrieve their unit equipment, offload the major subordinate unit equipment on their assigned vehicles, repackage and restore the unneeded equipment, and repack the vehicles with their own equipment. This

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[1046] Ma, "Navy Aims to Balance Industrial Base Needs in New Seabasing Plan."

type of "unit loading" likely will be far less efficient than pre-mission unit loading, as suggested by the offload of MPF ships during Operation *Iraqi Freedom*.[1047]

Then, on arrival in the JOA, since there will be only one well deck in the planned 14-ship MPF(F) squadron, most vehicles are to be selectively offloaded from LMSRs onto the three Mobile Logistics Platforms by crane or by ramp, where they would then be further loaded onto surface connectors. In other words, the current plan involves a major trans-shipment of unit vehicles at sea prior to their maneuvering ashore, injecting a considerable amount of friction into one of the most difficult military operations imaginable. Indeed, it is hard to imagine a rehearsal going on before an operation, since that would involve a minimum of three at-sea transshipments of cargo—a lengthy process, and certainly a dangerous one in all but the most benign sea conditions.

Indeed, with the exception of some cursory dockside experiments, the Battle Force has absolutely no experience in an operation of this sort. In numerous interviews conducted for this report, not one officer experienced in amphibious landings believed the operational concept for landings using the the MPF(F) squadron to be prudent, and all expressed skepticism about their safety and effectiveness.

***Fifth,*** the DSB's unbalanced over-emphasis on aerial maneuver operations from ships at sea needs to be reexamined. As mentioned earlier, the genesis of the DSB's air maneuver concepts can be traced to US Marine thinking about the impact that atomic weapons might have on amphibious operations in the late 1940s. These musing led to the idea of using helicopters to vertically envelop shore defenses in order to open up high-speed avenues of advance for surface assault elements. After the Marines' successful battlefield use of helicopters in the Korean War to move troops along the "main lines of resistance," these early ideas for vertical envelopment were expanded to include the idea of direct aerial ship-to-objective maneuver and quick-hitting vertical assaults during sustained operations ashore.[1048] Indeed, this new line of thinking spurred DoN experimentation throughout the 1950s with helicopter carriers—converted World War II CVEs and CVs—and ultimately led to the development of the Landing Platform Helicopter, or LPH, an improved World War II CVE design with accommodations for a full Marine battalion and a squadron of helicopters.[1049]

Although the US Army Air Force had acquired helicopters well before the Marines in World War II, post-war budgetary constraints and inter-service squabbles with the newly formed US Air Force limited early Army use of helicopters to casualty evacuation, aerial resupply, and other light aviation tasks. However, toward the end of the Korean War, the Army acquired several

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[1047] Vergun, "Outfitting the Operating Force," p. 37.

[1048] For a good contemporary description of US Marine combat helicopter operations during the Korean War, see Montross, *Cavalry of the Sky*.

[1049] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 190; and Freidman, *US Amphibious Ships and Craft.*

Marine-developed CH-19 *Chickasaws* and subsequently used them to carry out a small number of battlefield troop movements. The promise of helicopter-borne troop movements caught the attention of 1950s Army leadership, which included a large number of World War II airborne officers. These officers were mightily attracted to the emerging idea of helicopter-enabled "air mobility," the "New School" of airborne thinking, because it use it held the promise of solving two of the biggest problems associated with airborne drops—dispersal and disorganization of the air-landed force—and lack of tactical mobility for paratroopers once they had landed.[1050] After all:

> With a relatively unlimited choice of landing areas, troops [could] be landed in combat formations and under full control of the flanks or rear of a hostile position.[1051]

Moreover, Army leaders were as concerned about atomic weapons as the Marines. The advent of atomic weapons had rendered massed parachute drops all but impossible. Indeed, atomic weapons seemed to present Army leaders with a tactical dilemma: while nuclear devastation would make the speedy maneuver of ground forces very difficulty, rapid tactical movement was necessary for ground force survivability. Generals like Matthew Ridgeway and James Gavin saw the helicopter as the means to solve this dilemma, and increasing extolled the role of the helicopter in battlefield reconnaissance, screening, exploitation, and pursuit—the traditional roles of cavalry. As a result, the Army enthusiastically pursued the idea of helicopter-borne Air Cavalry and pioneered the use of helicopter gunships to provide these units with their own organic close air support.[1052]

Army and Marine enthusiasm for air cavalry, air assault, and vertical envelopments was tempered somewhat by their experience in the Vietnam War, which proved that rotary-winged aircraft operations in the face of even light defenses were risky propositions. Over the course of the Vietnam War, US forces lost approximately 5,000 helicopters out of a total of 11,827 that operated in theater—a combined loss rate of over 40 percent.[1053] During Operation Lam Som 719, the last major Army air assault operation of the Vietnam War, 100 helicopters were lost and another 400 damaged in just four weeks—and these losses came *before* the April 1972 battlefield

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[1050] Matthew Allen, *Military Helicopter Doctrines of the Major Powers, 1945-1992* (Westport, CT: Greenwood Press, pp. 1-6.

[1051] Major Rodney Propst, USMC, "The Marine Helicopter and the Korean War," found at http://www.globalsecurity.org/military/library/report/1989/PRN1.htm.

[1052] Allen, *Military Helicopter Doctrines of the Major Powers, 1945-19*92, p. 6; and "Helicopters at War," found at http://www.centennialofflight.gov/essay/Air_Power/Heli_at_War/ AP42.

[1053] One estimate for losses was 5,086 helicopters; see "Helicopter Losses During the Vietnam War," found at http://www.vhpa.org/heliloss.pdf. Another source puts the losses at 4,869. See "Helicopters at War."

employment of man-portable guided anti-helicopter weapons like the US *Redeye* or Soviet SA-7 *Strela*.[1054]

Based on the hard-learned lessons of Vietnam, DoN and Marine planners made two major course corrections—one during and one after the war. First, they rejected further LPHs, opting instead for the big-deck amphibious assault ships that combined both the aviation support capabilities of an LPH and the wet well deck of a LSD or LPD. This provided the ships with interfaces for both air and surface "connectors," giving them far more flexibility in amphibious landing operations, and enabling them to modify the landing plan based on the primary threat ashore. Second, after being rebuffed by OSD in their attempts to pursue a replacement for their battered Vietnam-era helicopter fleet, they decided to pursue tilt-rotor aircraft for the vertical envelopment mission. Because of its greater speeds and higher operating ceilings, a tilt-rotor promised to have greater operational reach and survivability than any helicopter, and faster troop build-up times, especially over long ranges.[1055]

After Vietnam, Army planners also pursued a different direction for their air assault units. Generally satisfied with the capabilities of the helicopter, they concluded that only the units' concept of employment needed to be changed. As a result, they gradually moved away from the concept of air assault and toward the "New, New School" of airborne thinking—deep operations involving *aerial maneuver*, landing forces behind enemy lines *where the enemy wasn't*, and *deep attack*, attacking enemy armored concentrations with helicopter gunships. The deep aerial maneuver of the 101st Air Assault Division during *Desert Storm* was a clear demonstration of the idea of aerial maneuver.[1056] The development of the AH-64 *Apache,* an armored gunship armed with stand-off guided weapons, and its successful employment during Operation *Desert Storm,* embodied the Army's new ideas about deep attack.[1057]

During the 1990s, leaders associated with the Army After Next project began to combine the thinking of aerial maneuver with the emerging ideas of operational maneuver from strategic distances to form an even broader vision: *air mechanization*. The leading proponent of this "New, New, New School" was Army Major General Robert H. Scales, Jr. In his judgment, while landing foot-mobile forces where the enemy wasn't might be good for setting up static blocking

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[1054] Peter A. Wilson, John Gordon IV, and David E. Johnson, "An Alternative Future Force: Building a Better Army," *Parameters,* Winter 2003-04, p. 25.

[1055] See the sections entitled "V-22 History: HXM," and "V-22 History: JVX," at http://www.globalsecurity.org/military/systems/aircraft/v-22.htm.

[1056] During the ground war phase of 'Desert Storm,' the 101st lifted more than 2,000 men, 50 transport vehicles, artillery, and tons of fuel and ammunition 50 miles into Iraq to set up Forward Operation Base (FOB) Cobra. Subsequently, the 101st was tasked to seize Highway 8, which was used to resupply the Iraqi Army from Baghdad. To accomplish this, the division conducted the largest Air Assault in history. The division lifted by helicopter from FOB Cobra to set up FOB Viper, which was used as a base of operations to attack Iraqi Army units withdrawing from the Kuwait border. See "101st Airborne Division (Air Assault)," at http://www.globalsecurity.org/military/agency/army/101abn.htm.

[1057] See "AH-64 *Apache*," at http://www.fas.org/man/dod-101/sys/ac/ah-64.htm.

positions, it was far less suited for offensive operations or operations designed to maintain pressure on an enemy. As a result, General Scales envisioned the insertion of light, mobile, *armored combat units* directly into an enemy's defended battlespace from intra-theater bases located 500 miles from the enemy's defended territory. The means for insertion would be either C-130s tactical transports or advanced "Air Maneuver Transports."[1058] Partly as a result of General Scale's intense salesmanship, the idea of deep aerial maneuver of combat forces began to gain currency within DoD, particularly within the DSB and the Office of Force Transformation, and on the Army staff. The requirement that the Army's new Future Combat System (FCS) must be transportable by C-130 tactical transports was driven both by strategic deployability and the promise for air mechanization.[1059]

Despite the concept's attractions, the size and cost of a tactical transport force designed to support the aerial maneuver of even one large armored combat unit from bases more than 500 miles away would be substantial. However, much more troubling in recent combat experience in Somalia, Afghanistan, and Iraq, which suggests that air maneuver and air mechanization operations in the maturing phase of the Guided Weapons Regime promise to be every bit as risky as airborne drops were in the earlier Unguided Weapons Regime.[1060]

Proponents of aerial maneuver and air mechanization would undoubtedly object to this conclusion, countering that these experiences were all with more vulnerable helicopters rather than with more modern tilt-rotor aircraft or advanced air transports, and that the idea of aerial maneuver is to land where the enemy isn't, and not on top of prepared positions or defenses. However, the fact that all of these aforementioned losses occurred in unsophisticated, non-guided weapon tactical environments, and the absurdity of thinking that an aerial insertion force will never be surprised by the unexpected appearance of defenders in a landing zone. undercut these two counter-arguments. As a recent RAND study on lessons learned from Operation *Iraqi Freedom* concluded:

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[1058] Wilson, et al, "An Alternative Future Force: Building a Better Army," p. 25. See also, Major General Robert H. Scales, Jr., "Operational Maneuver in 2015," an undated PowerPoint presentation.

[1059] Andrew Koch, "Boost for Sea-Basing Concept."

[1060] As recounted in the book *Blackhawk Down* (subsequently made into a movie), helicopters are especially vulnerable near the ground. The book tells of the harrowing aftermath of a "snatch and grab" operation in downtown Mogadishu, Somalia, after several helicopters were shot down. See Mark Bowden, *Blackhawk Down: a Story of Modern War* (New York, NY: Grove Atlantic, 1999). A version of the story can be found online at http://inquirer.philly.com/packages/somalia/sitemap.asp. During Operation *Anaconda* in Afghanistan, Army helicopters that were inserting Special Operations and Army combat units were ambushed in their landing zones. One helicopter was shot down and another forced to land. Enemy units surrounding the landing zone kept American units pinned down for some time, and inflicted numerous casualties. For a gripping account of Operation *Anaconda*, see Sean Naylor, *Not a Good Day to Die* (New York, NY: Penguin Group, 2005). See also "Operation Anaconda," found online at http://www. globalsecurity.org/ military/ops/oef-anaconda.htm. British Royal Marines thought the operation to be a "disaster;" see discussions about the operation at http://en.wikipedia.org/wiki/OperationAnaconda #March12.2C2002. And in Operation *Iraqi Freedom*, all air assault operations were cancelled because the risks were judged greater than the expected benefits. RAND, "Iraq: Translating Lessons Into Future DoD Policies," transmitted to Secretary of Defense Donald Rumsfeld via a letter dated February 7, 2005.

> Though planned, no air assault operations were undertaken, primarily because the risks outweighed the expected benefits…The experience in Iraq involving the employment of attack helicopters raises questions about some of the emerging concepts that place high reliance on so-called vertical envelopment operations deep into enemy territory.[1061]

As other RAND analysts make clear, a rapid aerial *deployment* capability remains an enviable goal. However, in their opinion, greater emphasis needs to be placed on pre-positioning options in different theaters and increased exploitation of high-speed *sealift* technologies.[1062] This was the same conclusion reached by the Institute for Defense Analysis in a study on the transportability of the Army's FCS—the cornerstone of future Army air mechanization plans. The study concluded that sea lift was the fastest mode of global transportation for FCS Units of Action, anywhere and anytime.[1063]

***Sixth,*** if DSB's clear bias for air maneuver operations from ships at sea needs to be revisited, so too must its bias against surface maneuver. In the future, a combined arms force landing from the sea will be able to generate tactical speeds unheard of in previous eras. To get an idea of the potential problems a defender might face against a future TFBN maneuver force claiming the sea as base, think of Operation *Iraqi Freedom* as a breakout from an amphibious lodgment area. US Marine combined arms columns, using the same equipment they would have used in an amphibious surface landing, were able to move *over 400 miles inland in little more than three weeks*. They accomplished this impressive feat of arms by concentrating a relatively small number of tanks at the heads of their columns; screening the columns' flanks using airpower; disrupting enemy blocking movements by massed guided weapons fire; and using high volume artillery fire to suppress enemy forces encountered in meeting engagements. By-passed enemy forces were able to harass the supply lines of these fast-moving columns, but never enough to threaten the momentum of their advance.

Recall that the DSB's rejection of future surface maneuver derived from their belief that mines and precision fires would prevent surface "amphibious operations." However, it is highly unlikely that an enemy will be equally strong along his entire coast. By using the sea as a base for maneuver, the TFBN can probe the enemy's defenses to determine where he is most weak, and land its forces ashore after opening a littoral penetration point covered by its formidable defensive and offensive fires. As the Japanese demonstrated when they attacked Singapore by land rather than by sea, the preferred way to attack "a fort" is to envelop or attack it from an unexpected direction. Using OIF as a model, a Marine force now could land via surface up to 400 miles away from a defended littoral penetration point and, covered by TFGN guided

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[1061] RAND, "Iraq: Translating Lessons Into Future DoD Policies."

[1062] Wilson, et al, "An Alternative Future Force: Building a Better Army," p. 24.

[1063] Cynthia Dion-Schwarz, et al, *Future Combat System (FCS) Vehicle Transportability, Survivability, and Reliability Analysis* (Alexandria, VA: Institute for Defense Analysis, April 2005). This study was made before the Army concluded that the weight of the Future Combat System would need to climb to 22,000 kilograms—about 5,000 kilograms more that can be lifted by the C-130—to meet all survivability requirements. See Joshua Kucera, "FCS Planners Opt For Heavier Vehicles," *Jane's Defence Weekly*, June 29, 2005, p. 4.

weapons fire, move quickly to attack the forces located there in less than a month. Future improvements in ship-to-shore connectors, such as improved LCACs, which now can travel at 40 knots, traverse 70 percent of the world's beaches, and deliver tanks, artillery, and other protected armored vehicles beyond a beach, and new surface assault platforms like the new Expeditionary Fighting Vehicle (EFV), the Marines' high-speed replacement for their old amphibious assault tractors, will provide the future TFBN new means to conduct even more effective distributed, high-speed surface attacks from ships at sea.[1064]

Moreover, once ashore, surface forces face far less of a "vulnerability gap" than the DSB imagined. Indeed, the gap suggested by Figures Seven and Eight was obsolete for surface landed forces as early as 1944. By that year, the Japanese island defenders in the Pacific had concluded that there was no exploitable operational pause between the initial landing waves and the follow-on waves of an American surface assault. They thus began to move their forces inland and to dig in, to better contest the American forces once they were ashore. In the end, the Japanese approach proved to be no better than conducting counterattacks against surface lodgments with mobile armored forces—the approach adopted by the Germans in the European theater. As the German Army learned from bitter experience, allied air superiority kept these forces from getting to the beach, or destroyed them outright on their movement there.[1065] It seems a safe bet that Figures Seven and Eight have even less applicability in the Joint Expeditionary Era and six decades into the Guided Weapons Warfare Regime. Any enemy that mounts a massed attack against a forced US surface lodgment protected by a fully intact Joint Multidimensional Battle Network—to include ballistic and cruise missile attacks—will likely find it as difficult "to get to the beach" as did the Germans in 1944-45.

Ironically, the "vulnerability gap" applies much more directly to initial attacks made by airborne, light infantry, or light armored forces air-landed deep in enemy territory—the very approach favored by the DSB. These types of landings tend to come in intermittent, concentrated pulses of combat power rather than the sustained pulses associated with well-planned surface maneuver operations. At extended ranges, the interval between pulses—the delay between the initial and follow-on air landed waves—would likely be substantial, and the defensive and offensive firepower of the Joint Multidimensional Battle Network far less effective. German airborne drops on Crete and the allied air drops associated with Operation *Market-Garden* during World War II, as well as more recent Army air cavalry experiences in the Ia Drang valley in 1965, suggest that the success for future aerial maneuver operations will depend far less on whether the support and sustaining base for the landings are at sea or on land, and far more on the actual distance from the supporting base and the landing point.[1066]

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[1064] See "Expeditionary Fighting Vehicle," at http://www.efv.usmc.mil; and Hunter C. Keeter, "EFV Brings Improved Range, Lethality to Marines," *Sea Power,* November 2003, p. 20.

[1065] Williamson Murray, "Flawed Triumph," *Military History Quarterly (MHQ),* Summer 2004, pp. 6-15.

[1066] Operation *Mercury*, the German invasion of Crete, relied heavily on airborne troops. Operation *Market Garden* involved a major allied airborne drop behind German lines in 1944. Both proved costly for the air landed forces. Of 22,000 Germans in their assault force, 5,500 became casualties. And of the 10,000 men of the British 1st Airborne Division dropped at the deepest point behind German lines, only 2,300 returned. See "Operation *Mercury,* The

The "vulnerability gap" will be especially severe for Marine air-landed and Army airborne forces, both of which move only as fast as their feet could take them. In this regard, Major General Scales had the right of it when he concluded that *foot-mobile* infantry units air-landed deep behind enemy lines will be especially vulnerable to interdiction and attack, especially on battlefields with guided or nuclear weapons. However, the concept of air mechanization, which would give the air landed force the mobility to survive, is likely decades away. For this reason, mechanized forces that can attack from the sea likely will remain useful for some time to come, since the most useful Joint forces for opposed theater will be ground combat units that can land and immediately transition to high-speed maneuver.

This discussion is not meant to imply that aerial maneuver should be completely abandoned. It is offered instead only to make the case that the DSB vision likely over emphasizes the importance and capability of aerial maneuver operations in the Guided Weapons Warfare Regime, and that TFBN transformation plans need be careful about under-emphasizing the effectiveness of surface maneuver. It is the *balance* of aerial and surface maneuver capabilities that will give future sea-based maneuver forces their enormous flexibility. Aerial maneuver will be especially valuable for the raids and counter-sanctuary operations consistent with the global irregular war, for carefully planned raids and screening operations in defended and contested access scenarios, and for supporting attacks during major combat operations. However, for the foreseeable future, the Joint forcible entry force needs to retain a strong surface maneuver capability.

***Seventh,*** keeping personnel and equipment at sea will be no panacea in the Joint Expeditionary Era. The same "[p]recision strikes, weapons of mass destruction, and cruise and ballistic missiles" that the NDP warned would threaten future land bases will pose equally severe threats to future Naval Battle Networks operating in coastal waters. Indeed—nuclear weapons aside—small numbers of guided missile "leakers" that hit a sea base could have a far greater catastrophic impact than attacks against a sprawling land base, because one hit could result in the total loss of an intact combat unit or a critical component of the Joint landing force.[1067] And in the case of nuclear weapons, would an adversary be less or more likely to employ nuclear weapons against US forces operating at sea or against a city or port on his own territory?

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German Invasion of Crete, 20 May-1 June 1941," at http://www.historyofwar.org/articles/battles_crete.html; and "Operation *Market-Garden*, September 1944," at http://www. worldwar2database.com/html/arnhem.htm. In 1965, the US Army 1st of the 7th Cavalry landed by helicopters in an landing zone called "X-ray." In the battle that ensued, the US force was nearly overwhelmed by counter-attacking North Vietnamese troops, despite the fact that supporting helicopter and fire support bases were relatively close. This battle was described by Army Lieutenant General Harold G. "Hal" Moore and photographer Joseph L. Galloway in the superb book, *We Were Soldiers, Once… and Young* (New York, NY: Random House, 1992).

[1067] During the Falklands campaign, two Argentine *Exocet* missiles struck the *British Atlantic Conveyor*, a commercial transport taken up in trade. The missiles sent the ship to the bottom, and a good portion of the British force of troop lift helicopters went to the bottom with it. Salvage was impossible. The loss meant that the British Force had to march across the Falklands to attack the Argentine troop concentration at Port Stanley. Under different circumstances, the loss may have had a major impact on the outcome of the British invasion. See "Atlantic Conveyor," at http://www.answers.com/topic/atlantic-conveyor.

Thinking during the Garrison Era suggests that the bar for employing nuclear weapons at sea is much lower than that on land.[1068]

In any event, if Battle Force defenses can be made "leak proof," why can't the same level of protection be provided over a port and nearby airfield? Indeed, extending fleet defenses over allied territory, ports, airfields, and Joint forces operating ashore is one of the basic tenets of "Sea Shield."[1069] In the end, the debate over whether land or sea bases are more vulnerable is a false one: as everyone recognizes except the most ardent sea basing proponents, for any large-scale power-projection operation the majority of the Joint force—and their support tails—will inevitably have to move ashore. Joint forces operating on both land and sea will be subject to attack by guided weapons, and both will have their own inherent vulnerabilities. It will be the aim of Joint commanders to mask these vulnerabilities.

***Eighth***, while selective cargo off-load should be a key goal for all future expeditionary maneuver ships, because the majority of Joint forces will continue to operate ashore resupplying Joint forces ashore directly from sea bases will likely be a niche TFBN capability for the foreseeable future. Sustained support of forces ashore from a sea base will only work for relatively small forces, perhaps up to several brigades in size, operating relatively close to the coastline. This capability will be most useful during the early phases of a forcible entry operation until Joint forces can establish an effective support structure ashore, or for providing sustained support of small garrisons fighting the global irregular war in which a major footprint ashore is neither required nor desired.

In any case, combining a selective offload cargo ship with a troop ship carrying a large number of personnel, once the goal of the MPF(F) program, is not a good idea. To maximize their cargo capacity, legacy prepositioning ships are "dense-packed" with both vehicles and supplies. This makes selective offload of any particular item very difficult. For example, during OIF, Army logisticians had to unload 800 containers off of an ammunition container ship before they could get at the 560 they wanted.[1070] To provide the space necessary to move cargo about internally, selective offload cargo ships need to be far less densely packed. In other words, selective offload ships carrying equivalent amounts of cargo need to be larger than regular cargo ships, and be designed with roomier holds that have fewer impediments to the movement of materials.

As a result, selective offload cargo ships will be inherently more vulnerable to guided weapons attack. As one admiral explained, a selective discharge cargo ship is like a floating Wal-Mart store. He then went on to say:

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[1068] See for example William M. Arkin, "The Nuclear Arms Race at Sea," Neptune Papers No. 1, October 1987, p. 25.

[1069] Vice Admirals Mike Bucchi and Mike Mullen, USN, "Sea Shield: Projecting Global Defensive Assurance," *Proceedings*, November 2002, at http://www.usni.org/Proceedings/Articles02/PRObucchi11.htm.

[1070] Ann Roosevelt, "Army, Navy Collaborating on Sea Basing Concept," *Defense Daily*, June 30, 2004.

> By the way, we usually have lots of compartments on Navy ships, so if you get hit, it won't sink. You can't do that if [the ship] is to be a Wal-Mart-type of environment.[1071]

Interestingly, the admiral was arguing that if the Marines wanted an MPF(F) ship with both troop carrying and a selective off-load capability, they would have to accept the risks associated with operating large numbers of troops off of commercial ships. Of course, the far more sensible approach—evident in the current MPF(F) squadron design—is to separate the cargo resupply and maneuver support roles, keeping the troops aboard the most protected ships possible. This is not a novel idea; selective discharge cargo ships—such as the AKAs of the (first) Expeditionary Era and the updated *Charleston*-class LKAs developed during the in the Garrison Era—have always had minimal troop accommodations.[1072]

By separating the resupply function from the maneuver support function, an entirely new set of alternatives to resupplying Joint forces from the sea comes to light. One is to assign the ashore resupply function to the Amphibious Landing Force, and to build updated versions of the *Charleston*-class LKA. Another would be to make the mission of "underway replenishment" of ground forces ashore the responsibility of the Navy's Combat Logistics Force. Another would be to expand the Logistics Prepositioning Force to support all Joint ground forces ashore with ammunition, fuel, waters, and basic supplies. The point here is that the MPF(F) squadron is not the only, or necessarily the best, way to solve the niche mission of supplying Joint ground forces ashore.

***Ninth,*** equally important with having a selective offload cargo capability is an ability to create a heavy theater logistics portal where one is not. Potential adversaries are as well aware as Joint planners that future major US power-projection operations will require the seizure of a deep water port and nearby airfield. This makes their defensive plans easier to develop. Having an ability to assemble an artificial harbor rapidly, anywhere in the world, complete with breakwaters, causeways, cranes, and the like, would provide future Joint planners with a means to complicate an adversary's defensive problem, as was amply demonstrated by the development of the MULBERRY artificial harbor for the allied invasion of Europe:

> The importance of MULBERRY [harbors] goes far beyond the operational issue of how efficacious they were. Until their invention it was axiomatic that invading armies would need to capture a major functioning port soon after landing, to replenish those forces already ashore and to sustain the build-up…Meanwhile, having persuaded themselves (wisely or not) that their logistical needs would be meet, for an extended time after the landings, by transportable [harbors], the allied planners freed themselves to think in a rather different geographical box from the German staff officers whose job was to second guess their

[1071] Castelli, "Admiral Sees Need For More Dialogue Between Services On Seabasing."

[1072] For information on the LKAs developed during the Garrison Era, see Polmar, *Ships and Aircraft of the US Fleet*, fourteenth edition, pp. 195-96.

> plans. Its highest purpose, indeed, was to enable an exercise in maneuverism of a scale unsurpassed since Hannibal.[1073]

In addition to complicating an adversary's defensive problem, many officers in the other services view the most critical contribution of sea basing as being the introduction of responsive Joint logistics.[1074] Seeking an improved TFBN ability to create a theater logistics portal where one doesn't exist, coupled with an improved ability to provide "underway replenishment" of Joint Forces operating ashore, will go a long way toward making the sea base a truly Joint force multiplier.

***Tenth***, as the above discussion suggests, the JROC's disregard of the DSB's prudent call for an extended period of Joint concept development and technological experimentation for sea basing needs to be revisited. The current short-sighted focus on the mid-term operational goal of conducting a brigade-sized forcible entry operation in ten to 14 days rather than on a long-term effort aimed at developing the ocean's base-characteristics more fully and improving all aspects of TFBN expeditionary maneuver capability ensures that important sea basing options and considerations likely will not be fully considered or will be foreclosed prematurely.

Development of the sea basing "system-of-systems" needed to fully exploit the sea as a Joint base will be vastly more complicated than the development of carrier aviation during the Interwar years. It took two decades of hard conceptual and technological development and experimentation before the DoN finally got carrier aviation right. DoN planners should therefore expect that the answers for the sea as base system-of-systems will take at least as long, if not longer, to discover. This expectation lends support to the DSB's recommendation that the development of sea as Joint base capabilities should be a long term endeavor, shaped by experimentation, war gaming, analysis, and technological research, and prototype development. The belief that the full conceptual and contextual development of something as complex as sea basing could take place in little more than three years is foolish.

***Eleventh***, as a result, current TFBN Sea as Base transformation plans appear to be both premature and out of balance. With regard to the former, in July 2004, when asked by Senator John Warner if the Navy would maintain 12 ESGs, the CNO responded that the requirement was for 12 ESGs, and would stay at 12 ESGs. He then went on to say:

> I will tell you that I'm in the process of…setting up a sea swap experiment for the Expeditionary Strike Group to see if we can do something that large. If we could, it would affect my recommended investment profile…[1075]

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[1073] Jane Penrose, editor, *The D-Day Companion* (New Orleans, LA: The National D-Day Museum, 2004), pp. 134-35.

[1074] Lieutenant Commander John J. Klein, USN, and Major Rich Morales, US Army, "Sea Basing Isn't Just About the Sea," *Proceedings*, January 2004, p. 33.

[1075] Castelli, "Navy May Cut Number of Expeditionary Strike Groups to Find MPF(F)," p. 1.

Since that time, there have been no “sea swap” experiments involving ESGs, with the exception of the “cross-decking” of a command group from one ESG to another, which is a far easier evolution than the complete swap out of an entire ESG.[1076] Nor have their been any systematic experiments on MPF(F) sea basing concepts or technologies. Certainly, there have been a number of “limited objective experiments” and technological demonstrations over the past three years, but nothing on the scale of the aforementioned Fleet problems which characterized the Interwar period and the development of carrier aviation tactics, techniques, and procedures. Yet the current DoN plans clearly endorse the MPF(F) solution, and reduce the Amphibious Landing Fleet and its capabilities even more, by closing the well deck on the next big-deck amphibious ship; truncating LPD-17 production at nine ships, rather than the 12 that were originally planned; and reducing the total number of amphibious landing ships by a third—or more—by 2035. In other words, TFBN plans for the Sea as Base Expeditionary Maneuver Fleet presuppose success in experiments that has yet to be conceived, much less conducted.

What explains this apparent rush to judgment? One reason might be that by substituting three civilian-crewed MPF(F) big-deck assault ships operated by the MSC for active Navy amphibious landing ships, the DoN will save up to 3,000 active duty billets. The Navy will also accrue additional O&S savings, all of which could be diverted into Navy procurement accounts. Another reason might be to help maintain the industrial base.[1077] Worthy as these goals are, they should be used to justify the premature foreclosure of all potential options for the Sea as Base Expeditionary Maneuver Fleet.

Also troubling is the stark contrast between the reduction of the TFBN’s total lift and expeditionary maneuver capabilities and the rapidly expanding capabilities of the Sea as Base Strike Fleet discussed in the previous two chapters. That current plans for TFBN strike and maneuver capabilities appear to be so woefully out of balance should come as no surprise. The imbalance reflects the emphasis the Navy placed on strike operations in the Garrison Era, the operational divorce of the Navy and Marine Corps, and the two services’ inability to define a common future. It also reflects the simple fact that there are only four admirals or admiral-selects in the entire Navy that have significant amphibious experience, and few Marine generals or general-selects who have experience planning amphibious operations involving units larger than a MEU(SOC). What else explains the obvious lack of clear thinking when amphibious landing ships are considered different than “sea basing ships” in the DoN’s own ship building plan? Until more flag officers with amphibious or expeditionary maneuver experience are selected, TFBN transformation plans will inevitably continue to reflect a bias in favor of aviation and surface combatant strike capabilities, and against expeditionary maneuver capabilities.

***Twelfth,*** standing in sharp juxtaposition to the DoN’s embrace of MPF(F) over general improvements to the Amphibious Landing Fleet is a global renaissance in amphibious assault

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[1076] Cavas, “Small Sea Swap Works for US.”

[1077] Ma, “Navy Aims to Balance Industrial Base Needs In New Seabasing Plan.”

platforms. While the platforms associated with this world-wide renaissance are varied, four key platform trend stands out.

The first evident trend is that purpose-built LPHs are a dying breed: there remains only one in the world—the *HMS Ocean*, operated by the Royal Navy. However, a new variation of the type is a CVV with an additional capability to carry troops. Heretofore, the prime example was the Italian 13,850-ton *Girabaldi*-class CVV. The Italian Navy is now pursuing a much larger 27,000-ton ship, the *Cavour*, which will be able to carry eight STOVL JSFs, 12 medium-lift helicopters, and up to 450 troops and 100 small vehicles, off-loadable through two roll-on/roll-off ramps.[1078] The US CVE/LHAR, with its closed well deck and improved ability to operate up to 23 JSFs, 28 MV-22s, or a combination thereof, are the only other examples of this type.

The second trend is that LHDs—with both a full-length flight deck *and* a floodable well deck—are the clear platform of choice for the navies that can afford them.[1079] The navies of France, Spain, South Korea, and Australia are either building or planning to build at least eight LHDs. The two French *Mistral*-class LHDs are 21,500-ton FLD ships can carry 450 troops and 60 armored vehicles. These two ships have a full-length flight deck and a below-deck hanger that can accommodate 16 medium/heavy lift helicopters, and a well dock that can accommodate four large displacement landing craft or two LCACs. The single Spanish LHD will be even larger. At over 27,000 tons full load displacement, it will carry a staff, air group, and landing force of 1,220 personnel. Its full-length flight and hanger decks can accommodate 22 helicopters, and its floodable well deck can carry four large landing craft. Both the French and Spanish LHD designs are competing for an Australian Navy requirement for two LHDs. The three South Korean "mini-LHDs" will be slightly smaller, at approximately 19,000 tons FLD, but will have the same full-length flight deck and well deck characteristic of the class.[1080] In addition, the Italian Navy recently announced it intended to build a LHD in the 20,000-ton range, with a floodable well deck, suggesting that Italian planners are uncomfortable with relying on CVVs with transport capabilities for the amphibious mission.[1081]

The third trend is that LPDs—with their substantial helicopter capacity and floodable well decks—are the clear platform of choice for medium-sized amphibious landing ships. The Netherlands, Spain, and Britain will soon operate 10 modern LPDs. The Royal Netherlands Navy

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[1078] *Jane's Fighting Ships*, 2004-2005; *Combat Fleets of the World, 2005-2006*; and Hooton, "Send an Amphib, the Future Cry," p. 10.

[1079] For a thorough overview of these LHD programs, see Ian Bostock, Scott Gourley, Kathryn Shaw, "Advanced LHDs Lead the Way," *Jane's Navy International*, May 2005, pp. 13-18.

[1080] *Jane's Fighting Ships*, 2004-2005; *Combat Fleets of the World, 2005-2006*; Hooton, "Send an Amphib, the Future Cry," p. 11; Bostock, et al, "Advanced LHDs Lead the Way;" and Jacobs, "South Korean Navy: Transformation to Provide New Capabilities," p. 46. The South Korean LP-X *Dokdo Ham*-class is classified as an LPD, but is more like a "mini-LHD." It will be able to carry a battalion of troops, up to 70 amphibious assault vehicles or 200 smaller vehicles, 15 UH-60 helicopters, and two LCACs.

[1081] Richard Scott, "Italian Navy Studies Design Options for New LHDs," *Jane's Navy International*, August 2005, p. 11.

will have two variations of their *Rotterdam*-class, one with a 12,750-ton FLD, the other with a 16,000-ton FLD. Both ships, designed to commercial standards, can carry landing forces of 500-700 personnel, which can be delivered by four and six troop-lifting helicopters carried on their large flight decks or in their hangers, or by a variety of landing craft stored in their large well decks. The same design was chosen by Spain for its two, 13,000-ton *Galicia*-class LPDs, and by Britain for its four-ship class of *Largs Bay* 16,000-ton FLD auxiliary LPDs. The British also have two modern 17,000-ton *Albion*-class LPDs, built to warship standards.[1082]

Other navies operate "LPD-like" ships, with floodable well decks and large flight decks, but no hanger space, opting instead to store their helicopters on the flight deck. Examples of this type include the four Japanese *Osumi*-class LPDs with FLDs of 13,000 tons, and the three small 8,000-ton Italian *San Giorgio* LPDs.[1083]

The final trend is that new classes of "multi-role" vessels that are capable of transporting and landing troops and vehicles are the choice of an increasing number of navies. For example, the Canadian Navy is planning to build up to three Strategic Multirole Aid and Replenishment Transports (SMARTs), large 35,000-ton ships designed both to replenish Canadian combatants *and* to transport Canadian peacekeeping troops and their vehicles.[1084] Moreover, this trend is not confined to the 17 next-largest navies. New Zealand is building a Multi-Role Vessel (MRV) based on an 8,700-ton RO/RO ferry design that can carry 150 troops and a small number of vehicles.[1085] Even the smallest of navies are seeking to improve their sea-based transport and/or maneuver capabilities, as evidenced by the requirement for Malta's new Offshore Patrol Vessel to have a helicopter flight deck and an ability to carry five small wheeled vehicles and 30 troops.[1086] Indeed, because of increased interest in these types of vessel, German shipbuilder HDW has developed a medium-sized MRV known as the MRV 7500, indicating its FLD in tons. The ship has accommodations for 312 troops, a garage big enough for 48 light armored vehicles, a container handling facility amidships, a stern RO/RO ramp, two landing craft, and a two-spot landing deck. A larger version, known as the MRV 10000, adds a wet well. Several Asian navies are reported to be interested in the design, particularly Malaysia.[1087]

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[1082] *Jane's Fighting Ships,* 2004-2005; *Combat Fleets of the World, 2005-2006*; and Hooton, "Send an Amphib, the Future Cry," p. 11.

[1083] Some references refer to these ships as LPDs, others as LSDs. *Jane's Fighting Ships*, 2004-2005; *Combat Fleets of the World, 2005-2006*; and Hooton, "Send an Amphib, the Future Cry," p. 11.

[1084] Sharon Hobson, "Canada Proceeds With Joint Support Ship Project," *Jane's Navy International*, January/February 2005, p. 4. The Canadian decision to pursue this ship is not without controversy. See Dr. Paul T. Mitchell, "Joint Support Ship: Transformation or White Elephant?" *Proceedings,* March 2004, pp. 64-66.

[1085] Hooton, "Send an Amphib, the Future Cry," p. 11.

[1086] Hooton, "Send an Amphib, the Future Cry," p. 10.

[1087] Richard Scott, "HDW Outlines New Multirole Ship Design for Military/Civil Missions," *Jane's International Defense Review,* July 2005, p. 5.

A particularly innovative variation of this particular trend is found in the Royal Danish Navy, which is combining the features of a seventh-rate combatant and a sea-based transport vessel into one hull. Called Flexible Support Ships, these 6,300-ton FLD ships are armed with a 5-inch naval gun, eight *Harpoon* ASCMs, and vertically-launched Sea Sparrow missiles. They have a flight deck large enough to handle heavy-weight helicopters and a hanger large enough to accommodate two medium-lift helicopters. However, they also have a wide, 900 square meter "flex-deck" that can accommodate ten 62-ton tanks, or 46 lighter vehicles, or a 25-TEU modular hospital, or even 300 mines that can be laid through the ship's stern ramp. The ships also carry two high-speed assault craft for special-purpose maritime reconnaissance missions. The ship can be configured for nine different roles.[1088]

As can be seen, then, many of the world's navies are beginning to put renewed emphasis on "out of area" expeditionary power-projection operations, as reflected in improvements in both their sea-based strike and sea-based maneuver capabilities. As can also be seen, ROW navies clearly consider purpose-built amphibious assault ships, equipped with both air and surface connector interfaces, to be the most efficient and effective transport and support platform for expeditionary maneuver forces. While allied decisions and preferences for sea-based maneuver platforms should not dictate TFBN choices, they do suggest that the DoN planners would do well to carefully consider any reduction in the size or capability of its Sea as Base Expeditionary Maneuver Fleet, and especially its component Amphibious Landing Fleet.

## DESIGNING THE SEA AS BASE EXPEDITIONARY MANEUVER FLEET

Based on the foregoing twelve observations, this paper suggests an alternative TFBN Sea as Base Expeditionary Maneuver Fleet. It starts from the aforementioned observation that sea basing is "the one element linking the global war on terror and major combat operations." If true, the Sea as Base Power-projection Fleet, made up of equally powerful Sea as Base Strike and Expeditionary Maneuver Fleets, must be designed able to contribute effectively to the maritime tasks associated with both the global irregular war and major combat operations. For the global irregular war, these are:

- In conjunction with the US Coast Guard, other services, and USG agencies, secure the maritime approaches to the United States.

- In conjunction with other services and our allies, conduct a distributed blockade of the Indian Ocean littorals. This distant blockade would involve broad area maritime surveillance and persistent, overt and covert ISR and patrolling of littoral seas and potential enemy littoral operating locations to identify enemy targets and intentions, and to learn local operating conditions; local sea control and sea denial operations; and

[1088] "Denmark's FSS Vessels: Versatility in Motion," *Jane's Navy International*, August 2005, p. 34; *Jane's Fighting Ships*, 2004-2005; *Combat Fleets of the World, 2005-2006*; and Hooton, "Send an Amphib, the Future Cry," pp. 11-12 persistent maritime interdiction operations and maritime hot pursuit of terrorist surface traffic. The intent of this blockade will be to deny the enemy use of coastal seas or the oceans, to defeat the enemy maritime strategy of *guerre de course*; and to ensure the uninterrupted global flow of maritime trade and energy resources within and from the Indian Ocean and in adjacent theaters. Securing the maritime approaches to the United States and conducting a distant blockade of the Indian Ocean littorals will be the primary responsibility of the National Global Patrol/Irregular Warfare/Homeland Defense Fleet and the Global Maritime Domain Awareness Network described in the previous chapter.

- In conjunction with other services and our allies, disrupt enemy operations on land. This task involves prompt strike of fleeting terrorist targets; the execution and/or support of covert landing party operations against terrorist targets (especially when the host nation is unaware of US intentions, or desires plausible deniability); the execution and/or support of larger independent naval or Joint special operations sea-based raids; and prompt counter-sanctuary operations such as Task Force 58's operations during the Afghanistan campaign.[1089]

- Support major Joint Stability Operations (STABO) in failed states in the Indian Ocean theater or in adjacent theaters, or to support weak governments fighting a Radical Islamic insurgency. These operations might require a substantial portion of Marine combat power, sustained sea-based strike support, and sustained logistics from the sea.

These tasks generally *will occur in unimpeded and guarded access scenarios.* Compare them with those tasks associated with a major power-projection operation in *defended or contested littorals*:

- Conduct routine peacetime probing and reconnaissance of potential defended or contested littorals. This is a major function of the Counter-A2/AD fleet.

- Conduct advance force operations, such as information operations, offensive counter-undersea, counter-mine operations, and counter-boat operations; Joint special operations force attacks, and sea-based raids against high value enemy littoral defenses or A2/AD nodes.

- Support forcible entry operations in order to seize access, or operations to screen the arrival and operations of Joint ground and air forces through theater ports and airfields.

- Support sustained operations ashore against a traditional adversary, or support Joint regime change operations against a state government harboring or supporting terrorists or threatening the use of weapons of mass destruction.

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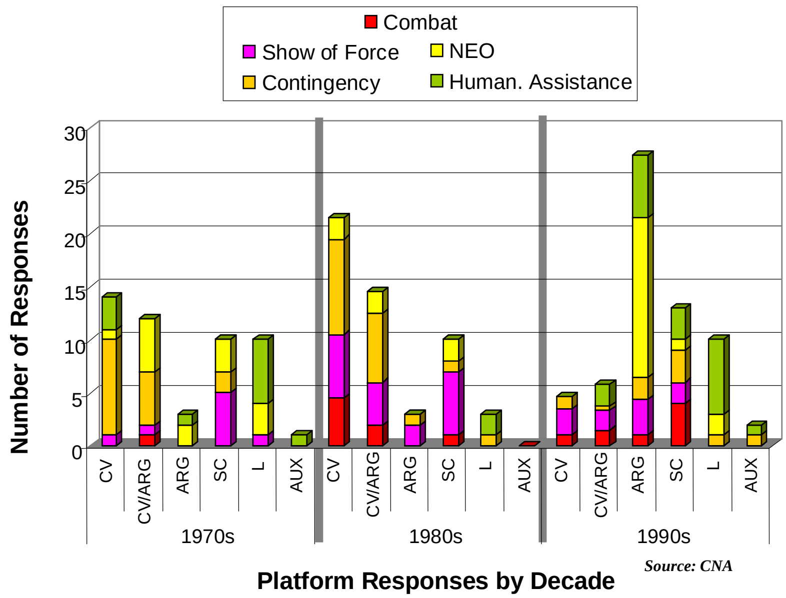
[1089] See "Task Force 58 Overview: Operation Enduring Freedom," at http://www.cpp.usmc.mil/press/kit/ OEF.asp.

A comparison of these two different lists helps to highlight the overlap between the tasks associated with the global irregular war and major combat operations. They also begin to highlight the appropriate roles for two major components of the TFBN's Sea as Base Expeditionary Maneuver Fleet—the Amphibious Landing and Maritime Prepositioning Fleets. The tasks associated with the global irregular war involve a heavy patrolling function and demand the capability to conduct prompt raids or counter-sanctuary operations. These raids and counter-sanctuary operations will seldom require more than one or two aircraft carriers and their escorts, or involve a landing party larger than two reinforced battalions. They therefore will typically be performed by the aviation power-projection platforms, surface combatants, and amphibious landing ships that make up the TFBN's forward-deployed crisis response stations, which also act as the leading edge of any Naval Battle Network surging from home waters in support of a more challenging power-projection operation. As a result, amphibious landing ships perform key linking function between the maneuver capabilities of the National Global Patrol/Irregular Warfare/Homeland Defense Fleet and the Sea as Base Power-Projection Fleet. This conclusion is buttressed by operational experience gained over the first decade of the Joint Expeditionary Era (see Figure Nine).

When contemplating fleet responses by TFBN platform category by decade, note that while the aircraft carrier was the platform of choice for naval responses during the Garrison Era, amphibious ships are now the platform of choice for the Joint Expeditionary Era. Indeed, since 1989, forward deployed Amphibious Ready Groups/ESGs have been employed twice as much as any other TFBN component. The reasons are readily suggested both in concept and experience: the Joint Expeditionary Era is primarily about naval operations in the littorals, which have traditionally called for both naval fire *and* maneuver, and forward deployed amphibious ships with a Marine Expeditionary Unit embarked can be used for a variety of functions, including humanitarian and disaster relief; non-combatant evacuation operations (NEOs); shows of force; raids; prompt counter-proliferation operations; and terrorist counter-sanctuary operations. In addition, as suggested by the CV/ARG and L-class entries on the graph, forward deployed amphibious task groups, along with forward deployed CSGs, form the leading edge of any Naval Battle Network being formed to support a Joint power-projection operation, which in the future may require forcible entry operations designed to seize Joint operational access.

**Figure Nine: Fleet Responses by TFBN Platform Category**[1090]




| | |
|---|---|
| CV | Carriers |
| CV/ARG | Carriers + Amphibious Ready Groups |
| ARG | Amphibious Ready Groups |
| SC | Surface Combatants |
| L | Amphibious ships |
| AUX | Auxiliary Ships |

Large MPF ships, with their very deep drafts, emphasis on cargo carrying capacity, lack of interfaces for surface connectors, and lack of armament make them ill-suited to perform either the linking function between the irregular war or the power-projection function in defended access scenarios. However, as discussed above, routine operations associated with the irregular war will normally be conducted in unimpeded and guarded access conditions—the very conditions for which MPF ships are designed. This suggests that the MPF force might be best refocused on supporting the global irregular war. If so, then the packets of combat power carried

[1090] D0002763.A2, *U.S. Naval Responses to Situations, 1970-1999*, December 2000, Copyright © 2000. The CNA Corporation, www.cna.org.

in MPF squadrons—designed for high intensity mechanized combat—are clearly too big, and the MPF squadrons themselves are not well aligned to support global TFBN operations. Consistent with the TFBN goals of *Get Integrated* and *Get Distributed*, MPF squadrons could be both repackaged and dispersed, to provide better theater coverage and more rapid speeds of response in potential areas of operations, and to better support TFBN and Joint operations focused on prosecuting the irregular global war.

Said another way, during the Garrison Era, under the general conditions of assured access, the Amphibious Landing Fleet gradually became a rotational transport fleet for Marine crisis response forces, and by the end of the era the MPF fleet had become the primary means to get heavy combat forces to major combat operations. In the Joint Expeditionary Era, under general conditions of uncertain access, the Amphibious Landing Fleet is once again being tasked with delivering intact combat forces—both to fight the global irregular war and possibly to seize a Joint lodgments during major contingencies. Meanwhile, the routine prosecution of the global irregular war occurs under conditions of unimpeded or guarded access, the very mission the MPF was designed for. As a result, the Garrison Era roles of these two major sea-based maneuver components need to be reversed, with the role of the Amphibious Landing Fleet returning to its power-projection roots.

If this judgment is true, then cutting the number of ships in the Amphibious Landing Fleet and "sea swapping" the crews of the remaining ships, while perfectly reasonable for a rotational amphibious crisis response force designed for conditions of assured access, is the wrong approach for a force tasked with being the linking element between naval support for the global irregular war and regional major combat operations. In this role, the key metric should be the total amphibious lift of the force, not the number of ships that can be maintained on station.

## STEP ONE: RECAPITALIZE AND EXPAND THE AMPHIBIOUS LANDING FLEET

Given its renewed importance, construction of an alternative Sea as Base Expeditionary Maneuver Fleet begins with the Amphibious Landing Fleet. The minimal Garrison Era requirement for amphibious lift of 3.0 MEB equivalents was validated in the so-called DoN Lift II study, completed in 1990, only one year into the Joint Expeditionary Era.[1091] Faced with constrained budgets throughout the 1990s, the lift requirement was soon reduced to the "fiscally constrained" goal of 2.5 MEB lift. However, given that the Amphibious Landing Fleet is now the linking element between the National Global Patrol/Irregular Warfare/Homeland Defense Fleet and the Sea as Base Power-Projection Fleet and provides a key forcible entry capability for the Joint Multidimensional Battle Network, this report shoots for the full validated 3.0 MEB amphibious lift requirement.

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[1091] The "DoN Lift II Study" is the short title for *Integrated Amphibious Operations and USMC Air Support Requirements* (Washington, DC: Department of the Navy, January 1990).

Such a plan is consistent with the "1+1+1+1" force sizing and planning metric outlined in this report, as it provides a force large enough to maintain amphibious crisis response platforms operating in support of the global irregular war, and to simultaneously support the two-brigade force assumed to be the minimum necessary for a future Joint Forcible Entry Operation. A two-brigade force offers the TFBN at least four sea-based operational maneuver options: an amphibious double envelopment of a Joint lodgment area, port, or airfield using two separate brigade thrusts; a one-brigade JFEO followed by an immediate brigade breakout from the Joint lodgment area; a two-brigade deep operational penetration; or a broad front, two-brigade, distributed infiltration attack made under threat of nuclear or guided weapons attack.

This plan is not fully consistent with the "10-30-30" strategic timeline, although it provides similarly response times to the 12-17 days provided by the current MPF(F) plan. As will be seen, new organizational and operational approaches will allow the assembly of a powerful amphibious advance force within 18 days of an execution order. However, a full two-MEB JFEO force cannot be assembled in much less than four weeks. What this plan gives up in timeliness, it makes up for in overall force capability, especially for power projection operations against a regional adversary with capable A2/AD defenses, including those armed with weapons of mass destruction.

The recapitalization plan for the Amphibious Landing Fleet begins with plans for the fleet's big-deck amphibious assault ships. In FY 07, LHD-8, the *USS Makin Island*—an improved version of the basic LHD class with a gas-turbine propulsion plant—will be commissioned.[1092] As the LHD-8 enters the fleet, one of the LHAs will be decommissioned, resulting in a fleet of eight LHDs and four LHAs.

With Marine aviation going back to sea, the character of the big-deck fleet will change slightly over time. The four *Commencement Bay* J-CVEs will replace the four LHAs and become the primary sea-based platform for Marine tactical fixed-wing aircraft. Normally, these four ships will be part of the aviation power-projection platform rotation plan to keep TFBN aviation strike assets forward in support of the ongoing irregular war and for crisis response. For power-projection operations, additional J-CVEs would surge forward and provide direct support to Marine operating ashore. Assuming an average ship operational availability rate of 85 percent, a four-ship class of ships would normally provide for three ships capable of surge operations. Recall that each J-CVE will be able to carry two 10-plane JSF squadrons, with three spares, allowing the force under maximum surge conditions to support 69 JSFs. As one MEB Air Combat Element includes 30 JSFs, three ships therefore provide the required two-brigade lift footprint demanded by a single large JFEO.

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[1092] LHD-8 introduces many other changes besides gas-turbine propulsion (the first seven LHDs were steam-powered), including: all electric auxiliaries, an advanced machinery control system, water mist fire protection systems, and the Navy's most advanced command and control and combat systems equipment. See PEO Ships, "LHD-8 to Begin Transformation of 'Big Deck' Amphibious Force," found online at http://www.globalsecurity.org/military/library/news/2003/05/mil-030512-navsea06.htm.

The eight LHDs will concentrate on the traditional Amphibious Landing Fleet role of delivering troops and equipment over the shore and inland. With both large flight decks and floodable well decks, these eight ships are particularly well-suited for this role, in both forcible entry and amphibious patrolling scenarios. They can land troops by sea, using either three LCACs or two large displacement Landing Craft Utilities (LCUs) carried in their floodable well decks, or by air using helicopters or tilt-rotor aircraft carried onboard.

However, in the amphibious patrolling role, their inherent ability to support STOVL aircraft gives the LHDs an ability to carry a flexible composite wing composed of tactical aircraft, tilt-rotor, and rotary-wing aircraft. The planned future wing consists of 12 MV-22 tilt-rotors; four CH-53E heavy-lift helos; four AH-1Z helicopter gunships; three UH-1Y utility helicopters; two MH-60S multi-role helicopters; and six AV-8Bs or JSFs. This aviation load-out is significantly larger than the aircraft "spotting factor" normally associated with an LHD, which was long advertised as being 45 CH-46 helicopter parking spot equivalents. However, subject to weight and other considerations, a recent DoN effort concluded this larger 58-spot load could be carried, albeit with three of seven "H-1s" in "locked spots" when carrying both MV-22s and JSFs (meaning they cannot be moved until other aircraft have been moved).[1093]

In a forcible entry operation, the JSFs would fly off and operate from the *Commencement Bay* J-CVEs, freeing up space for the MAGTF rotary-wing force. Even after the JSFs fly off, however, the rotary-wing force will find it to be a tight fit. Two amphibious MEBs require a supporting force of 96 MV-22s; 40 CH-53Es; 36 AH-1Zs; and 18 UH-1s. This force requires a notional spotting factor of 371 CH-46 parking spot equivalents. Assuming a ship availability rate of 85 percent, the seven LHDs that would normally be available would provide 294 parking spot equivalents using old planning factors, and 406 parking spot equivalents using the planning factors outlined above. An eight LHD force looks to be marginally capable of carrying the rotary-wing force required to support two MEBs.

This problem is driven primarily by the increased size of the MV-22 tilt-rotor, which takes 2.22 times the storage space of the CH-46 it replaces. There are several ways to address the resulting shortage of space. One way would be to build an additional LHAR or LHD. This might not be as hard as it seems. With nominal 35-year hull lives, the sustainment build-rate for the 12 big-deck amphibious assault ship/escort carrier force is one ship every three years. Building four J-CVEs at a rate of one every three years starting in FY 07 (and in FYs 10, 13, and 16) will replace the last of the four remaining LHAs. However, the first LHD was commissioned in 1989, meaning it need not be replaced before 2024. Accordingly, a fifth J-CVE could be built in FY 19, and production of a follow-on replacement for LHD-1—an LHD(X)—could slide to FY 22. With an expected delivery date of 2025, the delay in recapitalizing the LHD force would be only one year.

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[1093] These figures come from a message sent from the Deputy Commandant for Aviation (APP) to NAVAIRWARCENACDIV, date time group 061759Z, entitled "L-Class Ship ACE Support Meeting After Action." The impact that the larger MV-22 has on the design of the Amphibious Landing Fleet will be discussed in greater detail later in the report.

This should not cause a problem. The current Navy shipbuilding plan indicates the last LHA will be retired in FY 19. Since the youngest LHA was commissioned in 1980, this infers the ship will have an operational life of 39 years when it retires. If the service lives of all LHDs could be similarly extended without major problems to 39 years, the TFBN could expand the big-deck amphibious assault ship/escort carrier force to 13 ships with no increase in the steady-state three-year build rate. The building of LHD(X)-1 would simply move "to the right" and replace the LHD-1 three years later than originally planned. Moreover, because complex aviation power projection ships are all paid for out of the aforementioned capital investment account, the cost of the ship would be spread out over a 39-year period, causing little appreciable difference in the yearly planned investment of $3.56 billion.

In addition to supporting Marine rotary-wing aircraft in a major power projection operation, a fifth J-CVE could be earmarked for a variety of uses. The ship could be used to form a fifth J-CVE Strike Group, either in the active Navy or in the Naval Reserve. However, personnel and O&S costs for this option would be high. A cheaper option would be to assign the ship to the Military Sealift Command as a Joint Aviation Transport, or T-JAVT, transporting non-deployable helicopters to a Joint Operations Area. It could also assume a role as an auxiliary J-FAB. The point here is that by increasing the service lives of big-deck ships to 39 years, the TFBN would gain an additional aviation power-projection platforms for little apparent increase in its yearly ship-building costs.

The next step of the Amphibious Assault Fleet recapitalization plan involves the replacement of both the 11 aging LPD-4s *and* all 12 LSDs with the new LPD-17. The TFBN will soon accept delivery of its first LPD-17s after a difficult, and still painful, development process. Original plans called for a class of 12 of these ships, to replace the LPD-4 class.[1094] As the result of a "winner-take-all" competition held in 1996, eight of the ships were to be built by Avondale, while four of the ships were to be built by Bath Iron Works. The first of the class was to be delivered in September 2002, at a target cost of $830 million (in FY 96 dollars, not counting non-recurring design and engineering costs). However, as one Congressional source flatly stated, "This program got off to a difficult start."[1095] Due to lengthy delays in lead ship design and construction, its delivery date was slipped to September 2003, and these delays were accompanied by dramatic cost increases. As a consequence, and due to subsequent shipyard consolidations, the DoN decided to shift all production of LPD-17s to Northrop Grumman,

[1094] For an interesting view of the LPD-17 before its problems came to light, see Lieutenant Commander Stephen Surko, USN, "LPD-17…Arriving," *Proceedings*, January 1995, pp. 43-44. For a prescient warning that "over-specing" the LPD-17 would lead to problems, see Captain John E. O'Neil, Jr., USN, "Be Careful With the LPD-17," *Proceedings*, January 1995, p. 45.

[1095] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 190; Lorenzo Cortes, "LPD-17 Program Faces Both Programmatic Challenges and Cost Growth, Memo Says," *Defense Daily*, March 18, 2004; and Jack Dorsey and Dale Eisman, "Report Spotlights Ship's Problems," *The Virginian-Pilot*, July 13, 2005.

which had purchased Avondale. In return for lost work, the DoN give General Dynamics, which had purchased Bath Iron Works, the contracts for four DDG-79s.[1096]

Although top Navy officials declared the ship to be "out of the woods" after the shipbuilding swap, if anything, things just got worse. The lead ship's delivery date was slipped again to November 2004, which put it in the sights of OSD's Program Analysis and Evaluation (PA&E) group. In March 2004, PA&E warned of continuing "programmatic challenges" and "cost growth" associated with the ship.[1097] Their warnings proved to be prophetic. The ship's delivery date slid into 2005. Then, once delivered, the *San Antonio* (the name of LPD-17, as well as the class) was the subject of an unflattering report issued by the Navy's Board of Inspection and Survey, which highlighted over 15,000 ship deficiencies, and declared the ship "incomplete." By the time all the deficiencies are completed—hopefully by late 2005—the cost of the ship may well hit $1.85 billion.[1098] Given its problems, it is no wonder that the most recent DoN shipbuilding plan halts production of the class in FY 07, which will result in a class of only nine ships.

Given these problems, it may come as a surprise that this report recommends that the LPD-17 become the centerpiece of Amphibious Fleet recapitalization plans. One of the reasons why the lead ship was so troubled is that it took the idea of the Danish "Flexible Support Ship" to a much greater extreme. This 25,000-ton *expeditionary warship* (making it approximately 50 percent larger than the next largest LPD in the world) was designed to operate 25 miles off a defended shore, and in a nuclear environment. As a result, the ship will have a radar cross section equal to or smaller than a DDG-51/79;[1099] whipping hardening for its hull girders; shock hardening; blast-hardened bulkheads; fragmentation protection; and nuclear blast protection. It will also have a four-zone collective protective system, and an ability to receive contaminated casualties through a specially-designed triage center off the flight deck. It will have extensive fire insulation along with mist firefighting and smoke ejection systems. It will be equipped with the same SPQ-9B X-band radar and cooperative engagement capability being installed on AEGIS/VLS combatants (and space and weight for the MFR developed for the DD(X)), a top-notch electronic countermeasures system, towed torpedo decoys, and a variety of other offboard decoys. It will be armed with two 21-round RAM launchers, two 30mm guns counter-boat guns, and has the space and weight for 16 VLS cells, which could carry either 64 ESSMs or 32 ESSMs and eight land

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[1096] Margaret Roth, "LPD-17 Leads to Dramatic Changes in Design, Systems Integration," *Sea Power*, February 2004, p. 18.

[1097] Cortes, "LPD-17 Program Faces Both Programmatic Challenges and Cost Growth, Memo Says."

[1098] Dorsey and Eisman, "Report Spotlights Ship's Problems."

[1099] Cost problems with the first ship, LPD-17, caused some radar defeating measures to be eliminated from the ship, leading to several suspected radar "hot spots." Dorsey and Eisman, "Report Spotlights Ship's Problems." Representatives from Northrop Grumman expect these problems to be corrected in later ships of the class.

attack missiles (the equivalent of a fifth-rate frigate's armament), Given these features, it will be the most survivable amphibious *warship* ever built.[1100]

As for its amphibious warfare capabilities, the ship will be able to carry 700 troops, with a surge capacity to 800, and will have two medical operating rooms, a 24-bed ward, and overflow capacity for 100 casualties; a flight deck that will accommodate two MV-22s or CH-53s, or four CH-46s; a hanger that can store an additional MV-22 or CH-53, or two CH-46s, or three AH/UH-1s; a new low-maintenance well deck that can store either two LCACs or one large displacement landing craft; 24,000 square feet of vehicle stowage on three vehicle decks, one of which can carry 14 EFVs (enough to carry a full rifle company); and 34,000 cubic feet of cargo and ammunition stowage in two major holds. Moreover, it was specially designed with the amphibious patrolling mission in mind, with berthing spaces designed to maintain platoon unit cohesion, sit up bunks for its embarked troops, and increased air conditioning capacity. It is, quite simply, a stunningly capable amphibious platform.[1101]

Despite the continuing problems with the first ship, the majority of the problems associated with the ship's design and introduction now appear to be under control. Follow-on ships for the class are now being built for $1.1 billion, or .79 ASEs.[1102] While relatively high for a typical amphibious ship, its price appears reasonable given its improved capabilities. Moreover, for operations in a defended littoral in which nuclear weapons might be used, these capabilities are clearly superior to any practical MPF(F) ship alternative. Accordingly, the TFBN should keep the ship in production at a rate of one per year, through FY 2022. With learning curve efficiencies and multi-year contracts, the cost of the ship might be driven down below $1.1 billion.

This plan would result in a class of 24 ships by 2025. The first 12 of the class would replace the 11 legacy LPD-4s; the second 12 would replace the 12 LSD-41/49s, resulting in an efficient and capable all-LHD/LPD force. The 11 legacy LPDs would be scrapped, or perhaps sold to foreign navies. With nominal service lives of 35-40 years, the 12 LSD-41s and 49s would have the hull life left for other TFBN uses, if desired. For example, several of the ships could be converted into multi-purpose tenders for each of the Fleet Stations recommended in this report. Their vehicle storage and flight decks could be used to store containers and off-board systems, and their onboard cranes would be more than sufficient to transfer containers aboard LCSs, or missiles into VLS cells. Alternatively, the ships might be converted into T-LSVs, or vehicle

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[1100] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 190; Surko, "LPD-17…Arriving," p. 43; Roth, "LPD-17 Leads to Dramatic Changes in Design, Systems Integration," p. 19; and "LPD-17 Systems," a PowerPoint briefing provided to the author by Northrop Grumman Ship Systems.

[1101] See "Specifications, LPD-17 (*San Antonio* class) Landing Platform Dock, USA," at http://www.naval-technology.com/projects/lpd17/specs.html; Gary L. Pickens and Rear Admiral L.F. Picotte, USN (ret), "LPD-17—A Ship Built By and For the Expeditionary Warrior," at https://www.pms317.navy.mil/news/lpd17ashipbuilybyandfor.asp; and Surko, "LPD-17…Arriving," p. 43.

[1102] Admiral Clark put the cost of an LPD-17 in FY 05 dollars as $1.125 billion. See Clark, Statement before the Senate Armed Service Committee, April 12, 2005.

transports kept in reduced operating status by the Military Sealift Command, or Landing Craft Repair and Salvage Ships.

Given time to properly plan, the second "flight" of 12 LPD-17s also could be a variation off the basic hull. For example, the ships might be given the MFR and 16 VLS cells, providing the amphibious fleet with a high degree of self-protection against anti-ship cruise missiles. Other, more extensive modification might also be possible. Being a computer-designed ship, and having a big, beamy hull, the LPD-17 is especially suited for modification or conversion. Indeed, Naval Sea Systems engineers have used the hull to design a hospital ship; a Joint command and control ship; a mine warfare command and control ship; and an "advance force ship" with two 64-cell Mk41 batteries, a large naval gun, and enhanced aviation capabilities. In this regard, the ship is designed to take a 50-foot "plug" aft of the hanger, which would both extend the flight deck, add aviation maintenance shops, and improved the ship's aviation ordnance handling capabilities.[1103]

Even without major modifications to the LPD-17, an Amphibious Landing Fleet composed of 8 LHDs and 24 LPD-17s, augmented by four J-CVEs and a J-AVT or J-FAB, would provide greater than three MEB equivalents in all amphibious lift fingerprints except vehicle square, which would come in at 2.93 MEB equivalents. Assuming an 85 percent fleet-wide availability rate, the fleet would exceed the minimum 2.0 MEB forcible entry requirements in all categories with plenty of room to spare.

These ships would form a distributed sea base of consisting of 37 amphibious landing ships all built to warship standards. Indeed, by capitalizing on these ships' greatly expanded capabilities, TFBN planners could improve the fleet's amphibious patrolling function and provide an even better link between the irregular war and major combat operations. They could do so by reconfiguring today's twelve 3-ship Expeditionary Strike Groups into eight, 4-ship, *Distributed Expeditionary Sea Bases,* or DESBs. These DESBs would consist of one Base Support Group, consisting of an LHD, one CG-52 or DDG-79, equipped with their normal SAMs and *Tomahawks*, and perhaps with the AEGIS BSP modification and anti-tactical ballistic missile interceptors; and three Expeditionary Maneuver Groups, consisting of one LPD-17 and one DDG-51/79. Each DESB would also include a 2-ship LCS squadron in direct support, normally configured in the anti-mine and anti-surface roles.

With one DESB homeported in Japan, the remaining seven would provide a rotational pool for additional deployed DESBs. In this way, two DESBs could be kept constantly forward, where they would conduct the amphibious patrolling function associated with the global irregular war. Accounting for operations tempo limitations associated with the DESB in Japan, this would

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[1103] From interviews with NAVSEA engineers and designers in preparation for this report. For a good example of how the LPD-17 hull might be modified, see Naval Sea Systems Command, "Advance Force Ship—Option 2D," a Rough Order of Magnitude Study for the 21st Century Surface Combatant Program, conducted by the Surface Ship Design and Engineering Directorate, dated September 1996.

provide, on average, six dispersed two-ship naval task elements in the Indian Ocean and Western Pacific.[1104]

Given the increased size and flexibility of the DESBs, Marines would have some latitude in organizing and manning them. One option would be simply to spread load a 2,200-man MEU(SOC) across the four ships, saving the space for the at-sea arrival and assembly of other forces flown forward in the case of a crisis. Another option would be for each Expeditionary Maneuver Group to support a Special-purpose MAGTF (SPMAGTF), embarked aboard the LPD-17. This SPMAGTF might consist of a rifle company; an weapons platoon armed with machine guns, mortars, and anti-tank weapons; a platoon of 14 EFVs; a motor transport platoon with enough seven-ton trucks and small armored vehicles to transport the entire company; a RHIB detachment capable of carrying the company ashore; and an engineer company. The SPMAGTF could also be supported with an aviation detachment consisting of four CH-46s or MV-22s for short periods of time. So configured, and depending on the threat or mission, the rifle company could go ashore in soft vehicles aboard LCACs, or under armor in EFVs, or in RHIBs for clandestine reconnaissance or raids. In certain instances, the company could also be shuttled ashore by rotary-wing aircraft. The DDG-51/79 would provide both defensive and offensive fires in support of the SPMAGTF. This powerful two-ship group would recreate a small expeditionary fighting team of Sailors and Marines reminiscent of the Frigate Era.

The combination of the LPD-17 and EFV is a natural one. With its reduced radar cross section, stout defenses, and toughness, the ships could get closer to the beach before "splashing" the EFVs, minimizing their time in the water. Moreover, the LPD-17/EFV combination is ideally suited for counter-proliferation operations or operations made under threat of nuclear attack: the Marines will operate from a protected littoral base with a collective overpressure system, and will mount their attacks under armor, and protected by a similar overpressure system. Indeed, the minimum size of the EFV buy should be influenced primarily by the number of LPD-17s bought: 24 LPD-17s would carry 24 EFV platoons, suggesting a minimum requirement of 336 EFVs. Three full MEBs worth of EFVs would require approximately 660 EFVs.

The LHDs would carry the DESB composite aviation squadron and heavy support capabilities, such as a reinforced tank company, a DESB fires group, additional EFVs, and little else. In essence, it would provide aviation support to the Maneuver Action Groups, and be a reception and staging base for fly-in reinforcements. It therefore would become the key component for future sea basing operations.

In the event of a crisis, the one forward-based DESBs and one forward-deployed DESB could combine anywhere from the Persian Gulf to Northeast Asia (i.e., Korea), in 14-18 days.[1105] The

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[1104] Forward-deployed Naval Forces have different rules for the amount of time ships' crews can be deployed from home station. In essence, the rules work out to where the ships can be at sea approximately 50 percent of the year. As a result, on average, two of four two-ship groups found in the DESB would be available.

[1105] A four-day load out of the DESB stationed in Japan, followed by 14 days steaming time from Japan to the Persian Gulf, would combine the two DESBs in the Persian Gulf in 18 days. In a crisis in Northeast Asia, the DESB would be loaded and awaiting the arrival of the DESB sailing from the Persian Gulf, a trip of 14 days.

resulting eight-ship DESB would support six rifle companies with multiple insertion options, including all under armor in EFVs; two reinforced tank companies; two fire groups, augmented by ten 5-inch naval guns and approximately 800 VLS cells; 12 JSFs, 24 CH-46s or MV-22s, eight CH-53s, and 14 H-1 helicopters; 12 LCACs and four large displacement landing craft. The two LHDs could also receive and house significant additional reinforcements—be they additional Marine rifle companies, special operations forces, a Ranger Battalion, or an Army Light Infantry Battalion. Indeed, two LHDs and six LPD-17s would have the surge capacity to base over 8,000 total troops. While not a full brigade, this sea-based maneuver force would represent a formidable combat capability.

The Marine contingent described herein is not meant to be prescriptive. The point is that a force of eight LHDs and 24 LPD-17 would provide TFBN planners with enormous flexibility in designing a strong linking function between the maneuver capabilities needed to fight the global irregular war and those needed to conduct a major power-projection operation. Regardless of how the DESBs are organized, when combined with one or two Carrier strike Groups, multiple reinforcing LCS divisions, and forward deployed SSGNs, the leading edge of a Sea as base Power-Projection Network would represent a potent combat force, with a variety of balanced sea-based strike and maneuver options. Should the force encounter relatively light littoral defenses, its first job would be to seize a port or protected anchorage and nearby airfield to facilitate follow-on Joint forces. In this regard, they could be supported and reinforced by Army airborne UAs. In cases of heavy maritime defenses, the force would commence counter-network and other advance force missions in preparation for a more deliberate forcible entry operation.

## STEP TWO: RECAPITALIZE AND REORIENT THE MARITIME PREPOSITIONING FLEET

Under this new plan, the Maritime Prepositioning Fleet would be reconfigured to better support and complement the Amphibious Landing Fleet. A key aim, over time, would be to make the fleet less dependent on the availability of ports and airfields, better able to support operational maneuver from strategic distances, and better able to support the global irregular war.

### Combat Prepositioning Force (Future)

As the Army presence in Iraq is reduced, the Army's Afloat Prepositioned Stock-3 will be expanded into a far more capable Army Strategic Flotilla (ASF). Plans call for the CPF to be converted into three, 5-ship squadrons, each consisting of one LMSR carrying a single 1x1 Army brigade set of equipment (i.e., one armored battalion and one mechanized battalion) or heavy unit of action; one LMSR carrying combat support equipment; two container ships, one loaded with supplies, the other with ammunition; and a smaller, shallow draft RO/RO ship loaded with a special humanitarian/disaster relief and special operations support package.[1106]

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[1106] Major General Brian I. Geehan, and Brigadier General Kathleen M. Gainey, "Seabasing: Building the Army Contribution," PowerPoint presentation and remarks given at the Joint Seabasing Conference, held in Washington DC, February 16-17, 2005. Brigadier General Jim Rafferty, USA, "Army Field Support Command (AFSC)

Original plans were for the Army to begin transition to the new ASF structure by FY 2008. However, ongoing operations in Iraq will likely delay the transition. Note, however, that since the current CPF includes eight LMSRs, when the transition to the ASF is complete, the CPF requirement will drop to six LMSRs, allowing the Surge Sealift Fleet to expand from 11 to 13 ships.

Including a smaller, shallower draft RO/RO in the ASF squadron mix is an acknowledgement of one of the key problems with the larger, more capable, cargo ships found in the Maritime Prepositioning and Surge Sealift fleets. In 2002, the Illinois Institute of Technology Research Institute conducted a worldwide port survey of all ports in the Central and Pacific Command areas of responsibility. Unsurprisingly, it concluded that ship length and draft were the key factors in determining whether a port could accommodate a given vessel, with length being the most important. Researchers found that a vessel with a length greater than 152 meters could access only 36 percent of the ports studied. At 290 meters, the larger LMSRs and RO/RO ships in the ASF (and in the Surge Fleet) can berth at relatively few ports around the world. A smaller RO/RO would be able to access considerably more ports in austere locations, a key consideration for humanitarian, disaster relief, and special operations support missions.[1107]

Like the current MPF, the ASF squadrons would be anchored in the Mediterranean and at Diego Garcia and Guam, providing 10-14 days of closure time to any port from Europe to Northeast Asia. Importantly, however, Army planners explicitly assume that an advance force must be sent in to secure the sea port of debarkation and the air point of debarkation before the ASF squadrons can dock. This emphasizes the importance of maintaining a Joint forcible entry capability.[1108]

Accordingly, the Army would also like to expand the CPF to include an Afloat Forward Staging Base large enough to embark an Air Assault Brigade Combat Team (AABCT) consisting of approximately 3,800 personnel and 90 helicopters of all types. This would be one of the Army's sea-based contributions to Joint forcible entry operations. However, as Army helicopters are not "marinized" (i.e., specially modified to prevent salt-air corrosion) the AFSB would house the brigade only temporarily, and be capable of only limited maintenance. The brigade would shift operations ashore as part of a forcible entry operation. More importantly, once the brigade shifted its operations ashore, the AFSB would operate as a selective offload logistics sustainment facility.

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Command Overview Briefing," found at http://proceedings.ndia.org/5650/Rafferty.pdf. See also Roosevelt, "Army, Navy Collaborating on Sea Basing Concept."

[1107] John H. Williams and William K. Thomas, "Worldwide Port Survey 'Quick Look'," Illinois Institute of Technology Research Institute (IITRI), December 10, 2002; and "Army Regional Flotillas (ARF) and Afloat Forward Staging Base (AFSB)," US Army Information Paper, DAMO-SSW, dated July 22, 2003, found at http://hqinet001.hqmc.usmc.mil/pp&o/POE/POE-60/ARMY%20PREPOSITIONING%20PROGRAM%20BRIEFS/ARF%20%20AFSB%20Info%20Paper%20LG2.doc.

[1108] Geehan and Gainey, "Seabasing: Building the Army Contribution."

Army planners have examined a variety of options to base an Air-Assault Combat Team at sea, including modified LMSRs, the Maersk S-class ships, and decommissioned aircraft carriers, but have yet to settle on a particular material solution.[1109] In any event, it is not clear the Army will have the necessary funds to pursue such an approach.

However, even the development of the ASF has important implications for the TFBN. Today, the combination of the MPF and the CPF provide the lift for four sets of heavy combat brigade equipment that requires an available port and airfield to offload. The new ASF will raise that number to six. This infers that the Joint Multidimensional Battle Network could reconfigure two MPF squadrons for different duties with no appreciable decrease in today's capabilities. The Marines wish to convert these squadrons to MPF(F) "sea basing" squadrons for $30-$31 billion dollars. However, there is an alternative that is both less expensive and more attuned to current operational requirements. This alternative starts with changes to the Logistics Prepositioning Fleet.

## Logistics Prepositioning Force (Future)

As has been discussed, selective offload of equipment and supplies is desirable capability for all future ships in the Sea as base Power-Projection Fleet; it is not tied directly to the MPF(F) concept. Moreover, separating cargo and ammunition from troop and equipment carriers makes much sense, especially from the perspective of force protection and survivability. Finally, sea-based logistical resupply is a key concern of all services. As a result, the Logistics Prepositioning Fleet should be expanded and refocused on providing sustained logistical support to Joint forces operating ashore.

Steps are already being taken in this direction. The Defense Logistics Agency (DLA) sees sea basing as an integral part of its Global Stock Prepositioning Strategy. This strategy relies on seven dispersed Joint depots in Germany, Italy, Kuwait, Guam, Japan, Korea, and Hawaii; a deployable land-based distribution depot, or "depot in a box;" and *DLA Afloat Distribution Centers,* or DADCs. The DADCs are designed to fill the gap between the long-range delivery of supplies by air, which is fast but expensive (averaging $4.50 per pound), and long-range delivery of supplies by sea, which is cheap but slow (averaging 22 cents per pound). The DADC, a floating warehouse with selective offload capability, is designed to provide *immediate* sustainment until the logistics sea bridge can be established and expeditionary shore-based deployable distribution depots are up and running.[1110]

This highlights an important point: since the DLA considers shore-based distribution much more efficient than sea-based distribution, the DLA supply strategy is to run distribution from ships

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[1109] Geehan and Gainey, "Seabasing: Building the Army Contribution;" and "Army Regional Flotillas (ARF) and Afloat Forward Staging Base (AFSB)."

[1110] Fred Baille, Executive Director, Distribution and Reutilization Policy, Defense Logistics Agency, PowerPoint presentation given to the SDDC Conference, April 26, 2005, at http://www.sddc.army.mil/EXTRACONTENT/Symposium2005/SDDC%20Symposium%20Baillie.ppt#1; and Fred Baille, "DLA and the Seabasing Concept," PowerPoint presentation given at the Joint Seabasing Conference, Washington DC, February 16-17, 2005.

only as long as is necessary. As a consequence, the DADC will focus on providing heavy supplies that would be prohibitively expensive to ship by air, but that would take a relatively long-time to arrive by sea, such as bulk liquids, construction materials, and major subassemblies and repair parts. In this regard, the DLA already operates two offshore petroleum distribution centers. New selective offload cargo ships will carry the construction materials and repair parts.[1111]

Likewise, the Army is pursuing a Supply Support Activity Afloat (SSAA), designed to provide selective offload of cargo until the Joint theater logistics infrastructure is established ashore. In other words, despite the known risks of ballistic and cruise missile attack, both the Army and DLA presume that any major Joint power-projection operations will require the establishment of permanent bases and logistics infrastructure ashore. This is also the position of the Air Force.[1112] This makes clear once again that while the duplication of land bases at sea is a noble conceptual goal, the higher near- to mid-term payoff would be the development of a capable forcible entry capability and a fleet of common selective offload cargo ships that would logistically support the *entire* Joint force until the land-based distribution system is established.

This would require an expanded force of tankers as well as selective offload cargo ships, filled primarily with supplies, food, ordnance, and engineering supplies, and a modest amount of vehicles (most of which would be delivered via the Amphibious Landing, Maritime Prepositioning, and Surge Sealift Fleets). The stores would be kept either in containers or holds, meaning the ships would need to be capable of handling both containers and breakbulk cargo.

The DoN has already built and operated cargo ships with substantial selective off-load cargo capability for breakbulk cargo: the *Charleston* class LKAs. These ships were the first class of post World War II warships purpose-built for the rapid unloading of cargo via both surface and air connectors. All of the World War II APA attack transports from which they were derived were converted from or built to merchant standards. With 33,000 square feet of vehicle space, 70,000 cubic feet of cargo space, five high-speed elevators, two cranes, and ten booms, these designed-from-the-keel-up ships were invaluable in moving bulk munitions, supplies, and provisions ashore. Indeed, these five ships remain in Category B reserve, suitable for reactivation in 180 days. Note that these ships did not double as troop transports, having accommodations for little more than 200 Marines—only those required to drive off the vehicles and to run supply operations.[1113] The requirement is now to combine the selective cargo offload capability of the LKA with an ability to retrieve supplies from containers.

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[1111] In "supply speak," these are Class III, IV, and IX supplies, respectively. There are eleven different classes of supplies. See "Logistics," at http://www.globalsecurity.org/military/library/policy/army/fm/90-31/Ch9.htm.

[1112] Geehan and Gainey, "Seabasing: Building the Army Contribution;" Rafferty, USA, "Army Field Support Command (AFSC) Command Overview Briefing;" and Brigadier General Mike Worden, USAF, "Joint Services Perspectives on Seabasing Logistics," comments made at the Joint Seabasing Conference, Washington DC, February 16-17, 2005.

[1113] For information about this class, see Polmar, *Aircraft of the US Fleet*, fourteenth edition, pp. 195-96.

A combination of tankers, container ships, and a new class of selective offload and breakbulk cargo ships—tentatively dubbed the T-JLKA—would provide the foundation for the development of a prepositioned Joint Offshore Logistics Support Base (JOLSB), providing common sea-based logistics capabilities for the Defense Logistics Agency, Army, Navy, Air Force, and Marine Corps.[1114] The JOLSB would be sized to support Joint units conducting forcible entry operations, as well as Joint forces ashore until the Joint theater logistics infrastructure can be established. The vessels could also support Joint operations ashore where the establishment of a large logistics footprint may not be prudent, or during humanitarian and disaster relief exercises when the ashore infrastructure has been destroyed.

Given its critical operational support role, the LPF/JOLSB should be viewed as an integral part of the TFBN's Combat Logistics and Mobile Logistics. This recommendation is inspired by the new British Military Afloat Reach and Sustainability (MARS) program, which is to replace the major part of the Royal Fleet Auxiliary Fleet—the British equivalent of the TFBN's Naval Fleet Auxiliary Force that operates the majority of the TFBN's combat logistics force ships (TFBN Combat and Mobile Logistics Forces and the NFAF will be more fully discussed in the next chapter). As described by British planners, the MARS vessels will be required:

> …to deliver bulk consumables (fuels, oils, lubricants, ammunition, food, water, and air stores) to embarked forces, provide logistics support from afloat to joint forces ashore, including supporting air formations, and offer forward-aviation support to maritime rotary-wing squadrons.[1115]

The requirement for the JOLSB to "offer forward-aviation support to maritime rotary-wing squadrons" suggests that replacement plans for the two T-AVB aviation support ships now in the LPF be modified. Recall these ships carry cargo containers with the Intermediate Maintenance Activity for Marine aircraft. Although the ships have the provision to support some operations at sea, they are optimally designed to offload their containers ashore. To provide for a true offshore aviation logistics capability, these two ships need to be replaced with more capable ships designed to service and repair aircraft *at sea*.[1116]

Provided Congress would approve the purchase of a foreign-designed and built hull, the logical replacement for these two ships might be modified Maersk S-class container ships, discussed in the chapter concerning aviation power-projection platforms. Recall that these ships also have very large flight decks, with operating spots for 15 Marine CH-53 or Army CH-47 heavy-lift helicopters or 12 MV-22 tilt-rotor aircraft. These ships can 72 CH-46 equivalents during transit,

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[1114] Lieutenant General Gary S. McKissock, USMC, "Seabasing: The Maritime Intermediate Support Base," *Marine Corps Gazette*, June 2002, pp. 12-15. For ideas how the DLA, Army, and sea basing logistics requirements might be met, see Jonathan Kaskin, Director of Strategic Mobility and Combat Logistics, "The Challenge of Joint Seabasing Logistics," a PowerPoint presentation given to the Joint Seabasing Conference, Washington, DC, February 17, 2005.

[1115] Richard Scott, "MARS Program Passes Initial Gate Milestone," *Jane's Navy International*, September 2005, p. 15.

[1116] See Major M. Scott Ballard, USMCR. "Maritime Prepositioning Force Future: The Future of Seabased Aviation Logistics," *Marine Corps Gazette*, May 2002, pp. 31-33.

can support every rotary-wing aircraft in the Joint inventory, and have room for 200 TEU containers and 1,000 personnel.[1117] Two ships, manned by civilian crews from the Military Sealift Command, and ready to be activated in 96 hours, would provide the TFBN with an additional 144 CH-46 equivalent parking spots, and a mobile Joint rotary-wing aviation support facility. These new T-JAVBs would also have an inherent ability to operate as an auxiliary J-FAB, further increasing the flexibility of the aviation power-projection fleet.

Another advantage of pursuing these ships is that they are one of the same ships considered by the Army for its Air Assault BCT Afloat program. Should the Army free up the funds to pursue this capability, having a common ship would lower the average acquisition costs for both the Army and the DoN. Interviews with representatives from Maersk indicate that the ships might be bought and modified for less than $400 million a ship based on a six-ship buy (two T-JAVBs and four Army Afloat Forward Staging Bases).[1118]

The operations of the LPF/Joint Offshore Logistics Support Base, especially its ability to selective offload of cargo, will be greatly facilitated by the development of the Joint Modular Intermodal Distribution System (JMIDS), a Joint program sponsored by the US Transportation Command, led by the Army, and supported by the Navy. The goal of the program is to develop common sustainment modules that could be shared by the four Services and transported across different modes of transport without repackaging. With embedded asset tracking technology, the JMIDS would also help to support all Joint sea-based logistics efforts, and set the stage for floating Joint automated warehouses with common logistics transfer equipment and selective discharge capabilities.[1119]

The JMIDS and Joint sea-based selective discharge capability would do well to take into account the long experience that the DoN has with its MPF fleet. The first major offload of the MPF fleet, which during the 1990-91 Gulf War, was “agonizingly slow, tedious, and disorderly.”[1120] This spurred a decade-long logistics innovation program that paid huge dividends during Operation *Iraqi Freedom*. These innovations included the development of storage and transformation frames (STFs), five of which fit snugly inside a standard 8x8x20 foot shipping container; small vehicle storage and transformation frames (V-STFs), designed to fit in the back of a High Mobility Multi-wheeled Vehicle (“Humvee”); a repair parts carousel container, which has a motorized conveyor belt of part shelves built to fit inside a standard shipping container; and

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[1117] Polmar, “Sea Base Ships for the Future;” Carmel, “A Commercial Approach to Sea Basing—Afloat Forward Staging Bases;” and Maersk Line, Limited information brochure entitled “Afloat Forward Staging Base Transformation.”

[1118] These were estimated costs. Final costs would depend on DoN and Army specifications as well as other contractual agreements.

[1119] Alan Galonski, Chief, Future Concepts Division, Army Logistics Research and Engineering Directorate, “Providing Logistics Support to Our Warfighters,” a PowerPoint presentation at http://www.dtic.mil/ndia/2005armaments/galonski.pdf; and Geehan and Gainey, “Seabasing: Building the Army Contribution;”

[1120] Vergun, “Outfitting the Operating Force.”

widespread use of scannable packing labels on containers and STFs. As a result of these innovations, ships that had taken a week to offload during *Desert Storm* in 1990 were offloaded in an average of 48 hours in 2003.[1121]

Recall that the Air Force currently has four ships filled with ammunition and supplies, and the Navy one. DoN planning analyses suggests that a selective offload container ship with the capacity to carry 600 TEUs and a selective offload breakbulk cargo ship based on the aforementioned T-AKE cargo ship would provide 14-15 days of supply for a five-battalion combat brigade operating ashore and the ships supporting them. A single T-AO would provide 2.5 days of supply for ships in the sea base and five battalions ashore.[1122] For tentative planning purposes, then, the Joint Offshore Logistics Support Base would include two selective offload container ships and two T-JLKAs (based on the T-AKE) for the Marines; one T-JLKA to support Navy shipboard ordnance requirements; and six tankers. This 11-ship package would provide 14-15 days of ordnance, supplies, fuel and water to support two forcible entry MEBs in combat for 14-15 days. DLA, Army and Air Force requirements would add to these numbers. It is easy to see how these numbers could rise dramatically. For example, two selective offload container ships and two T-JLKAs for the Army might support two airborne brigades for 14-15 days. The Air Force now has four ships in the LPF; it seems unlikely that these numbers would go down. DLA requirements are also certain to include several ships. And these numbers do not include the tanker requirements to support early entry Army and Air Force forces.

Although the DoN would incur the non-recurring engineer costs to design the ships for the Joint Offshore Logistics Support Base, the actual procurement costs for Air Force, Army, and DLA ships would be borne by the respective Departments or Agency. Final size of and anchorages for the JOLSB would be determined by follow-on operational analysis.

### MULBERRY 21

A new capability found in the LPF would be an ability to create an artifical harbor and heavy theater logistics portal. As previously discussed, such a capability would help to increase operational independence and freedom of action for the entire Joint ground force. This capability, dubbed MULBERRY 21 after the artificial harbors developed for the invasion of France, would allow Joint planners "to think in a rather different geographical box from the [enemy] staff officers whose job was to second guess their plans," and to enable expeditionary maneuver across transoceanic distances.[1123]

MULBERRY 21 would expand upon the Joint Enable Theater Access—Sea Ports of Debarkation (JETA-SPOD) program sponsored by the Pacific Command.[1124] This program

[1121] Vergun, "Outfitting the Operating Force."

[1122] Kaskin, "The Challenge of Joint Seabasing Logistics."

[1123] Penrose, editor, *The D-Day Companion*, pp, 134-35.

[1124] Geehan and Gainey, "Seabasing: Building the Army Contribution."

includes the development of new lightweight modular causeway systems, and lightweight container handling systems. These new initiatives would be combined with new rapidly deployed and employed breakwater systems and legacy platforms such as the Auxiliary Crane Ships found in the RRF to create the ability to form a protected harbor anywhere in the world.

MULBERRY 21 would be both a program and a Joint Task Force, perhaps under the US Transportation Command. The JTF would be responsible for developing and testing new harbor and SPOD technologies and systems, and employing MULBERRY 21 during a crisis. The costs for developing this capability should be borne by all the services equally.

### Maritime Prepositioning Force (Future)

The reshaping of the Amphibious Landing Fleet to be the linking element between the global irregular war and major combat operations, the upgrading the Army's Combat Prepositioning Force into a MPF clone with three Army Strategic Flotilla Squadrons (and possibly a Air Assault AFSB), and the expansion of the Logistics Prepositioning Force into a Joint Offshore Logistics Support Base allows the TFBN to recast its plans for the MPF(F) program. These new plans would be informed by three facts:

- The current MPF ships all have greater than 20 years service life left in them. Indeed, even as it planned for a new MPF(F) capability, the DoN planned to buy out the leases for the legacy MPF ships, and place them in the RRF;

- The final character of a future "sea basing" MPF squadron should be determined and shaped by considerable more experimentation and technological development, and possibly prototype development; and

- Recent moves to provide temporary offshore bases in support of the "global war on terror."

With regard to the last point, an important supporting mission in the global irregular war is to work to increase partner capacity, primarily by providing training and direct support to governments fighting a local terrorist problem of their own. Another mission is to operate in or near ungoverned areas, conducting periodic patrols and operations designed to disrupt enemy attempts to establish safe operating areas or sanctuaries. In both cases, being able to establish a temporary sea base capable of supporting relatively modest contingents of Joint special operations forces, Marines, or other Joint forces conducting training or support missions is an attractive operational option, especially in cases where infrastructure ashore is non-existent or a host government desires a relatively modest US footprint. Significantly, these missions would normally be conducted in unimpeded or guarded access scenarios, the scenarios for which the MPF was explicitly designed.

Recently, the DoN modified the USNS *Stockham*, one of the 16 legacy MPF ships to create an Irregular Warfare Maritime Support Base. The ship was given a new 54-foot flight deck capable of handling two MH-60 helicopters; a commercial type aviation refueling system; a medical module; communications upgrades; and far more watercraft than normally assigned to the ship. For a conversion cost of just $3 million, the *Stockham* "is off doing real good stuff that we can't talk about."[1125]

Building on this sensible modification, and to increase the TFBN's ability to support the global war on terror, the leases for the three MPF squadron leases should be purchased outright as planned, and two of the three squadrons should be resized and reshaped for a new mission. In this regard, the two, 5-ship MPF squadrons would be repackaged as five, 2-ship Irregular Warfare Maritime Support Squadrons, and be assigned to each of the Fleet Stations discussed earlier. One squadron would be repositioned to Ascension Island, and be focused on supporting Marine and Joint ground and special operations forces operating in the West African littoral; one squadron would remain in the Mediterranean, focused on supporting Joint ground and special operations forces operating from the northwest coast of Africa to the Horn of Africa; one squadron would be retained on Diego Garcia, from which it could support irregular warfare operations throughout the Indian Ocean; one squadron would be repositioned to Palau, as part of the Southeast Asian Station; and one squadron would remain on Guam, focused on the Western Pacific, from the Philippines to Northeast Asia.

Each of the ships would receive more extensive modifications than those given to the USNS *Stockham*. These modifications would include expanded rotary wing support capabilities and increased watercraft and lighterage. Most importantly, however, the ships would be modified to house, feed, and sustain up to a reinforced rifle battalion. For planning purposes, these modifications are projected to cost approximately $25 million per ship. Total conversion costs for tens ships would come to $250 million.

Additionally, the ships in the squadron would trade the equipment associated with heavy ground combat operations—equipment which, in the future, would be routinely delivered to the fight by amphibious warfare ships—with equipment specifically tailored for irregular warfare. This would mean heavier emphasis vehicles better designed to defeat mines and improved explosive devices, armored Humvees, armored trucks, engineering equipment, and water purifying units. Because irregular enemies are increasingly drawn to complex terrain such as cities and built up areas, the equipment sets would also emphasize urban warfare capabilities, such a robotics and non-lethal weapons. Assuming approval by the Government of Australia, the heavy ground combat equipment from MPF Squadrons 2 and 3 might be restaged at the logistics and training bases located in northwest Australia. One squadron could be used to provide an equipment training pool for combined arms training for Marines and the Australian Army, and the other could serve as prepositioned wartime stocks. In the event of a major combat operation, the Irregular Warfare Squadrons could sail to Australia, trade their lighter equipment for tanks,

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[1125] Richard R. Burgess, "Keys to the Future," *Sea Power*, May 2005, p. 31.

artillery, and other heavy equipment, and then deliver them to the fight as part of the assault follow-on echelon.[1126]

The third of the current MPF squadrons would remain berthed at Diego Garcia. Over the near- to mid-term, interim, it would become a “swing squadron,” capable of delivering the equipment set for a Marine Expeditionary Brigade in support of either a major combat operation or a major stability operation, allowing Marines to form a full Marine Expeditionary Force for either mission. The squadron would be unit and combat loaded to the extent practical, and be given additional watercraft and lighterage to improve their “in-stream” off-loading ability. The ships might also be configured to allow some RSOI in transit.

The squadron would also become the focus of experiments designed to illuminate and fully explore basing and supporting large combat units on and from a sea base. The aim would be to transform the “swing squadron” over time to fully support a Marine Expeditionary Brigade at sea.

## Step Three: Recapitalize the Surge Sealift Fleet

The 11 LMSRs in the Surge Sealift Fleet will soon be joined by two additional ships freed up by the new Army Strategic Flotilla program. Together, these 13 ships will be able to carry nearly ten heavy units of action. The oldest LMSR is less than ten years old, and all remain quite capable; these 24-knot ships will remain the backbone of the Surge Sealift Fleet for the next several decades.[1127] The focus of attention on Surge Sealift recapitalization plans should therefore be on the eight aging Fast Sealift Ships. All are all approaching 40 years of service, and will soon need to be replaced. As suggested by the “10-30-30” planning metric, increased DoD emphasis on reducing strategic closure will put the DoN under “tremendous pressure to improve high-speed lift.”[1128] Therefore, the replacement ships should be at least as fast, if not faster, than the 30-33 knot FSSs.

One model for a new FSS might be the ship being designed for FastShip, Inc., which is designed for fast point-to-point ocean transport of perishable goods between the east coast of the United States and Cherbourg, France. The planned capabilities for the ship, which include military sealift requirements in mind, are impressive: a speed of 36-40 knots in conditions up to sea state seven (25 foot wave height); a range of 11,500 nm at full speed; a 12,000-ton, 158,000 square foot cargo capacity; a container train system allowing off-load speeds of 360 standard containers

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[1126] The idea for using Australia for a staging base for US pre-positioned wartime stocks came from interviews with staff members of Marine Forces Pacific (MARFORPAC).

[1127] The first four LMSRs were conversions of Danish built RO/ROs. Two were completed in 1996; and additional two in 1997. The *Bob Hope*- and *Watson*-class LMSRs were all completed between 1998 and 2003, with an additional ship completed in 2004. See Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 292, 300-02.

[1128] Vice Admiral Cebrowski, former Director of the Office of Force Transformation, as cited in Richard Barnard, “Iraq Conflict Brings Increased Interest in Military Airships,” *Sea Power,* July 2003, p. 1.

per hour; a roll-on/roll-off capability from multiple cargo decks; and an ability to offload equipment directly over beaches with gradients up to ten degrees using a modular causeway system carried on its own cargo decks. These capabilities would allow the delivery of an Army brigade unit of action equipment set from the United States to the Persian Gulf in just 11 days.[1129] FastShip estimates that four of these high-speed transoceanic cargo ships would cost $1.7 billion, or a little more than $425 million per ship.[1130]

The speedy delivery of equipment across transoceanic distances is certainly a worthy Joint goal. However, consistent with arguments made earlier in this paper, high speed in and of itself should not become the driving technical consideration for FSS replacements. Instead, the focus should be *to improve US global freedom of action and to improve its operational independence*.

With the TFBN's amphibious lift capacity increased to 3.0 MEB equivalents, and with ten irregular warfare support bases capable of carrying an additional 2.0 brigade equivalents (ten reinforced rifle battalions), the TFBN will have five brigades worth of operationally independent lift across the full range of potential access scenarios. The new Maritime Prepositioning Force will carry the equipment for at least four brigades (three Army heavy brigades and one MEB) that can be used to quickly reinforce a Joint lodgment or to rush forces to a theater with ready access—maintaining today's level of capability. The addition of an AABCT afloat would increase the Joint lift capability by one brigade. And the 11 LMSRs in the Surge Sealift Fleet, augmented by two more ships transferred from the CPF force, can deliver an additional ten brigades worth of equipment through prepared ports. What is still lacking, however, is any material improvement in the number of heavy ready-to-fight brigades that the TFBN can deliver to a distant theater over and from the sea. This suggests that the first priority for the replacements for the eight Fast Sealift Ships should be to eliminate their dependence on deep water ports *and* to improve their ability to support operational maneuver from strategic distances.

Eliminating the lengthy RSOI required at the other end of a transoceanic voyage would, by itself, improve strategic *employment* times for expeditionary maneuver forces by up to a week. Said another way, a ship that carries **intact combat units** can be *slower* than a ship designed to deliver just equipment, and still be *faster* in delivering ready-to-fight brigades to a distant theater. Moreover, by conducting mission rehearsals in linked virtual environments (including onboard vehicle computers) on the way to theater, the unit will be rested and well prepared to enter battle upon arrival. Therefore, emphasis should be placed on pursuing ships that combine the good speed and austere delivery capability of the FastShip with an ability to carry *intact* combat units—perhaps a reinforced Battalion Task Force—much like the High Speed Shallow Draft Ship envisioned during the Army After Next project. Using these types of ships, now referred to as Austere Access High Speed Ships (AAHSSs), the Army could inject heavy Army forces from the continental United States or from theater intermediate staging bases directly into and through a littoral, in trail of forcible entry forces.

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[1129] See "FastShip, Inc., at http://www.fastshipatlantic.com; and "High Speed Sealift," at http://www.globalsecurity.org/military/systems/ship/hss.htm.

[1130] "High Speed Sealift."

Another option that has be discussed would be to try to forego having to stop at an austere post or beach entirely, by replacing Fast Sealift Ships with lighter-than-air *hybrid ultra-large aircraft*, or HULAs. HULAs are an idea championed by OSD's Office of Force Transformation in the wake of the failed attempt to position the US Army's 4th Infantry Division in Turkey. In the view of OFT analysts, these airships, with speeds perhaps twice as fast as practical fast sealift ships, and with potential cargo payloads from 30 to 1,000 tons, "could have made a difference" in getting the 4th Division into the fight. However, while being able to support operational maneuver from strategic distances, the HULAs would still find it hard to compete with the sheer volume that can be moved by large sealift shifts. By OFT's own analysis, a fleet of 20 HULAs would be able to ship six Army Apache helicopter battalions from Fort Campbell, Kentucky, to Saudi Arabia in 26 days. However, with a cargo capacities of nearly 400,000 square feet, two or three of today'24-knot LMSRs and 33-knot FSSs can accomplish the same task in 32 days.[1131]

Moreover, while shaving six days off of the arrival time sounds impressive, these speeds are still too slow to immediately support the leading elements of a forcible entry force that could arrive on the scene within as little as 18 days. Accordingly, for reasons discussed above, the eight Fast Sealift Ships should be replaced with a squadron of ships that can carry the equipment and personnel associated with one Army modular division, consisting of three to four heavy units of action and their basic combat loads of fuel, ammunition, and supplies; travel across transoceanic ranges at speeds of 36-39 knots (same speed as the RSLS); and deliver them through an austere, shallow draft port or across an undefended beach. A Fast Sealift Squadron capable of injecting three or four Army UAs through multiple austere theater entry points would increase the number of access insensitive and ready-to-fight heavy brigades normally delivered by sea in a JFEO from two (delivered on amphibious assault ships) to five or six.

The costs for such ships will undoubtedly be quite high. The ships will cost at least as much as the RSLS's price tag of $1.3 billion. Adding a capability to discharge the equipment through an austere port or across a beach by giving it a shallower draft and improved offloading capabilities would cost additional money. Because of their high costs, and because the ships would be designed to support the Army's ability to conduct operational maneuver from strategic distances, the costs for the ships should be shared equally by the Departments of the Army and the Navy.

## STEP FOUR: BUILD A NEW FAMILY OF SEA BASE CONNECTORS

Sea base "connectors" are a critical component of any Sea as Base Expeditionary Maneuver Fleet. These connectors support the Amphibious Landing Fleet and provide additional support to distributed Joint sea bases. These connectors come in three different varieties—intertheater connectors; intratheater connectors; and lighterage and assault connectors.[1132]

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[1131] Barnard, "Iraq Conflict Brings Increased Interest in Military Airships;" and Michael Sirak, "US Navy Floats Lighter-The-Air Transport Concept," *Jane's Defence Weekly*, May 7, 2003.

[1132] Rear Admiral Mark Fitzgerald, USN, and Lieutenant General Edward Hanlon, Jr., USMC, "High Speed Connectors," an undated Navy and Marine Corps concept document, p. 4.

Intertheater connectors provide the primary linkage between the CONUS base of operations and intermediate staging bases and the sea base. These connectors are designed to deliver high volumes of personnel, equipment, and supplies over transoceanic distances either to transshipment locations or directly to the seabase. At this point, the sea base is incapable of landing strategic airlifters like the C-5 and C-17, or even intratheater aerial connectors such as the C-130. As a result, for the foreseeable future, the primary intertheater sea base connectors will be ships.[1133]

One example of a potential sea base intertheater connector is the aforementioned Rapid Strategic Lift Ship now being explored by the DoN. The RSLS's notional characteristics are a speed of 36 to 39 knots, a range of 8,000 nm, and a draft of 8.1 meters. It is designed primarily to deliver a MEB's worth of non-deployable helicopters (20 CH-53E/Xs; 18 AH-1Zs and nine UH-1Ys; and ten CH-60s), and 1,650 personnel, to a MPF(F) squadron. As mentioned earlier, the projected cost of the ship is $1.3 billion.[1134]

Because of their high costs, the RSLS will compete directly with the replacements for the Fast Sealift Ships. However, the AAHSS desired by the Army would require a shallower and better cargo discharge capability than the RSLS—and a higher price tag. Negotiations continue between the two services over the ship's final design parameters. However, in keeping with the changes recommended herein, this report supports the Army's call for the AAHSS.

Intratheater connectors are capable of self-deploying to the theater of operations. However, their primary role is to then move forces and supplies over operational distances within the theater. While these connectors play a vital role in performing the movement of intratheater logistics, in the appropriate threat conditions they could also be used to insert intact combat units over intratheater ranges, like the C-130 tactical cargo aircraft, which is used to insert airborne, special operations forces, or small mobile forces into enemy territory, especially in support of airhead seizure operations.

Indeed, the HULA appears to be a much better fit as an *intra*theater connector. Although its payload capacities are far less than strategic sealift ships, they are several times that of the tactical transport aircraft. Until these airships are developed, however, a promising new type of intratheater connector with similar cargo capacity is nearing service. This connector is known as the Joint High Speed Vessel, or JHSV.[1135]

Conceptually, the JHSVs are the successors to the large numbers of intratheater connectors built during World War II, particularly the Landing Ship Tank (LST) and the Landing Ship Medium (LSM). These ships ranged in size from the LST's 4,080 tons to the LSM's 900 tons; had ranges

[1133] Fitzgerald and Hanlon, Jr., "High Speed Connectors," p. 5.

[1134] Koch, "US Navy Explores Joint High-Speed Cargo Ship."

[1135] For a good overview of intra-theater sealift, see Scott Gourley and Richard Scott, "Speed At Sea is the key For Intra-Theater Lift," *Jane's Navy International,* March 2005, pp. 11-16.

of 4,000-6,000 miles; and made speeds less than 13 knots. However, both had one key characteristic: they were beachable. As a result, they formed a fleet of "one-way, one-shot" intratheater connectors that augmented the larger amphibious warships, specializing in the delivery of intact motorized, mechanized, and armored units to an amphibious lodgment area. Once they discharged their cargo, they were not reused until the next amphibious operation.[1136] Nearly 1,700 of these ships were built during World War II, and they saw extensive action in all theaters of war.[1137]

After the war, the smaller LSM faded quickly from Battle Force service; it was too small for transoceanic amphibious operations. However, the larger LST lived on. Indeed, many World War II LSTs were reactivated for the Korean War, which led to the building of 22 new LSTs during and after that conflict. These LSTs were, in turn, replaced by 20 *Newport*-class LSTs, the ultimate beachable US landing ship. These 8,450-ton ships—twice as big as their predecessors—traded in the clam-shell doors characteristic of the World War II and Korean War LSTs for an elevated bow ramp. This arrangement allowed the ships to keep up with the 20-knot, transoceanic amphibious ships developed during the Garrison Era.[1138] However, indicative of the declining interest in amphibious operations during that period and in the early years of the Joint Expeditionary Era, the ships were retired during the 1990s, without replacement, long before the end of their 35- to 40-year service lives. Indeed, several of the ships sail today in foreign navies.[1139]

The retirement of the 20-knot LSTs meant that the only remaining intratheater connectors that can beach themselves and deliver cargo ashore are found in a vestigial force of nine *Besson*-class Vehicle Landing Ships (LSVs) and 35 large LCU-2000s operated by the Army Transportation Corps. The former have a full load displacement of 4,199 tons, a range of 5,500 nm, and a speed of 12 knots; the latter have a FLD of 1,102 tons, a range of 4,500 miles, and a speed of 11.5 knots. Both have the bow ramps necessary to discharge vehicles directly over a beach. Significantly, however, the ships are optimized solely for the intra-theater transport of *vehicles*; they do not have the troop berthing spaces to carry intact combat units.[1140]

The inability of either the Army or the TFBN to deliver large numbers of intact combat units over a beach severely hampers the emerging visions of operational maneuver from the sea and operational maneuver from strategic distances. As a result, both the Army and the DoN began thinking about new intratheater connectors that could be used in these roles. Recall that the Army After Next program called for the development of a Theater Support Vessel, or TSV, which

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[1136] Freidman, *US Amphibious Ships and Craft*, pp. 115-27; pp. pp. 203-05.

[1137] See "Landing Ships and Craft," at http://www.ibiblio.org/hyperwar/USN/ships/ships-ls.html.

[1138] Freidman, *US Amphibious Ships and Craft*, pp. 347-45.

[1139] Polmar, *Ships and Aircraft of the US Fleet*, Fourteenth edition, pp. 206-11.

[1140] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 627-29.

could discharge intact combat units through austere ports or even across beaches, thereby complementing the larger High Speed Shallow Draft Ships. One conceptual version of a TSV was based on a high-speed trimaran, with seats for 970 troops, and 1,900 square meters of vehicle stowage space. The ship could deliver a payload of 500 tons to a range of 750 nautical miles at speeds of 38 knots; by dropping both its speed (to 23 knots) and payload (to 355 tons), the ship could extend its range to 3,000 nm.[1141]

In comparison, the DoN vision for its intratheater connector was a modular, high-speed vessel (HSV). As envisioned by officers at the Naval War College and the Naval Warfare Development the HSV would perform the role of high-speed logistics connector for a sea base, transferring personnel equipment from theater land bases to the sea base; between ships in the sea base; and from the sea base to shore. However, by virtue of its modular design, the HSV could also perform additional Battle Force roles, such as mine warfare or support of special operations forces.[1142] In other words, Navy planners never envisioned the HSVs as "one-way, one-shot" connectors. Instead, they saw them as a multi-functional component of a TFBN sea base.

Both the Army and the Navy started to test and further explore their respective visions of intratheater connectors by leasing modified, high-speed commercial car ferries. Since 2001, the Army, Navy, and Marines have experimented with no fewer than four different types of these vessels. One of the vessels was used to support Operation Iraqi Freedom, and another continues to provide logistical support to Marines on Okinawa as part of the Logistics Prepositioning Fleet. The results of the experiments proved promising enough to prompt both the Department of the Army and Navy to launch formal procurement programs for high-speed, sea-based, intratheater connectors.[1143]

Happily, in late 2004, the Departments of the Army and Navy signed a Memorandum of Intent to merge the TSV and HSV programs into a single Joint High Speed Vessel program.[1144] The logical intent was to develop a common hull form to keep costs to both Departments low and to ensure interoperability between the two vessels. Critically, however, the JHSV will retain an ability to inject intact combat units from a sea base or theater base directly into an enemy's defended territory. Or, as is explained by Army planners, the aim of the program is to:

> …provide high speed intra-theater surface connector capability to rapidly deploy selected portions of the Joint Force *that can immediately*

[1141] Ian Bostock, "Austral Details High-Speed Sealift Trimaran Designs," *Jane's Defence Weekly*, December 8, 2004, p. 30.

[1142] See "High Speed Vessel (HSV)," at http://www.nwdc.navy.mil/Concepts/Sea_Basing/ConceptsHSV.aspx.

[1143] For a description of the different TSVs and HSVs, see Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 626-27. See also William Cole, "Navy Shows Off Speedy New Vessel at RIMPAC," *Honolulu Advertiser*, July 13, 2004; Lorenzo Cortes, "High-Speed Catamaran Performing the Lift Mission Well, Marine General Says," *Defense Daily*, July 9, 2004, p. 3; and "High Speed Vessel (HSV)."

[1144] Lieutenant Colonel Lawrence S. Ryder, "Joint High-Speed Vessel," *Marine Corps Gazette*, March 2005, pp. 22-25.

> *transition to execution*, even in the absence of developed infrastructure, *and conduct deployment and sustainment activities in support of multiple, simultaneous, distributed, decentralized battles and campaigns.* The primary missions include: support to Theater Cooperation Program and Global War on Terrorism, littoral maneuver, and sea basing (emphasis added).[1145]

In other words, the JHSV program will result in a modern, updated version of the World War II LST and LSMs, but one that will do those ships one better: in addition to supporting the insertion of intact combat units across a potentially hostile shore, the JHSVs will also provide a range of additional TFBN and Joint Multidimensional Battle Network capabilities, improving both their operational fungibility and their potential combat contributions. Both will be used to transport forces and supplies from in-theater intermediate support bases to the sea base or directly to the JOA; transport personnel and supplies within a sea base; or transport personnel, supplies, or intact combat units from the sea base to the shore.

Once again, high top-end speed will likely be less important than payload capability and the ability to deliver payloads directly to the shore. In this regard, the Office of Naval Research recently made a Broad Agency Announcement for a Sea Base Connector Transformable-Craft (T-CRAFT) Prototype Demonstrator. The T-CRAFT must be able to deploy in an unloaded condition from the intermediate support base to the sea base (range of 2,500 nm), and then be used as a sea base connector, transporting wheeled and tracked vehicles *through the surf zone and onto the beach.*[1146] One option for both the JHSV and T-CRAFT would be a vessel such as the E-Craft, or Expeditionary Craft, a vessel based on small waterplane area twin hull, or SWATH, technology. This type of vessel uses twin submerged hulls supported by short struts. The benefit of such a design is that it performs well in a variety of sea conditions. Its drawback, however, is that SWATH hulls have deep drafts, preventing them from operating close to the shore or in shallow water.[1147]

To solve this problem, the E-Craft incorporates commercial lift boat technology that allows the boat to change from the SWATH mode to a barge mode by lowering and raising its center deck. In the SWATH mode, the ship has good speeds and seakeeping; in the barge mode, the vessel has a draft of only three feet, allowing it to discharge its cargo directly over a beach. Interestingly, the idea for the E-Craft came from the requirement for ferry service among small

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[1145] See "Army RDT&E Budget Item Justification (R2 Exhibit)," dated February 2005, found online at http://www.dtic.mil/descriptivesum/Y2006/Army/0208058A.pdf.

[1146] Office of Naval Research Broad Area Announcement 05-020, Sea Base Connector Transformable-Craft (T-CRAFT) Prototype Demonstrator, posted August 16, 2005, with a response date of September 30, 2005.

[1147] Tyler Rhodes, "Ferry Could Float Two Communities," *Alaska Journal of Commerce*, May 21, 2004, at http://www.alaskajournal.com/stories/052104/loc_20040521001.shtml. The E-Craft is an evolved design of a Lockheed Martin design called the VariCraft. It is similar to a French design called the L-Cat. See Christopher P. Cavas, "US Navy Seeks Unusual Test for Innovative Craft," *Defense News*, August 22, 2005, p. 39.

Alaskan settlements where docking infrastructures are austere or nonexistent.[1148] In any event, a JHSV based on E-Craft technology would likely meet the requirements for a T-CRAFT, and provide the most flexible intratheater surface connector.

The third type of connector includes cargo and assault connectors, essential for ship-to-objective maneuver and other sea base operations. Cargo connectors include lighterage and other craft used to offload maritime prepositioning, surge sealift, and other cargo ships in-stream, in unimpeded or guarded access conditions. These consist of side-loading warping tugs, amphibious warping tugs, powered causeway sections, unpowered pontoon causeways, and self-propelled Joint modular lighters. These cargo offload connectors can be used only in protected harbors or benign sea states. One side-loading warping tug and three or four powered causeway sections are normally carried by each MPF ship.[1149]

Assault connectors come in three basic types. The first are s*hip-to-shore surface connectors*—landing craft or other special-purpose craft that are carried by the larger ships in the sea base. These special-purpose ships, developed before and during World War II and updated throughout the Garrison Era, have always played a vital role in amphibious operations.[1150] Indeed, during World War II, in 1944 alone, over 25,000 landing craft weighing less than 50 tons were built, or an average of ten for every large sea base maneuver platform or intratheater connector.[1151] Even today, until a VTOL rotor or aircraft can be developed that lifts 25 or more tons, ship-to-shore surface connectors will remain the preferred means of transporting heavy equipment ashore.

The most capable ship-to-shore surface connectors are those specially designed to support amphibious landings. Today, these include the 40-plus knot Landing Craft Air Cushion, or LCAC, capable of delivering 60-75 tons across 70 percent of the world's beaches; the Landing Craft Utility (LCU), a displacement landing craft capable of transporting up to 190 tons of equipment directly to the beach at speeds of 11 knots; and the smaller Landing Craft Medium (LCM), capable of delivering 34-65 tons of cargo directly to the beach at speeds of approximately 12 knots.[1152]

Given the ambitious goals of operational maneuver from the sea and ship-to-objective maneuver, as well as TFBN sea basing plans, it is unsurprising that these connectors are being thoroughly modernized. At least 72 of the 91 original LCACs are being put through a Service Life Extension

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[1148] In an unusual arrangement, the Office of Naval Research will cover the construction costs of the vessel (approximately $25 million), while Alaska will pay for the craft's operations and maintenance. Cavas, "US Navy Seeks Unusual Test for Innovative Craft." See also Rhodes, "Ferry Could Float Two Communities."

[1149] Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 212-13.

[1150] Freidman, *US Amphibious Ships and Craft,* Chapters 4, 7, and 10.

[1151] Labaree, et al, *America and the Sea: A Maritime History,* p. 599.

[1152] These ship-to-shore surface connectors are augmented by small Landing Craft Personnel, Light, that carry 17 passengers or two tons of cargo. Polmar, *Ships and Aircraft of the US Fleet,* eighteenth edition, pp. 201-08.

Program (SLEP) to extend their service lives, improve their engine performance, and make other necessary improvements.[1153] These are to be augmented and eventually replaced by the end of the next decade by a new, more capable LCAC(X). Additionally, the slow but dependable LCUs are to be replaced by a far more capable replacement heavy landing craft, or LCH(X). This craft is expected to have a speed of 30 knots and carry 2,200 short tons.[1154]

*Ship-to-objective surface connectors* are special assault connectors designed to transport a combat team directly from the ship to an inland objective without needing to unload on the beach. The first of type were the World War II amphibious tractors, with open personnel bays.[1155] These were subsequently replaced by amphibious assault vehicles (AAVs). In essence, these craft are armored vehicles that "swim" to the shore at relatively low speeds (8 kts), and then operate as an armored personnel carrier. The current AAV is the AAVP7 (for seventh in the series). It is protected by reactive armor, armed with a .50 caliber heavy machine gun and a 40mm grenade launcher, and can carry 18 Marines.[1156]

The AAV is scheduled to be replaced by the Expeditionary Fighting Vehicle, or EFV. Although it will carry three less troops, the EFV will carry Forward-Looking Infrared (FLIR) and night vision devices for 24-hour operations and be armed with a powerful 30mm automatic cannon as well as a 7.62 mm machine gun. As discussed earlier, it will also have a vehicle overpressure system, providing the crew and passengers with protection against radioactive fallout or chemical and biological contamination. However, its most dramatic improvement will be in its mobility; it is designed to achieve water speeds as high as 25 miles per hour, and have cross-country mobility equivalent to that of an M1 tank. Marines hope this system will allow them to perform high-speed, protected tactical maneuvers directly from the ship to an inland objective.[1157]

To achieve these high water speeds, the EFV needs both a very high horsepower engine and an ability to "plane" on the water's surface. The result is a very complex and expensive machine that costs around $8 million. Moreover, the large engine encroaches into troop compartment, splitting up the seating arrangement and making the tactical loading and unloading of troops loaded down with their equipment a difficult proposition. It is not yet certain that all of the technical challenges and operational tradeoffs associated with the EFV have been fully resolved. Still, current Marine plans are to buy over 1,000 of the vehicles, enough to outfit two amphibious brigades and three MPF brigades. Based on the plans developed in this report, and assuming the

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[1153] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 202.

[1154] Andrew Koch, "Navy Considers Seabase Transport Options," *Jane's Defence Weekly*, February 23, 2005, p. 8; and Kaskin, "The Challenge of Joint Seabasing Logistics."

[1155] For a good history of the development of these vehicles, see Freidman, *US Amphibious Ships and Craft*, especially pp. 213-19, and 298-302.

[1156] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 210-11.

[1157] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 209.

vehicle is deemed operational effective, the maximum EFV buy should be no more than four brigades worth (three amphib brigades and one MPF “swing” brigade), and the minimum buy no less than two brigades worth of vehicles (two forcible entry amphib brigades).

During the early years of the Garrison Era, Marines pioneered the use of helicopters as *ship-to-objective aerial connectors.* The first helicopters could carry no more than eight to ten Marines.[1158] By Vietnam, however, the “medium lift” CH-46 helicopter could lift 18 to 24 combat loaded Marines, and the “heavy lift” CH-53—although optimized as a cargo carrier—could lift 35 or more. All three utility and troop lift helicopters were escorted to their landing zones by AH-1 gunships. Updated versions of all four of these helicopters remain in service today. Not surprising, then, Marines have plans to replace or upgrade them all.

The Marines are close to replacing their Vietnam-era CH-46 medium troop lift helicopters with the MV-22 tilt-rotor, which combines the vertical take-off and landing capabilities of a helicopter with the high speed of a turbo-prop aircraft. The transition is long overdue; more than 20 years after the start of the JVX program that led to its development, the MV-22 has yet to enter squadron service because of a series of crashes and nagging design problems.[1159] However, it appears that the MV-22’s problems are now behind it, and the Marines can’t wait to get it.[1160] As they like to say, with the MV-22 the Marines will have an aircraft that “is twice as fast, can carry three times as much, and goes six times farther than the aging CH-46Es” it replaces.[1161]

As is often the case, the MV-22’s sharp increase in performance comes at a sharp increase in price. The aircraft’s current fly-away cost is $70 million or more, a price that puts heavy pressure on a DoN aviation procurement account also on the verge of funding the JSF, the MMA, the ACS, J-UCAS, and other Marine Corps rotary-wing aircraft. Based on its high cost alone, continued close scrutiny of the MV-22 is warranted. However, setting aside the question of cost for a moment, the more fundamental question is whether or not the aircraft is the best fit for the emerging Sea as Base Maneuver Fleet. And the answer to this question may be that because the MV-22’s development has been so long delayed, it may no longer be the right aircraft for the job.[1162]

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[1158] Freidman, *US Amphibious Ships and Craft*, p. 348.

[1159] Fosnaugh III, “How We Provide For the Common Defense: A Review of the Interactive Decision-Making Process of the V-22 Osprey Program From 1981-1992.”

[1160] The MV-22 is now doing well in its operational testing. See Amy Butler, “Spreading Its Wings,” *Aviation Week and Space Technology*, July 18, 2005, pp. 24-25; and C. Mark Brinkley, “Osprey Works to Shed its Troubled Past,” *Defense News,* July 25, 2005, p. 54.

[1161] M. Thomas Hayden, “The MV-22 *Osprey*,” found online at http://www.military.com/Opinions/0,,Hayden_101304,00.html.

[1162] The MV-22 has had many supporters and detractors from its inception. For the opposing views on the aircraft, see the statements of Dr. L. Dean Simmons, Institute of Defense Analysis, and Dr. David S. C. Chu, Office of the Secretary of Defense, before the US Senate Appropriations Committee, Defense Subcommittee, on July 19, 1990, found at http://www.au.af.mil/au/awc/awcgate/navy/edm/exc-dma3.pdf. For a more recent recapitulation of the

Why? The MV-22 was conceived soon after the Vietnam War as a replacement for the CH-46. This was long before the concepts of operational maneuver from the sea or sea basing came into vogue. Therefore, although the aircraft's problems now appear to be behind it, the plane appears to be a poor fit as part of the system of systems of ship-to-shore aerial connectors. For example, the MV-22's speed and range are much greater than the heavy lift helicopters that lift the landing force equipment, the utility helicopters that provide command and control during aerial maneuver operations, or the helicopter gunships that would normally escort it. This means that a force making a deep air insertion using MV-22s will need to be escorted by AV-8Bs or JSFs, and the force will be limited to what the MV-22 can carry inside its cargo box. And therein lies the second rub: although its cargo "box" is slightly larger than the CH-46 it replaces, because of its internal seating arrangements the MV-22's designed load of 24 Marines is an extremely tight fit. One Marine sergeant involved in the operational testing of the plane believes the aircraft's true combat load to be closer to 12 Marines.[1163]

The problem also extends to cargo. Because the MV-22's cargo box is less than six feet wide at its narrowest point, it can carry only specially-modified "internally transportable vehicles," small jeep-like four wheel drive vehicles capable of carrying no more than four Marines. Moreover, although it can carry more than 10,000 pounds externally, when it does it sacrifices its speed and range advantages over a helicopter. At present, it can carry its full external load at speeds up to 110-120 miles per hour over a radius of only about 70 miles.[1164]

Summing up, then, the MV-22 is a superb high-speed people mover. As such, it is best suited for Vietnam Era air assault missions involving the insertion of foot-mobile troops supported by a small number of small gun carriers or reconnaissance vehicles;[1165] seizure of airheads; or deep raids. Indeed, the aircraft's deep raiding and insertion capability explains the interest of the Special Operations Command with the aircraft. Current plans are for SOCOM to procure 50-55 CV-22 variants specially optimized for these missions.[1166] However, it appears far less suited to be the Marine Corps' primary ship-to-objective aerial connector in forcible entry operations, primarily because of its limited internal cargo capacity and its impact on the size and design of the Amphibious Landing Fleet.

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arguments for and against the MV-22, see Christopher Bolkcom, "V-22 Osprey Tilt-Rotor Aircraft," Congressional Research Service, January 7, 2005.

[1163] C. Mark Brinkley, "Tilt-Rotor Impresses US Marines With Speed, Other Improvements," *Defense News*, July 25, 2005, p. 54.

[1164] Butler, "Spreading Its Wings," p. 25.

[1165] The MV-22 is incapable of lifting an up-armored High Mobility Multi-Wheeled Vehicle, the preferred land vehicle now in use in Iraq. Butler, "Spreading Its Wings," p. 25.

[1166] Major Scott A Shaeffler, USAF, "Getting it Right With the CV-22," found online at http://www.airpower.maxwell.af.mil/ airchronicles/cc/schaeffler.html.

Although the MV-22 can go faster over longer ranges than the CH-46, it carries the same number of troops—or potentially less. Therefore, the Marine Corps medium lift plans have long assumed that the future MV-22 squadron will require the same 12 aircraft as the current CH-46 squadron. This has unfortunate ramifications for the sea base, because as was mentioned earlier, the MV-22 is twice as big and twice as heavy as the CH-46. Indeed, the aircraft's size is the primary cause for the dramatic increase in the number of CH-46 equivalent parking "spots" needed to sea base a MEB's worth of rotary-wing aircraft. While four, 12-plane, CH-46 squadrons require 46.0 shipboard spots, four, 12-plane MV-22 squadrons require 106.56 spots. In essence, then, a two-MEB forcible entry operation supported by MV-22s requires three more LHDs than an operation supported by the CH-46, which helps explain the aforementioned recommendations to pursue a fifth J-CVE and two new T-JAVBs. Indeed, the $3.4 billion shipbuilding costs associated with these three ships can be properly viewed a shipbuilding premium that should be added to the price of every MV-22. For an aircraft buy of 360 MV-22s, this equates to a $9.7 million shipbuilding premium per aircraft, on top of its current fly-away cost of over $70 million.

This is a very step price to pay for a high-speed aerial personnel mover. As the DSB pointed out, the key to getting dramatic improvements in the operational capabilities of a Sea as Base Expeditionary Maneuver Fleet is to develop an aerial connector that can compete with surface connectors *in payload*. Accordingly, there have been increasing calls for a number of heavy-lift ship-to-objective aerial connectors. These include "Quad Tilt-rotors;"[1167] blimps;[1168] a Joint Heavy Lift aircraft with lift fans;[1169] and gyro-copters.[1170] All of these concepts, like many of those of the Pentomic Division, are exciting; however, also like the Pentomic Era concepts, they are likely years, if not decades, away. The Marines and Army have yet to agree on the performance parameters of a future Joint Heavy Lift aircraft, and if the MV-22 is any indication, the costs of developing such a system will be high.[1171] Moreover, no one is quite sure how big such a heavy lift aircraft would be, or its potential impact on the sea base. Marine Deputy Commandant for Aviation Lieutenant General Michael Hough estimated that an aircraft capable of lifting 25 tons over 400 to 500 miles at speeds of 350 knots—the general characteristics

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[1167] Major General Richard L. Phillips, USMC (ret), Lieutenant Colonel Mark J. Gibson, USMC, ret, "The Missing Piece to the OMFTS Puzzle: The Quad Tiltrotor," *Marine Corps Gazette*, November 2000, pp. 70-73; and David A. Fulghum and Robert Wall, "Military Envisions Family of Tiltrotors," *Aviation Week and Space Technology*, December 23, 2002.

[1168] Dave Ahearn, "Hagee Sees Need For Huge Ship-based Tilt-Rotor or Blimp," *Defense Today,* April 21, 2004.

[1169] Andrew Koch, "Ship-to-Objective Lift Still a Key Issue, Says US Study," *Jane's Defence Weekly,* August 27, 2003.

[1170] "Iraq Operations Accelerating Transformation, Cebrowski Says," *Aerospace Daily and Defense Report,* August 4, 2004; and Dave Ahearn, "Cebrowski Sees New Aircraft, Movable Maritime Airfield," *Defense Today,* August 4, 2004, p. 1.

[1171] Joshua Kucera, "Services Divided Over US Joint Heavy Lift Aircraft," *Jane's Defence Weekly,* November 17, 2004, p. 5.

desired by the DSB—would weigh 200,000 pounds when fully loaded and require a flight deck that is 1,200 feet long—figures that current or planned sea base ships cannot support.[1172]

Indeed, rather than waiting for the Joint Heavy Lift aircraft to be defined and developed, the Marines have opted to purchase 154 new CH-53Xs, a follow-on to the CH-53E heavy-lift helicopter now in service. The CH-53E can carry a six-ton payload over a combat radius of 110 nautical miles, and a 16-ton payload over a combat radius of 50 nautical miles. With new engines taken from the MV-22, new rotors, and other improvements, designers hope the CH-53X will be able to carry a 13.5-16 ton payload over a 110-nautical mile radius of action, at half the operating cost of the CH-53E.[1173] It will also carry three times the load of a CH-53E at ranges up to 200 nautical miles.[1174]

From the Marines' perspective, they can't get the CH-53X fast enough. The current CH-53E fleet was and continues to be heavily used in Afghanistan and Iraq, and they are wearing out much faster than expected. Current estimates are that, starting in 2010, the Marine Corps will need to start removing about 15 helicopters a year from service as they reach their design lives of approximately 6,100 hours of flight operations. Even if the Marines started a crash program to develop CH-53X, it would likely not be ready before 2015.[1175] In any event, a crash program is not likley. Because budgets are so tight, the Assistant Secretary of the Navy for Research, Development, and Acquisition has refused to allow the program to go forward with the project until $800 million is found within existing budgets.[1176]

Given that a primary Naval Battle Network responsibility will be to help seize a Joint APOD and SPOD or to create access where it isn't, and given the CH-53X's superior personnel and cargo-hauling capability in sea-based maneuver operations, freeing up DoN funds to procure the CH-53X appears to be an important goal. One option might be to truncate the MV/CV-22 buy at approximately 175-200 aircraft, with the aim of creating a Joint Tilt-rotor Force of ten, 12-plane squadrons. The entire force would be upgraded to CV-22 standard, with upgraded terrain following radar, a suite of integrated radio-frequency countermeasures, and directed infrared countermeasures. These modifications would enable the Joint CV-22 force to "go anywhere, anytime, and come back"—an enviable characteristic for a *national* deep raiding force.[1177] In

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[1172] John T. Bennett, "Army-Led Team Mulling Possible Heavy-Lift Aircraft for Seabasing," *Inside the Pentagon*, October 28, 2004, p. 1.

[1173] Robert Wall, "Weighty Decisions," *Aviation Week and Space Technology*, October 25, 2004, p. 38; Lisa Troshinsky, "New CH-53 Helo Will Double Lift and Range, Expert Says," *Aerospace Daily and Defense Report*, July 20, 2004.

[1174] "New Build CH-53X Performance," at http://www.vtol.org/news/issues604.htm#ch53; and "CH-53X Super Stallion," at http://www.globalsecurity.org/military/systems/aircraft/ch-53x.htm.

[1175] Jay Price, "Copters Recalled From Boneyard," *The News&Observer.com*, August 21, 2005.

[1176] Dave Ahearn, "Young Says $800 Million Needed For New-Build CH-53X Helicopter," *Defense Today*, April 20, 2005.

[1177] Fulghum and Wall, "Military Envisions Family of Tiltrotors."

other words, the force would support Marines, Army Rangers, Joint Special Forces, or the National Mission Force, depending on the mission.

The best home for the Joint Tilt-rotor Force could likely be the US Special Operations Command, the supported commander for the global war against Radical extremists and terrorists. The force could be either a true Joint force, comprised of Marine Corps, Army, and Air Force personnel, or a Marine Corps aviation detachment assigned to SOCOM. In any event, the pilots would be trained to conduct deep raids or special forces insertions and extractions from austere forward bases or from aviation power-projection platforms and big-deck amphibious ships.

The cost savings associated with the reduced MV/CV-22 buy could then be diverted into accelerating the CH-53X's development and pursuing it as the TFBN's single primary surface-to-objective aerial connector.[1178] Although it is about 20 percent larger than the MV-22, the CH-53X is capable of lifting many more troops (55 troops with center-line seats, at least two times more than the designed capacity of the MV-22, and three times more than the CV-22) and much more cargo over the operational ranges associated with an attack from the sea.[1179] It is also capable of lifting more powerful vehicles ashore, like the up-armored High Mobility Multi-wheeled Vehicle or the Light Armored Vehicle. An all-CH-53X force thus would likley require fewer total aircraft than a mixed MV-22/CH-53 fleet. The necking down to a single primary sea-based aerial connector would also save O&S dollars.

A second option would be to pursue an alternative medium lift/heavy lift rotary-wing force with a less expensive medium helicopter in place of the MV-22. There are three likely potential candidates: the CH-60, CH-92, and EH-101. The CH-60 and CH-92, both variants of the Army's UH-60 helicopter, would leverage Navy and Joint helicopter procurement plans, which also rely heavily on variants of the same aircraft.[1180] The EH-101 was recently chosen by the DoN for the Presidential helicopter support mission, and is a candidate for the Air Force's 132-aircraft Personnel Recovery Vehicle Program.[1181] However, given the much greater lifting capacity of the CH-53X, as well as the increased costs associated with introducing a new airframe into fleet service, pursuing all-CH-53X force looks to be both more attractive and more flexible than any of these options.

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[1178] The Marine Corps has long envisioned rotary-wing support in terms of "medium lift," like the CH-46 and the MV-22, and "heavy lift," like the CH-53E. It is not clear that these terms now make much sense when discussing sea-based maneuver operations. As the DSB made clear, the key requirement for effective sea-based maneuver operations is an aircraft with heavy lift capability. It is perhaps best, then, to think of the future rotary-wing requirement in terms of a single sea base aerial connector. This is the same thought found in Major G. Kevin Wilcutt, USMC, "Medium Lift Replacement," 1993 Marine Corps Command and Staff paper, found online at http://www.globalsecurity.org/military/library/report/1993/ WGK.htm.

[1179] The deck spotting factor for a MV-22 is 2.22 times that of a CH-46; for a CH-53, it is 2.68.

[1180] See "CH-60S/MH-60S *Knighthawk*," at http://www.globalsecurity.org/military/systems/aircraft/ch-60. htm.

[1181] See EH-101, at http://www.fas.org/man/dod-101/sys/ac/row/eh101.htm; "DoD Special Briefing on the Award of the Presidential Helicopter Contract," found at http://www.dod.mil/transcripts/2005/tr20050128-2044.html; and "Personnel Recovery Vehicle (PRV)/Combat Search and Rescue CSAR Replacement Aircraft Program," found at http://www.globalsecurity.org/military/systems/aircraft/prv.htm.

A third alternative, of course, would be to continue to buy the MV-22 as planned. The strongest argument in support of this option is that further delay in replacing the tired CH-46 fleet is simply not prudent. Moreover, despite its operational limitations and high costs, the MV-22's speed and range improvements will certainly create new operational opportunities for the TFBN, especially for the forward deployed amphibious crisis response forces that link the global war on terror with prompt power-projection operations. There are two possible variations of this alternative:

- Replace CH-46s with MV-22s on a one-for-one basis, as now planned. To account for this possibility, this report's naval platform architecture will support the sea basing of a mixed MV-22/CH-53X force. A fifth J-CVE, along with space provided by two new T-JAVBs based on the Maersk S-class, would easily accommodate the space requirements of the larger force, at a shipbuilding premium cost of just over $9 million per aircraft. However, it would not free up money to pursue the CH-53X.

- Therefore, a second variation would be to replace CH-46s with MV-22s on less than a one-for-one basis. Indeed, because the transition to the MV-22 is much slower than originally planned and CH-46s are nearing the very end of their service lives, Marines already intend to replace every four CH-46s with three MV-22s over the near- to mid-term, resulting in "interim" squadrons of nine aircraft.[1182] By making this plan permanent, the DoN would both free up money to divert to the development of the CH-53X, and reduce the required deck spotting factor for a 2.0 MEB forcible entry operation by more than an LHD equivalent.[1183]

## RECOMMENDATIONS FOR THE SEA AS BASE EXPEDITIONARY MANEUVER FLEET

To recap the foregoing discussion, this report recommends that:

- The 3.0 MEB requirement for amphibious lift be reaffirmed, and that the Amphibious Landing Fleet be equipped with eight LHDs and 24 LPD-17s. The 15 additional LPD-17s above the nine now in the plan would be purchased at a rate of one per year from FY 08 to FY 22. The first 12 LPD-17s would replace the 11 aging LPD-4s; the final 12 LPD-17s would replace the LSD-41/49s on a one-for-one basis.

- Consideration be given to making the second batch of LPD-17s a "Flight II" design with improved capabilities, perhaps with the MFR and 16 VLS cells.

[1182] Based on interviews with USMC officials.

[1183] 24 aircraft x spotting factor of 2.22 = 53.28 spotting factor. Depending on the spotting factor used, an LHD equivalent ranges between 45 and 58 deck spots.

- The current ESG formations be reorganized into eight, 4-ship Distributed Expeditionary Strike Bases, or DESBs, each consisting of one LHD and one CG-52; three LPD-17s and three DDG-51/79s; and an LCS Division. With one DESB homeported in Japan, the remaining seven would keep one DESB rotationally deployed in the Indian Ocean. The remainder of the force would be postured for rapid surge in support of a single major combat operation.

- An additional J-CVE be purchased in FY 19 and transferred to the Military Sealift Command as part Logistics Prepositioning Fleet. This recommendation is based on the assumption that the expected service lives of LHDs and J-CVEs can be extended to 39 years. The cost of the extra ship would be absorbed within planned payments into the capital account for aviation power-projection platforms. The ship could be used in a variety of roles: auxiliary J-FAB; rotary wing aviation transport; or support of TFBN MV-22 operations during a major forcible entry operation.

- The two small T-AVBs now in the LPF be replaced by two larger T-JAVBs, based on the Maersk S-class hull. The potential for a six-ship buy with the Army, which is looking into the possibility of sea basing an Air Assault BCT, should be explored. Because they are foreign-designed and built hulls, procuring Maersk S-class ships would require Congressional approval.

- The Logistics Propositioning Fleet be further expanded into a Joint Offshore Logistics Support Base. The mission of the Support Base would be to provide logistics support to Joint forces ashore until an expeditionary theater infrastructure could be established. Notional planning requirements for ships in direct support of the TFBN include six tankers, three T-JLKAs (based on the T-AKE), two 600-TEU containers ships, and the three aviation support ships discussed above (one J-CVE and two T-JAVBs). Requirements for the DLA Afloat Distribution Center, Army Supply Activity Afloat, and Air Force support would be established by the respective Agencies and Departments.

- The leases for the three MPF squadrons be bought out, and a total of ten of the 16 ships be converted to Irregular Warfare Maritime Support Bases, similar to the modifications made to the USNS *Stockham*. These ten ships would be organized into five, 2-ship Irregular Warfare Squadrons, positioned at Ascension Island (assuming approval of the Government of Britain); Italy; Diego Garcia; Palau; and Guam The heavy combat equipment now stored on these ten ships would be positioned in northwest Australia (assuming approval of the Government of Australia); one equipment set would support combined arms training between Marine Corps and Australian Army units; the other would become prepositioned war reserve stocks.

- A single six-ship MPF Squadron remain anchored at Diego Garcia, focused on reinforcing either a major stability operation or a major combat operation. This squadron would become focus of TFBN sea basing experimentation. The final selection for future MPF(F) ships would be dictated by the outcome of sea basing experiments, and be heavily influenced by the size of future high-speed connectors. In the interim, this squadron would be unit and combat loaded to the greatest extent practical, and be augmented with additional lighterage to improve its "in-stream" cargo offload capability.

- The eight FSSs be replaced by a small class of 36-39 knot Austere Access High Speed Ships designed to transport the equipment and personnel of a modular Army division, consisting of three to four heavy UAs over transoceanic distances, and to insert them through austere ports or over beaches. The intent of the program is to increase the number of heavy ground combat brigades delivered in ready-to-fight combat condition. For planning purposes, the squadron would consist of eight ships.

- The DoD and DoN initiate a MULBERRY 21 program to create the Joint capability to rapidly create a protected harbor and theater logistics portal anywhere in the world.

- The Joint High Speed Vessel Program be continued, with a goal of creating a family of intratheater connectors to augment both the Amphibious Landing Fleet and the Austere Access Shallow Draft Ships. Vessels that can discharge their cargo over a beach, like those envisioned in the T-CRAFT program, would be most versatile. For planning purposes, the JHSV fleet would consist of 22 Army JHSVs (half the current force of legacy LSVs and LCU-2000s) and 10 DoN JHSVs (one per Fleet Station, and five more to support a major power projection operation). The final number of ships bought will depend on further DoN and Army analysis.

- OSD and the DoN accelerate plans to develop and procure the CH-53X force, either by:

    - Truncating the overall buy of V-22s to 175-200 (down from 410), and forming a Joint Tilt-rotor Force composed of ten, 12-plane squadrons. This force would support operations for all services as well as special operations forces. The money saved would be diverted toward buying an all-CH-53X aerial ship-to-objective connector; or

    - Reducing the number of aircraft in planned MV-22 squadrons from 12 to nine, and diverting the money saved to develop the CH-53X. The result would be a mixed MV-22/CH-53X force aerial ship-to-objective connector force.

### Associated Shipbuilding Costs

Eight LHDs are bought and paid for. The additional 15 LPD-17s called for in this plan would be built at a rate of one per year from FY 08 to FY 22, preferably on a multi-year contract. The projected yearly cost for a LPD-17, assuming a long-term, multi-year buy, is $1.1 billion (.79 ASEs) per year in FY 05 dollars. The total incremental cost for 15 additional LPD-17s should not exceed $16.5 billion—approximately $1.0 billion more than the projected cost for a single MPF(F) squadron (including a Rapid Strategic Lift Ship). In essence, then, this plan substitutes a far more capable Amphibious Landing Fleet in exchange for a single MPF(F) squadron.

Spread out over a 39-year period, the cost for a thirteenth big-deck amphibious ship would be only $64 million. The costs for the fifth J-CVE therefore would be covered with little apparent increase to the yearly investment in Aviation Power-projection Platform Capital Investment Fund. The projected costs for two T-JAVBs based on Maersk S-class ships is $800 million.

Shipbuilding costs for other ships assigned to the LPF/Joint Offshore Logistics Support Base will be discussed in the next chapter along with other Combat and Mobile Logistics Force requirements.

Total near-term costs for the Maritime Prepositioning Fleet would be the costs associated with the buy-out of the three leases, and the costs associated for the conversion of ten MPF ships into Irregular Warfare Maritime Support Bases. For planning purposes, conversion costs are estimated to be $25 million per ship, or approximately $250 million for ten ships.

Costs for the replacements for the aging Fast Sealift Ships will depend entirely on their key performance parameters and the final numbers bought to support the deployment of a modular Army division. For planning purposes, this report assumes the average unit replacement costs for eight Austere Access High Speed Ships will be $1.5 billion ($200 million more than the projected cost for the Rapid Strategic Lift Ship). Given expected shipbuilding budgets, and given these ships will provide the Army with a dedicated operational maneuver capability, the Department of the Army should shoulder half the cost for the ships.

Total costs for the JHSV program would depend on the final number purchased by the DoN and the US Army. Costs should be limited by opening a competition for a ship designed-to-cost for no more than $300 million, and seeking approval for a multi-year construction contract.[1184] Assuming a DoN requirement for 10 JHSVs, the total procurement cost would be $3 billion.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

Should the second Flight of LPD-17s be equipped with the MFR and be armed with 16 VLS, weapon procurement costs would rise slightly to account for the additional 192 TFBN VLS cells.

The recapitalized Amphibious Landing Fleet of eight LHDs and 24 LPDs would require an aggregate crew of 17,781 officers and Sailors. While this represents a manpower savings of 3,564 people over the current fleet, it would be approximately 3,400 more than the current DoN plan, which trades active duty amphib ships for contractor-crewed MSC ships. This would result in higher than anticipated O&S costs.[1185] However, it is important to note that this manpower savings would exceed the savings in any other TFBN component. Additional savings might be

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[1184] At a conference in February 2005, Army officials intimated that the first batch of JHSVs would cost $380 million. This price seems to be quite high for a modification of what is in essence a commercial car ferry. To be conservative, this report adopts a price that hopefully will prove to be a gross over-estimation.

[1185] The current DoN plan calls for eight LHDs, eight LPD-17s, and eight LSD(X)s. For comparative purposes, the crew of a LSD(X)s is assumed to be 300 officers and Sailors. The total manpower requirement for this force would be approximately 14,400 officers and Sailors.

made by converting some of the LPD-17 crews to civilian seamen provided by the Military Sealift Command, and arrangement now being tried on TFBN command ships.[1186]

Critics of this plan would be quick to point out that the aggregate manpower savings is far smaller, given that four additional LHARs/J-CVEs would be found in the aviation power-projection fleet. However, these ships should properly be as a substitute for two larger, and much more expensive, CVNs. This report thus includes the resulting manpower savings in the aviation power-projection fleet without regret.

The MSC would see an relatively large increase in the number of ships in its fleet, including one T-JCVE, two T-JAVBs, two 600-TEU container ships, three T-JLKAs, four tankers, and potentially ten JHSVs. It is cautiously assumed the manning requirements for these additional ships could be met by an increase in civilian contract workers.

The ultimate consolidation of amphibious landing ships into two ship classes—LHDs and LPD-17s—would ease training, maintenance, and logistics costs in the Amphibious Landing Fleet. The replacement of LSDs with new LPD-17s would free up 12 ship hulls to be converted into other uses, such as Fleet Station tenders. This idea will be more fully developed in the next chapter.

## Final Requirements for the Surface Battle Line

Adding the escort requirements associated with the eight Distributed Expeditionary Strike Bases, the final TFBN requirement for first- and second-rate combatants is as follows:

| | CG First-Rate | DG Second-Rate | Total Combatants |
|---|---|---|---|
| 1 Forward-based CSG | 1 | 2 | 3 |
| 1 Forward-based TAMD SAG | 1 | 2 | 3 |
| 1 Forward-deployed DESB | 1 | 3 | 4 |
| 8 Deployable CSGs | 8 | 16 | 24 |
| 8 Ballistic Missile Defense Groups | 8 | 8 | 16 |
| 4 Deployable CVESGs | 4 | 8 | 12 |
| 7 Deployable DESBs | 7 | 21 | 28 |
| **Total** | **30** | **60** | **90** |

This requirements list suggests two things. First, recall that one option was to retire eight DDG-51s as eight DDG-79s were procured from FY 07 and FY 14. The figures above would require

[1186] Frank Randall, "Military Sealift Command Maintains an Accelerated Pace," *Seapower*, July 2004.

the TFBN to instead modernize six of the DDGs and return them to service. Transferring these six ships into the Naval Reserve Force as replacements for eight NRF FF7s would minimize additional active duty manpower costs. By the time LBNCs began to enter the force, the surface battle line would thus consist of 22 CGs; 26 DDG-51s, with six of those in the NRF; and 42 DDG-79s.

Second, the requirements list also suggests that 30 first-rate LBNCs be procured to replace the 22 *Ticonderoga*-class first-rates now in the fleet. Interestingly, this is the same number of DD(X)/CG(X) first-rates included in the DoN's 325-ship Shipbuilding Plan. For planning purposes, then, this report assumes the LBNC will enter production in FY 15. It also assumes than the CG and DDG Modernization programs will increase the service lives of CGs and DDGs from 35 to 40 years. This will mean that the 22 CG-52s will retire over a nine-year period, between 2026 and 2034, at an average rate of 2.4 ships per year, and that DDGs will begin to retire in 2035.

The building plan to account for these circumstances will be displayed in detail in the final chapter. Generally, LBNC first-rates will be built at a rate of one ship per year between FY 15 and FY 21; two per year starting in FY 22, after LCS production ceases; three per year starting in FY 28; and finish with two ships in FY 31. All 30 first-rate LBNCs would thus be in service by 2034, the year the final CG-52 retires. Eight DDG-51s would be retired in conjunction with the delivery of the first eight first-rate LBNCs, keeping the surface battle line at 90 ships.

Second-rate LBNC production would commence at a rate of one per year in FY 31, and thereafter would remain at two to three per year thereafter until the 60 remaining DDG-51s and 79s were replaced.

# XIV. COMBAT AND MOBILE LOGISTICS FORCES AND FLEET SUPPORT SHIPS

> The lack of fast and mobile oilers and of a fast, large, and modern "fleet train" of supply ships and tenders rooted the US Navy logistics to "substantially a system of continental support." That is, naval task forces were dependent upon fixed bases for support, and those bases, even when established in forward areas, were dependent in turn upon a line of supply reaching back to the United States….it took two years (1942 and 1943) to establish an effective logistics system in the Pacific theater and another year to develop underway replenishment groups.[1187]
>
> *American & British Aircraft Carrier Development, 1919-1941*

## THE "FLEET TRAIN"

A key aspect of the "carrier revolution" was the development of combat and mobile logistics forces—collectively referred to as the "fleet train." By the end of Pacific Campaign in World War II, Service Squadrons 6 and 10 formed a vast, mobile, distributed logistics base capable of sustaining continuous forward Battle Force operations. Service Squadron (ServRon) 6 was tasked with replenishing ships at sea while underway. It consisted of tankers, ammunition ships, aircraft transports, dry store ships, and tugs or salvage ships used to tow battle damaged ships away from a forward operating area. ServRon 10, comprising thousands of individual ships and platforms, maintained Battle Force assets and repaired or salvaged battle damaged ships. Its ships and platforms included the large Advance Force Sectional Dock, capable of docking any ship in the Pacific (including aircraft carriers), repair ships and submarine tenders, and small tugs and barges. In essence, ServRon 6 was the Battle Force's mobile "service station" and "mini-mart". ServRon 10 served as the Battle Force's mobile dealer maintenance and service store.[1188]

Together, ServRons 6 and 10 underwrote the Battle Force's ability to operate free from fixed forward based and granted battle groups enormous freedom of action, and in the process converted the carrier force from a tactical battle grouping into a strategic offensive striking force.[1189] They allowed the Battle Force to penetrate the successive rings of the Japanese A2/AD network without access to large forward bases. Today, the underway replenishment capability of ServRon 6 lives on in the form of a small but capable Combat Logistics Force (CLF). However, the contemporary Mobile Logistics Force (MLF)—reduced to two submarine tenders, five fleet tugs, and four salvage ships—is a mere shadow of ServRon 10.

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[1187] Hone, Freidman, and Mandeles, *American & British Aircraft Carrier Development, 1919-1941*, p. 69.

[1188] For a concise description of ServRons 6 and 10, see "Developments in Naval Warfare," at http://www.ramskov.nu/krih/ww2/001/12.htm.

[1189] See Hone, Freidman, and Mandeles, *American & British Aircraft Carrier Development, 1919-1941*, pp. 69-74.

With the shift to the Joint Expeditionary Era, a key question for TFBN designers is whether or not their modern Combat and Mobile Logistics Forces are up to the task of supporting forward fleet operations and sustaining the fleet in a contested access environment and in the presence of capable modern A2/AD defenses. This chapter explores this issue.

## THE MILITARY SEALIFT COMMAND

One cannot sensibly discuss the Combat and Mobile Forces without acknowledging the Military Sealift Command (MSC). During World War II and through much of the Garrison Era, ships of the Combat and Mobile Logistics Forces were active US Navy ships. Today, the majority of the CLF and MLF ships are found in MSC.

The commander of the MSC is a "type" commander in the US Navy and a component commander of the US Transportation Command. As such, the commander is responsible for both providing at-sea replenishment for TFBN forces *and* providing ocean transport for Army and Marine Corps combat equipment, munitions for the Air Force and Navy, cargo for the Defense Logistics Agency, and fuel for all services.[1190] Accordingly, all of the ships in the aforementioned Maritime, Combat, and Logistics Prepositioning Forces are operated by the MSC.

MSC ships are identified as US Naval Service (USNS) ships. They are crewed and operated by civil service mariners augmented by small active duty Navy communications, ordnance handling, and helicopter detachments.[1191] Manning MSC ships with civilian contract mariners provides two important payoffs for the DoN. First, it frees up expensive active-duty officers and Sailors to perform other TFBN duties. For example, large USS "Fast Combat Support Ships" (to be discussed below) are crewed by 541 active-duty Navy personnel. The same ship operated by the MSC has a crew of 176 civil service mariners and 59 active-duty Sailors. The smaller crew reflects both the experience of the civilian mariners and the MSC policy of substituting overtime for additional crew members.[1192] In other words, shifting a Fast Combat Support Ship from the active Navy to the MSC frees up nearly 500 active duty personnel for duty elsewhere in the TFBN.

Second, civilian mariners under contract are not constrained by the personnel tempo rules that dictate the maximum amount of time active-duty Sailors are allowed to be away from their homeports. This means that MSC-crewed ships can spend nearly 80 percent of their time at sea. In contrast, Navy-crewed ships typically spend about 24 percent of their time at sea. As a result, MSC ships maintain extremely high in-service rates and operational tempos, rivaled only by

[1190] Randall, "Military Sealift Command Maintains an Accelerated Pace," p. 32.

[1191] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 50.

[1192] "MSC Commander Envisions a Sea Base With Air Express Service Into the War Zone," *Seapower*, May 2003, pp. 26-27.

TFBN SSBNs which are manned by dual crews.[1193] The practical impact of high operational availability means that *peacetime* TFBN support requirements can be met with a much smaller number of operational ships.[1194]

## THE COMBAT LOGISTICS FORCE

Most of the ships in the TFBN's Combat Logistics Force, which perform the all at-sea replenishment of TFBN ships, are found in the MSC's Naval Fleet Auxiliary Force (NFAF).

On December 31, 2004, the CLF consisted of:

- A seven-ship "station fleet" consisting of three *Sacramento*-class Fast Combat Support ships in the active fleet, and four *Supply*-class Fast Combat Support Ships in the NFAF, The ships are known as AOEs and T-AOEs, respectively. The prefix "T" in a ship's designator denotes that the ship is operated by the MSC. These seven large ships are fast enough (26 knots) to support high-speed CSG operations, and are designed to provide the carrier and its escorts with fuel, ammunition, and dry stores. Hence, these ships are known as "triple-product ships."[1195]

- A 26-ship "shuttle fleet" consisting of 14 fleet oilers (T-AOs); six ammunition ships (T-AEs); and six dry stores ships (T-AFSs). As indicated by their ship designators, all 26 ships are assigned to MSC, and all are part of the NFAF. These "single-product ships" ships literally shuttle between forward logistics bases and steaming CSGs, naval combatants, and vessels, replenishing them with oil, ammunition, or dry stores, as needed. The ships also "top off" the triple product station ships operating with CSGs.

As mentioned above, unlike the prepositioning and sealift ships discussed in the previous chapters, MSC-operated CLF ships have small active duty communications, ordnance handling, and aviation support detachment s. The total number of active Navy personnel found on the 30 MSC-operated ships is 618. In contrast, the three active AOEs require 1,812 personnel—nearly three times as many as the 30 MSC ships.

### Station Fleet Recapitalization Plans

The three *Sacramento*-class AOEs are all between 35 and 38 years old and are reaching the end of their 40-year service lives; they are all scheduled to be retired by FY 2006. When they retire, there will be no remaining CLF ships in the active Navy. Current plans are to replace the *Sacramentos* with four new T-AOE(X)s. The four T-AOE(X)s will join the four *Supply*-class T-

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[1193] See "MSC Ship Inventory," at http://www.msc.navy.mil/inventory/inventory.asp?var=PM1.

[1194] During wartime or major combat operations, personnel tempo rules are waived for all officers and Sailors.

[1195] See the section on "Fast Combat Support Ships," in Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 270-73.

AOEs to form an eight-ship station fleet. This force is sized to support the current "6+2" carrier planning metric, which calls for the TFBN to be able to surge six Carrier Strike Groups within 30 days, and an additional two within 90 days. Recall that this metric is tied to a strategy that requires the TFBN to be able to respond to *two* near-simultaneous major combat operations.[1196]

Although built to commercial standards with a double hull, the new T-AOE(X)s will be expensive ships, with expected price tags of up to $1 billion, or .71 ASEs.[1197] The current shipbuilding plan calls for one T-AOE(X) to be built in FYs 09, one in FY 10, and two ships in FY 11. However, given expected budgets, the likelihood that two $1 billion CLF ships can be built in a single year is very low.

### Shuttle Fleet Recapitalization Plans

Plans for the shuttle fleet reflect the different ages and material condition of the ship classes in the fleet. For example, the TFBN's fleet oilers are in relatively good shape. Sixteen *Henry J. Kaiser*-class T-AOs were commissioned between 1986 and 1995.[1198] With expected service lives of 40 years, these ships will not need to be replaced until the 2020s. Heretofore, 14-15 of the class have normally been in service with the NFAF, with the remainder either in a reduced operating status or out of service, in reserve. However, plans show the fleet dropping to 13 oilers in 2014, and to ten by 2024.[1199]

The fleet's ammunition ships and dry store ships are old and tired, and are in the process of being replaced. The six *Kilauea*-class T-AEs were all commissioned between 1968 and 1972, and have seen between 33 and 37 years of hard service. The three *Mars*-class and three *Sirius*-class T-AFSs were commissioned even earlier, between 1963 and 1970.[1200] These 12 aging ships are to be replaced by 11 large, *Lewis and Clark*-class dry cargo/ammunition ships, or T-AKEs. These 35,400-ton FLD "double product ships" have two-thirds the capacity of a T-AFS *and* two-thirds the capacity of a T-AE. Additionally, they carry 3,000 tons (18,000 barrels) of fuel.[1201]

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[1196] Except as noted, ship numbers and service dates for these ships and the remainder of the ships in this section are drawn from the "325-ship plan" outlined in the "Interim Report to Congress on Annual Long-Range Plan(s) for the Construction of Naval Vessels for FY 2006." See Cavas, "US Navy Sets 30-year Plan;" and Ahearn, "Navy Carrier Force Drops to 10 in 2014, But Surge Ability Unchanged." The "260-ship" Plan calls for only seven total T-AOE/AOE(X)s.

[1197] Richard R. Burgess, "Navy Eyes $1 Billion Support Ships To Supply Carrier Strike Groups," *Seapower*, October 2004, p. 24.

[1198] Polmar, *Aircraft of the US Fleet*, eighteenth edition, pp. 268-69.

[1199] The number of oilers in the "260-ship Plan" falls to nine by 2024.

[1200] All commissioning dates are drawn from Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition.

[1201] Initial DoN plans were to build 12 *Lewis and Clark*–class T-AKEs. However, both shipbuilding plans indicate the class will be top out at 11 ships. Information on the T-AKEs can be found in Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 267; and at "T-AKE *Lewis and Clark* Class," at http:// www.global security.org/ military/systems/ship/take-schem.htm.

The T-AKEs are being built to commercial standards, and cost approximately $400 million in FY 05 dollars.[1202] They have eight internal cargo elevators, a total of five underway replenishment stations (three to port, two to starboard), and four ten-ton capacity extendable cranes.[1203] Current plans are for the last of the 11-ship class to be authorized in FY 08 and be in service by 2011. However, by 2020, the numbers of the active ships falls to only eight ships. Presumably, the remaining three, with decades of service life in them, will be placed in the Ready Reserve Fleet, or are included in MPF(F) squadron numbers.[1204]

Given its large cargo capacity, capacious holds, high speed elevators, and modern material handling systems, the T-AKE is the perfect ship for selective cargo offload duties. Three T-AKE variants are now planned for MPF(F) squadron service in that role. Accordingly, they are also the ship to fill the role in the new Joint Offshore Logistics Support Base, the DLA Afloat Distribution Center, the Army Supply Activity Afloat, and for other service selective cargo offload needs.

Moreover, a T-AKE and a *Kaiser*-class oiler operating together provide the same replenishment capability as a single triple-product T-AOE, although they can only sustain 20 knots, which causes some problems during high-speed carrier group operations. However, their lower speeds would not pose a problem when supporting 22-knot J-CVEs, which would also require station ship support. Indeed, because of their smaller size, the amount of cubic feet required for ordnance and other consumables for just ten days of sustained J-CVE air operations exceeds 150 percent of the storage space available on these ships, making a station ship an imperative.[1205]

## Up for the Job?

In summary, current DoN plans are for the Combat Logistics Force to drop over time to just 26 ships: eight T-AOEs/AOEXs; eight T-AKEs; and ten oilers[1206] These numbers reflect the output of complex DoN transport and availability models. However, at the macro level, they suggest a wartime operating model of eight CSGs, supported by eight underway replenishment groups consisting of a T-AKE and oiler, and two extra oilers. Such a small number of CLF ships seems out of touch with the requirement to conduct a distributed blockade in support of the global irregular war, or the possible requirement to sustain Joint maneuver forces operating ashore for some period of time from sea bases in distant theaters in defended and contested access scenarios.

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[1202] Kaskin, “The Challenge of Joint Seabasing Logistics.”

[1203] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, p. 267.

[1204] The number of MPF(F) ships listed in the “325-ship Plan” is 20, implying 1.5 squadrons. This would be consistent with a requirement for three T-AKEs.

[1205] Gellar, Jr., “LPD-17 and LHAR.”

[1206] The “260-ship Plan” has one less T-AOE/AOE(X) and one less oilier, for a total of 24 ships.

Assuming maximum surge rates, today's shuttle fleet of nine T-AKE equivalents[1207] and 14 oilers would respond to the demand signal from eight deployable carriers, 60 top-rate surface combatants, 26 seventh-rate ASW frigates, and 30 amphibious ships. This suggests TFBN planners consider one T-AKE is sufficient to support 13.8 deployed ships and one tanker is sufficient to support 8.9 deployed ships. In 2024, current plans are for eight T-AKEs and ten oilers to support the demand signal for eight deployable carriers, 86 top-rate combatants, 64 seventh-rate combatants, and 46 amphibs and sea basing ships—for a ratio of one T-AKE for every 25.5 ships and one tanker for every 20.1 carriers and warships.[1208] This implies either a dramatic increase in at-sea replenishment efficiency, or an astounding decrease in the logistics demand signal per ship. With regard to the former, given increased TFBN emphasis on distributed operations, it is hard to foresee a great improvement in TFBN replenishment efficiency. It is equally hard to foresee the latter; more ships will consume more food, more parts, and more ordnance, and more fuel. For example, when operating at the speeds so often touted by the ship's proponents, the LCS will have far less endurance than the FF7 it replaces, and it undoubtedly will place more pressure on the tanker fleet. Moreover, these calculations do not include other ships in the National Fleet, such as Coast Guard cutters and Army JHSVs, which might also participate in a major Joint power-projection operation. These simple comparisons thus cast serious doubt on current TFBN plans for CLF ships.

The doubts only increase when considering the emerging requirement, discussed in the previous chapter, for CLF ships to replenish the logistics ships in the Logistics Prepositioning Force and MPF(F) squadrons that will perform "underway replenishment" of Joint forces operating ashore. Recall that the notional LPF/JOLSB of six tankers two 600-TEU container ships, and three T-JLKA variants of the T-AKE carry only enough supplies, ordnance, and fuel to sustain two brigades in combat for 14-15 days.[1209] For a power-projection operation supporting two Marine brigades ashore for 30 days, this entire force would either need to be replaced or replenished one time. Requirements to resupply the Defense Logistics Agency's Afloat Distribution Center and the Army's Supply Support Activity Afloat, and tankers proving fuel for Air Force and Army forces, would put additional pressure on the TFBN shuttle fleet.

Of all the TFBN components *not* to reduce in the Joint Expeditionary Era, the Combat Logistics Force—which underwrites the global mobility of Naval Battle Networks and affords them great freedom of action--stands at the top of the list. Given conditions of uncertain access and potential requirements to support both a persistent irregular maritime campaign as well as a major Joint power-projection operation involving the establishment of a distributed joint sea base, its seems safe to say that current DoN plans for the CLF provide little, it any, flexibility or margin for error.

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[1207] A T-AKE carries 67 percent of a T-AE's ammunition capacity and 67 percent of a T-AFS's dry stores capacity. Six T-AEs and six T-AFSs therefore represent nine T-AKE equivalents (6/.67=9).

[1208] These numbers assume the maximum of eight carriers called for in the "6+2" Fleet Response Plan, and 85 percent of TFBN warships and amphibs.

[1209] These numbers assume only 26 ships in the sea base. Kaskin, "The Challenge of Joint Seabasing Logistics."

## The Mobile Logistics Force

If planned reductions to the CLF are not troubling enough, consider the condition and plans for the TFBN's Mobile Logistics Force. The tiny 11-ship Mobile Logistics Force that served the Battle Force on December 31, 2004 represents the vestigial remnants of mighty ServRon 10—the vast sea-based logistics force developed during World War II to sustain the Battle Fleet's long attack across the Pacific. The force includes:

- Five *Powhatan*-class fleet tugs (T-ATFs). These ships, all assigned to the NFAF, are designed to tow battle-damaged TFBN ships away from forward operating areas;

- Four active *Safeguard*-class salvage ships (ARSs). These ships are fitted for towing, heavy lift, and diving support; and

- Two active *Emory S. Land*-class submarine tenders (ASs).

Only three of these 11 ships serve outside the United States: one ARS is homeported in Japan; one submarine tender is home-ported on Guam; and one submarine tender is homeported in Sardinia.[1210] The speed of the ARS is only 13.5 knots; the tugs can make 15 knots. As a result, they would take some time to transit to a distant Joint Operations Area.

The total manning requirement for the MLF ships is 1,700 officers and Sailors. Both the salvage ships and submarine tenders will eventually be transferred to the MSC, and be crewed by civilian mariners, freeing up a considerable amount of manpower for other TFBN duty. Small detachments of active-duty Navy personnel will continue to provide specialized dive services aboard the salvage ships, and services for the intermediate maintenance facilities found aboard the tenders.[1211]

### Recapitalization plans for the MLF

Over time, plans are for the MLF force will dwindle further still. By 2024, all five of the tugs will have been decommissioned without replacement, leaving just the four ARSs and two ASs in the fleet. By 2029, the four ARSs will have been replaced by two ARS(X)s, and one of the two ASs will have been decommissioned without replacement, cutting the MLF to just three ships.[1212] Evidently, the thinking of the TFBN planners is that modern ships are simply too complex to repair in forward theaters, and that salvage and towing services will simply be contracted whenever necessary.

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[1210] For information about these ships, see Polmar, *Aircraft of the US Fleet*, eighteenth edition, pp. 275-281.

[1211] Randall, "Military Sealift Command Maintains an Accelerated Pace," p. 32.

[1212] The MLF in the "260-ship Plan" includes just two ARS(X)s and no tenders.

### Global Operational Independence?

Plans for the MLF appear incongruous with a TFBN that touts itself as being capable of independent global operations. In a future where access is uncertain and Joint power-projection operations in distant operations will be the norm, and operations in defended and contested access conditions a strong possibility, the general impression one gets when reviewing DoN plans is that the TFBN is tying itself once again to "substantially a system of continental support."

Is this a prudent plan? In defended or contested access scenarios, is it true that the TFBN would not benefit from repair ships or tenders that could perform some hasty repairs on battle damaged ships in theater? In a confrontation with an adversary with a capable A2/AD network, can the TFBN count on contracted towing and salvage support? Given that the TFBN has already given up on trying to replenish VLS missiles at sea, would it not at least benefit from mobile tenders that could rearm ships in austere anchorages located close to the area of operations? And finally, won't TFBN moves toward modular ships like the LCS demand a requirement to change out mission modules or repair mission package components in theater, perhaps in austere locations?

Even cursory answers to these questions should give TFBN planners pause. Indeed, current DoN shipbuilding plans for the CLF and MLF give the impression of a future naval force will be a formidable fighter with a heavy punch, but perhaps one with a glass jaw.

## Fleet Support Ships

The TFBN is supported by three additional types of special purpose support ships. The first of these are command ships. On December 31, 2004, the TFBN operated three of these ships. Two were specifically designed as command ships: LCC 19, the *Blue Ridge*, the command ship for the US Seventh Fleet, and homeported in Japan; and LCC 20, the *Mount Whitney*, the command ship for the US Sixth Fleet, homeported in Italy. The third ship, AGF 11, the *Coronado*, is the command ship for the US Third Fleet and located on the West Coast. It is a converted LPD. A fourth command ship, the *La Salle*, AGF3, also a converted LPD, was still on the Naval Vessel Register but was in the process of being decommissioned.[1213] The combined crew for these three ships includes 1,691 officers and Sailors. Depending on the outcome of a new manning experiment, the crews for the remaining three command ships may be converted to a mixed crew of active duty Navy and MSC civilian mariners.

At one time, the DoN had planned a class of four Joint Command and Control Ships, or JCC(X)s, to replace the legacy command ships. During budget drills, these "single-mission platforms" lost out to multi-mission alternatives. As a result, current plans show the last of the command ships being decommissioned without replacement by FY 19. However, the leading candidates to replace the functionality found on the JCC(X)s were MPF(F) ships.[1214] However,

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[1213] Polmar, *Ships and Aircraft of the US Fleet, eighteenth edition,* pp. 174-79.

[1214] Hunter Keeter, "High Hopes and Purple Suit Questions," *Sea Power,* November 2002, found online at http://www.navyleague.org/sea_power/dec_02_48.php. See also Polmar, *Aircraft of the US Fleet*, eighteenth edition, pp. 174-75.

as the capabilities of the MPF(F) ships were de-scoped to rein in rising costs, all Joint command and control capabilities were removed from the ships, leaving only MEB command and control packages. Therefore, the possibility of pursuing two new JCC(X)s to replace the two purpose-built LCCs has been raised in the 2005 QDR.[1215]

The second type of TFBN support ship is the fleet hospital ship, or T-AH. The MSC operates two of them in support of the TFBN. Like the T-AVBs, one T-AH is maintained on each coast, ready to be activated within four days. The two hospital ships currently in fleet service are large, converted tankers. These ships are ungainly and have limited receiving capability, having only one helicopter spot and a limited ability to receive casualties from boats.[1216]

Ocean surveillance ships, or T-AGOs, are the final type of support ship operated by the MSC in support of TFBN operations. The T-AGO fleet were originally designed to augment the fixed arrays of the US underwater surveillance net erected during the Garrison Era. The ships towed both long passive and active acoustic arrays and sent the collected data to TFBN Ocean Surveillance Centers for processing. The four ships in service are all that remain of the Garrison Era fleet.[1217]

With updated arrays and advanced signal processing, the T-AGO fleet now operates in support of TFBN counter-A2/AD operations by helping to localize enemy submarines operating in littoral waters. All four of the current ships will operate into the 2020s, with three surviving into the 2030s. The ships likely will all eventually operate in the Pacific, focused on the Chinese submarine fleet in the Western Pacific littoral.

## RE-ESTABLISHING THE FLEET TRAIN/LOGISTICS SEA BASE FLEET

Although it is highly unlikely the TFBN will ever need to recreate a fleet train on the scale seen during World War II, taking some modest steps to improve the TFBN's ability to operate independently in forward theaters would appear to be a prudent move.

With regard to the Combat Logistics Force station fleet, the final recapitalization of the aviation power-projection fleet will result in a force of nine deployable Carrier Strike Groups and four Escort Carrier Strike Groups. Under surge conditions, the carrier force will generate five CSGs and three J-CVEs in 30 days and one additional CSG in 60 days. This results in a total requirement for nine station ships or station ship combinations.

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[1215] According to Navy officials, this is one option being discussed in the 2005 QDR.

[1216] Polmar, *Aircraft of the US Fleet*, eighteenth edition, pp. 265-66.

[1217] The final Garrison Era force planning target for T-AGOs was for 17 ships. See Polmar, *Aircraft of the US Fleet*, eighteenth edition, pp. 258-60.

A T-AKE/T-AO combination is sufficient for each 22-knot Escort Carrier Strike Group, and the TFBN already counts four 26-knot T-AOEs that will be in service for several decades. It would be hard to justify the expense associated with designing a two-ship T-AOE(X) class to provide each surge CVN with its own large, high-speed combat logistics force ship. A better, less expensive plan would therefore to be to plan for five T-AKE/T-AO combinations that would likely cost between $600-650 million apiece-a savings of $350-400 million over the potential price tag of $1 billion for each new T-AOE(X).

As was discussed earlier the future LPF/Joint Offshore Logistics Support Base should be viewed as the “station ship” for a major Joint power-projection operations, and part of the Combat Logistics Force. Accordingly, these ships should be properly counted as part of the Naval Fleet Auxiliary Force. For planning purposes, these ships would include two 600-TEU selective offload container ships, three T-JLKA selective offload assault cargo ships (T-AKE variants), and six T-AOs, enough ships to sustain a two brigade (10- battalion) forcible entry force and a supporting sea base for 14-15 days. The two large T-JAVBs and fifth J-CVE would also be included in NFAF numbers. These 14 ships do *not* include additional selective offload cargo ships procured to support DLA, Air Force, or Army offshore logistics support requirements.

Under conditions of maximum surge, the future shuttle fleet must meet the demand signal of six deployable carriers, three J-CVEs, one J-FAB, 78 large battle network combatants, 71 small battle network combatants, 27 amphibious ships, 14 JOLSB ships—and ten battalions operating ashore. Assuming replenishment efficiency on par with today’s CLF force, a shuttle fleet of 14 T-AKEs and 21 T-AOs would be called for. With the improved efficiency suggested by current TFBN shipbuilding plans, a shuttle fleet of seven T-AKEs and nine tankers would cover expected demand. For planning purposes, this report recommends splitting this range, and shooting for a shuttle fleet of ten T-AKEs and 15 T-AOs.

In total, then, this report recommends that the CLF be expanded to one T-JCVE, two T-JAVBs, two selective-offload container ships, three T-JLKAs, four T-AOEs, 15 T-AKEs, and 26 tankers. Considering the six tankers in the JOLSB as merely forward deployed shuttle ships, the tanker fleet might be reduced to 20 ships, resulting in a total of 47 CLF/JOLSB ships. While this represents ambitious expansion to current TFBN plans, it is more attuned to future conditions of uncertain access and increased emphasis on extended sea base operations.

Similar improvements to the Mobile Logistics Force are also indicated. The first step would be to develop a class of five multi-purpose TFBN tenders. These tenders would be designed to provide support to deployed nuclear-powered submarines, conduct forward rearming of VLS cells, perform hasty voyage repairs of TFBN ships, and provide support for deployed LCS divisions, to include swap out of mission modules. A five-ship tender force, stationed on Ascension Island, Sardinia, Diego Garcia, Palau, and Guam, would provide forward support to ships operating on the five fleet stations. During major Joint power-projection operations, two of three of the tenders could reposition to fleet anchorages near the Joint Operations Area.

Building on the two submarine tenders now in the fleet, the force would be expanded by modifying the first three LSD-41s taken out of service as they are replaced by new LPD-17s. These ships would be converted into USNS ships and be given the designator T-ABN, for Battle

Network Tenders. Over time, these five tenders—two T-ASs and three T-ABNs—would ships would might themselves be replaced by five new T-ABNs based on the LPD-17 hull.

A major Joint power-projection operation in defended or contested access scenarios will see the major employment of unmanned surface and underwater vehicles, and require the salvage and repair of LCACs and other landing craft. Two additional LSDs might therefore be converted into T-ARBNs, for Battle Network Repair Ships, to perform maintenance, repair, and salvage of these systems.

Given the possible requirement to support Joint power-projection operations against a regional adversary armed with weapons of mass destruction, and the associated requirement to operate in a "dirty," contaminated environment, the TFBN should provide NBC protected command facilities for Joint Task Forces and improve its ability to recover and process contaminated casualties. The LPD-17 hull, which was specifically designed for operations in a dirty environment, is ideal for both missions. Indeed, naval design architects have already conducted rough order of magnitude studies on using the LPD-17 hull as the basis for a JCC(X) command ships and a hospital ship.

The current T-AGOs fleet of four ships appears sufficient to support a single Joint power-projection operation in a defended or contested littoral. Over time, it seems likely these ships might be replaced by UUVs or USVs. In any event, given that the oldest of these four ships was placed in service in 1991, the decision on their replacement need not be made for another 20 years.[1218]

As indicated by the foregoing discussion, the LPD-17 hull, with its large, beamy design, might form the basis for up to seven tenders or repair ships; two JCC(X)s; and even a hospital ship. By using a flexible design already in production to meet a variety of TFBN needs, the ASE and total shipbuilding costs would be lowered. Savings in fleet-wide O&S costs would also result.

The foregoing recommendations perhaps represent the biggest departure from current TFBN plans. Whereas the current TFBN plan focuses on big improvements in its overall strike capabilities, this report instead opts to improve its ability to sustain Naval Battle Networks in forward theaters by pursuing improvements in both the Combat and Mobile Logistics Forces as well as in support ships.

## Recommendations for Combat and Mobile Logistics and TFBN Support Ships

Based on the foregoing discussion, and consistent with a "1+1+1+1" planning metric, this report recommends that:

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[1218] Polmar, *Ships and Aircraft of the US Fleet*, eighteenth edition, pp. 259-60.

- The TFBN build a CLF fleet of one T-JCVE; two T-JAVBs; three T-JLKAs; four T-AOEs; 15 T-AKEs; and 20 T-AOs. This force would provide station ships or station ship combinations for six CSGs and three CVESGs; a Joint Offshore Logistic Support Base capable of supporting two MEBs (ten combat battalions) ashore for 14-15 days; and a shuttle fleet sufficient to support all TFBN requirements. Ship requirements to support DLA, the Air Force and the Army offshore logistics needs would be developed by the respective services and Agency, and be additive to these numbers.

- The TFBN maintain five multi-purpose Battle Network Tenders. In addition to the two submarine tenders now in service, the TFBN would convert three tenders from excess LSD-41/49s hulls made available when replaced by LPD-17s. The interim five-ship tender force would be replaced by new tenders based on the LPD-17 hull at the end of the LPD-17 production run. Consistent with current plans, all five ships would be manned and operated by the MSC, with small active-duty maintenance, ordnance handling, and aviation detachments.

- The TFBN convert two additional LSD-41/49s into Battle Network Repair Ships, focused on the maintenance, repair, and salvage of damaged landing craft, unmanned surface craft, and unmanned underwater vehicles. Like the aforementioned Battle Network Tenders, these ships would ultimately be replaced by more capable LPD-17 variants at the end of the LPD-17 production run. Like the multipurpose Battle Network Tenders, these ships would be manned and operated by the MSC, augmented by small active-duty detachments.

- The two current hospital ships would be augmented by a third, smaller hospital ship designed to support operations in a “dirty” littoral (contaminated with either nuclear radiation or chemical and biological agents). To take advantage of existing ship designs and save costs, TFBN architects should look to a variant of the LPD-17 hull to meet this requirement.

- Given the re-scoping of the MPF(F) program and the loss of the command ship functionality expected to be found on these ships, the TFBN replace its three command ships with two new JCC(X)s. Again, to take advantage of existing ship designs and to save costs, the JCC(X) should be a variant of the LPD-17 hull, if at all possible.

- The total requirement for TFBN tugs and salvage ships should be reviewed under the assumption that commercial salvage and towing services might not be available, especially in the case of operations against a highly capable A2/AD network.

### Associated Shipbuilding Costs:

The T-AKE production line would remain open after the 11 T-AKEs in the current plan are completed in FY 08; ships would continue to be built at the rate of one per year for a minimum of seven more years to reach the force structure planning target of 15 T-AKEs and three T-JLKA selective cargo offload ships. DLA and other service requirements would be added on top of these plans. The T-AKEs are projected to cost $400 million apiece (.29 ASEs, FY 05 dollars); the T-JLKAs are projected to cost $680 million apiece (.49 ASEs, FY 05 dollars).[1219]

A total of 20 oilers are called for by this plan: five as CVN/J-CVE station oilers, and 15 in the shuttle fleet and JOLSB. There are 15 *Henry J. Kaiser*-class T-AOs now in commission, an additional one in reserve, and eight transport tankers in the Local Defense and Miscellaneous Support Forces fleet, including two configured as Offshore Petroleum Distribution Systems for the DLA. These 24 tankers thus appear to meet near-to mid-term TFBN requirements. With expected service lives of 40 years, the first of these tankers need not be replaced until 2026, meaning that the first of class need not start construction until FY 24. Projected replacement costs for the ships are $250 million (.18 ASEs, FY 05 dollars).

There will be an eight-year gap in CLF/MLF shipbuilding between the last of the T-AKEs/T-JLKAs built in FY 15 and the first T-AO built in FY 24. During these years, eight Austere Access High Speed Ships, the replacements for the eight Fast Sealift Ships discussed in the previous chapter, would be built. The costs for these ships are projected to be $1.5 billion, split equally between the Departments of the Navy and Army.

The costs for converting five LSD-41/49 hulls into three multipurpose Battle Network Tenders and two Battle Network Repair Ships should be relatively modest. For planning purposes, the estimated conversion cost is projected to be $100 million per ship. The costs for new tenders, based on a LPD-17 variant, would be substantially higher. Although these ships fall outside this report's planning window, their replacement costs are estimated to be $1 billion. Planning costs for the special-purpose AH and JCC(X)s, also assumed to be LPD-17 variants, are $1 billion and $1.5 billion, respectively.

### Weapons Procurement, Fleet Manning, and Other O&S Considerations

All CLF ships are currently unarmed. Should the decision be made to increase their self-defense armament, TFBN weapons procurement counts will increase accordingly.

The retirement of the three *Sacramento*-class AOEs and three command ships, and the transfer of two submarine tenders and four salvage ships to the MSC will result in manpower savings of approximately 5,000 officers and Sailors. The actual savings will depend on the size of the active duty detachments that remain on the tenders and salvage ships. The active duty requirements outlined in this report will be higher than planned, as it replaced two tenders, three command ships, and two hospital ships with seven tenders and repair ships, two command ships, and three hospital ships—a net increase of five ships.

Indeed, the expanded CLF/MLF outlined above would require additional O&S dollars, given that the T-AKE fleet (including T-JLKA variants) would expand from eight to 18 ships, and the

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[1219] The cost for the T-JLKA is taken from "Maritime Prepositioning Force (Future) Shipbuilding Requirements." These costs seem high for a conversion, especially if DLA, the Army, and the Air Force decide to order additional ships.

tanker fleet would double, from ten to 20 ships. This plan assumes that the MSC would be able find the additional contract mariners needed to man these ships.

# XV. A NEW NAVAL PLATFORM ARCHITECTURE FOR A NEW STRATEGIC ERA

> As most recent naval writers have recognized, major fleet actions are a thing of the past. The locale of decisive action has switched from the sea to the land: not the inner heart of the land mass, to be sure, but rather to the coastal area, to what various writers have described variously as the Rimland, the Periphery, or the Littoral. It is here rather than on the high seas that the decisive battles…of any future hot war will be fought. Consequently, naval writers…have not hesitated to admit and, indeed, to proclaim the importance of ground force. The reduction of enemy targets on land, Admiral Nimitz stated, "is the basic objective of warfare."[1220]
>
> Samuel P. Huntington, 1954

## NEW ERA, NEW STRATEGY, NEW RULES, AND NEW ARCHITECTURE

The DoN Total Ship Battle Force, derided by critics as being too small, represents the most awesome concentration of naval power in history. It enjoys total command of the seas. The major warships in the TSBF have an aggregate displacement that is greater than that of the next 17 naval powers, combined. Its aviation power-projection fleet includes three times as many platforms as the next nearest navy, and has the theoretical capacity to strike approximately 7,600 individual aimpoints *a day*. Its surface battle line of 71 ships carries over 7,500 battle force missiles—more than the 366 warships operated by the next 17 most powerful navies. It operates 53 modern and lethal nuclear-powered attack submarines—more than twice as many as the next largest nuclear submarine fleet. Its Sea-based Transport Fleet can quickly move 17 combat brigades anywhere in the world, although this capability is critically dependent on the availability of ports and airfields.

Incredibly, despite its already overwhelming strike power, the TSBF continues to add to its combat punch. By 2011, the carrier fleet will be able to strike over 10,000 targets a day. The battle line will grow to 84 ships, carrying nearly 9,000 battle force missiles. The SSN force will be joined by four capacious SSGNs; when they do, the Battle Force will have 1,000 covert VLS cells capable of firing land-attack missiles. If anything, the fleet has *too much* usable strike capacity, paid for at the expense of other important capabilities, such as expeditionary maneuver and combat logistics.

While the Battle Force enjoys a distant lead in the global naval competition, it must adjust—as it has always done—to the recent passing of one strategic era and the emerging requirements of a new one. This new era will be characterized by operations to secure the approaches to the United States and to protect the homeland against direct attack by both state and non-state adversaries,

[1220] Huntington, "National Policy and the Transoceanic Navy," p. 490.

and Joint power-projection operations launched from the continental United States. Both will require the Battle Force to operate on, from, and through the world's "narrow seas," or littorals—in the Western Hemisphere and abroad, under various maritime access conditions.

In this new Joint Expeditionary Era, the Battle Force will be tasked to:

- Protect the homeland against a WMD attack;

- Fight a persistent war against an irregular naval opponent pursuing a strategy of *guerre de course*, and to support Joint campaigns and operations associated with a persistent, global war against Radical extremists, terrorists, and the states that harbor them;

- Concentrate and defeat a *single* traditional/catastrophic or disruptive/catastrophic challenger armed with weapons of mass destruction in defended or contested littorals; and

- Hedge against a broader disruptive traditional naval competition with China.

To accomplish these tasks, the Battle Force will need a new, adaptable naval platform architecture that can be envisioned as having four very different conceptual and complementary components: a Strategic Dissuasion/Deterrence Fleet; a National Global Patrol/Irregular Warfare/Homeland Defense Fleet; a Counter-A2/AD Fleet; and a Sea as Base Power-Projection Fleet. Together, these four conceptual fleets can adequately meet all four Battle Force taskings in the emerging Joint Expeditionary Era.

Designing a new naval platform architecture with such widely varying design requirements will be made even more difficult by two factors: expected steady-state shipbuilding budgets of approximately $10-12 billion per year in FY 2005 constant dollars; and an average shipbuilding cost of $1.4 billion per ship for all ships except large, complex, aviation power-projection platforms, which themselves are two to six times more expensive than the average ship. Given these challenges, unless the "average shipbuilding equivalent" is reduced, DoN architect designers will find it increasingly difficult to build the platforms required to meet all of the various missions and tasks assigned to the future Battle Force.

These circumstances call for a naval competition strategy best described as a *Strategy of the Second Move*. This strategy aims to keep the nation at the top the list of naval powers—while working within a tight budget—by exploiting the commanding lead the United States now enjoys in the enduring global naval "race." It is a strategy both patient and bold, depending first on an ability to fully exploit the remaining service life of legacy platforms by introducing rapid Battle Force-wide improvements and quickly adopting tactical or technical innovations. Meanwhile, as competitors struggle to catch up with the Battle Force in key areas, the strategy takes steps to introduce advantageous, disruptive change in the mid- to far-term in order to disorient and demoralize emerging competitors, and tilt the competition back in its favor. This strategy maintains a precious commodity—naval design expertise—and depends on a robust research and development budget and a vibrant shipbuilding industry.

The *Strategy of the Second Move* and the need to design an associated naval platform architecture will augur in a new Battle Force Era, characterized by five new complementary design goals. These goals are to: *Get Connected, Jointly; Get Modular; Get Offboard; Get Unmanned; and Get Payload.* The Strategy and the new Battle Force Era will also be driven by five equally important operational imperatives, which are to: *Get Integrated; Get Quick; Get Distributed; Get Combined; and Get Properly Configured, Industrially.* These design goals and operational imperatives will spur a Battle Force Era marked by distributed, scalable **Integrated Naval Battle Networks,** effective in all potential maritime access conditions (unimpeded, guarded, defended, and contested) and against all potential challengers and challenges (traditional, irregular, catastrophic, and disruptive).

In designing the aggregate naval *network* architecture, or **Total Force Battle Network**, some Battle Network *platforms* will be designed for a single specific mission, such as providing the nation with a survivable nuclear deterrent, or delivering Joint ground combat forces over transoceanic distances. However, many more of the ships and platforms that make up the architecture will share a common characteristic: operational fungibility. They will be adaptable and reconfigurable, and capable of performing many missions. As a consequence, they will be required to have open combat system architectures, standardized platform-payload connections, and modular mission packages.

The Joint Expeditionary/Naval Battle Network Era will demand new ways of counting ships. The old ship counting rules are an artifact of a by-gone era in which only ships that made *immediate* contributions to *Navy* combat power were recognized as part of the "Total *Ship* Battle Force." Not counted were an entire category of ships called Local Defense and Miscellaneous Support Forces, despite their critical contributions to generating Joint combat power or assembling Joint Multidimensional Battle Networks. In an era where DoN job one is to facilitate the delivery and application of Joint combat power, modifications to these counting rules are long overdue. Indeed, they are a key source of Battle Force friction, since those who obsess over numbers rather than *relative* capabilities consistently divert attention away from the astounding aggregate power and capability of the Total Force Battle *Network*. Additionally, it is important to recognize contributing platforms outside the DoN; in an era where the Coast Guard makes vital contributes to three of four key DoN tasks, their 160 cutters and boats can no longer be ignored when calculating the full extent of the nation's aggregate maritime power.

Consistent with these thoughts, the naval platform architecture associated with the ***National*** Total Force Battle Network consists of no less than 633 vessels of all sizes, from diminutive, 90-ton coastal patrol boats to 100,000-ton nuclear-power aircraft carriers (see Figure Ten). Under current counting rules, 287 ships (those italicized) would not be included in a Total Ship Battle Force count, resulting in a TSBF of 346 ships. However, as can be seen, all of the 633 ships listed in the National TFBN would be available in 30 days, and all would contribute directly to the defense of the homeland and the generation of Joint combat power. They thus deserve to be counted, and are.

**Figure Ten: The National Naval Platform Architecture**

| | |
|---|---|
| **58** | **Undersea Warfighting Systems** |
| (12) | SSBNs |
| (40) | SSNs/Undersea Warfare Systems |
| (6) | SSGNs |
| **14** | **Aviation Power-projection Ships** |
| (9) | CVNs, with a tenth in long-term overhaul |
| (4) | J-CVEs, Joint Escort Carriers, employing STOVL aircraft |
| (1) | J-FAB, a CVN modified to be a Joint Forward Air Base |
| **94** | **Large Battle Network Combatants** |
| (30) | CGs/LBNCs (first-rate) |
| (60) | DDGs/LBNCs (second-rate) |
| (4) | IFSs, Inshore Fire Support Ships |
| **239** | **Small Battle Network Combatants** |
| (84) | LCS (seventh-rate) |
| *(33)* | *Large and Medium Coast Guard Cutters* |
| *(58)* | *Small Coast Guard Cutters* |
| *(64)* | *Coastal Patrol Boats* |
| **116** | **Sea as base Expeditionary Maneuver Ships** |
| (32) | Amphibious Landing Ships |
| *(10)* | *Irregular Warfare Maritime Support Bases* |
| *(21)* | *Combat and Maritime Prepositioning Force Ships* |
| *(8)* | *AAHSSs, Austere Access High Speed Ships* |
| *(13)* | *LMSRs, Surge Sealift Ships* |
| *(32)* | *JHSVs, Joint High-speed Vessels* |
| **122** | **Combat and Mobile Logistics Forces and TFBN Support Ships** |
| (33) | Combat Logistics Force Ships |
| (14) | Joint Offshore Logistics Support Base Ships |
| (9) | Mobile Logistics Force Ships |
| (8) | Support Ships |
| *(58)* | *Ready Reserve Force Ships* |
| **633** | **Total ships, cutters, vessels, and patrol boats** |

Even these impressive numbers tell only half the story, since they do not include other vitally important Battle Network platforms such as the E-2C *Hawkeye* radar warning and aircraft control plane, with a radar that extends the sensor horizon of a Naval Battle Network 200 miles or more; the Airborne Common Sensor, designed to provide intelligence support to Battle Network commanders; maritime patrol aircraft and long-endurance unmanned aerial vehicles, vital for broad area maritime surveillance and tracking; Marine Corps ground control radars that extend Battle Network sensor coverage deep inland; or hundreds of UAVs, UUVs, and USVs used for a variety of vitally important Battle Network tasks. The point here is that in an age where networks form and fight, simply counting ships is no longer an adequate measure of the aggregate combat power provided by the Navy and Marine Corps.

## CLEARED FOR ACTION?

The purpose of this final chapter is to compare the National Total Force Battle Network outlined in Figure Ten with the stated design criteria developed for this report. Consistent with the criteria of *Get Connected, Jointly*, this naval platform architecture forms a seamless connection with both Joint Multidimensional Battle Networks and with its own component parts. Aircraft carriers now form exquisite Joint information nodes, and are capable of sharing high bandwidth targeting data with Air Force strike planners. Many ships (and aircraft) will share sensor and targeting data through the Cooperative Engagement Capability network, allowing all that receive the data to sense well beyond the reach of their own platform sensors. Submarines with new communications devices like the Recoverable Tethered Optical Fiber buoys will soon be able to plug into and be an integral part of Naval and Joint Battle Networks.

*Getting Connected, Jointly*, has a meaning far beyond just connecting platforms with Joint communications links, however. By being explicitly designed to exploit the sea as a *Joint* base, the TFBN is inextricably linked with the operations of the Joint Force. For example, it provides a high-speed, Joint Forward Air Base, capable of supporting any rotary-winged aircraft in the Joint inventory at sea for extended periods of time; Joint Escort Carriers, capable of basing Air Force STOVL aircraft at sea; Joint Aviation Maintenance Ships, capable of serving and maintaining Joint rotary-wing and STOVL aircraft; high-speed ships that enable Army heavy combat units to conduct operational maneuver from strategic distances; a Joint Offshore Logistics Support Base that can support *all* Joint forces ashore until a working theater logistics infrastructure can be established; and an ability to create a Joint theater logistics portal where one did not exist before.

The second design criteria, *Get Modular*, is also expressed in a variety of different ways. Complex aviation power-projection platforms are, at their heart, large modular payload systems that carry modular air wings that can be flexibly tailored for the task at hand. The widespread proliferation of the vertically-launched missile system has, in effect, converted the surface battle line into a large, modular missile battery, in which weapons can be interchanged and mixed and matched based on the specific threat. The six TFBN SSGNs have 24 large payload bays that can accept and launch any weapon or system that can be designed to fit into the new flexible payload modules. The Littoral Combat Ship introduces an entirely new type of modular, Small Battle Network Combatant with a modular “sea frame” designed to perform a variety of TFBN missions. The SSN ARCI program introduced a modular, rapidly upgradeable open combat systems architecture model now copied in the AEGIS open Architecture, VLS Open Architecture, and CEC Open Architecture programs; all facilitate the rapid fleet-wide upgrades called for in the *Strategy of the Second Move*.

*Getting Offboard* dramatically increases the numbers of TFBN network nodes and thereby expands the sensing and combat range of future Naval Battle Networks. For example, the nine active and one reserve air wings consist of some 600 offboard ISR and strike systems, and the four Joint Escort Carriers add over 100 more. These long-range systems expand the sensing and strike power of the TFBN over thousands of miles. The future TFBN will operate approximately 500 flexible, multi-mission helicopters, which will extend a Naval Battle Network's intermediate-range sensor and engagement envelop. And short-range offboard systems will expand the sensor and weapons reach around individual Battle Network platforms. Indeed, in this regard, the LCS will be the wave of the future; with the exception of a simple basic shipboard self-dense and sensor package, its entire combat power will be found in offboard aerial, surface, and undersea systems.

Over time, *Getting Offboard* will be increasingly synonymous with *Getting Unmanned*. In the future, unmanned aerial vehicles, unmanned aerial combat systems, unmanned surface systems, and unmanned underwater vehicles will be used to extend the sensing and engagement envelope of both the TFBN and individual platforms, and to perform the most dangerous missions, such as mine clearing and suppression of enemy air and littoral defenses. For example, the future Broad Area Maritime Surveillance System will be a long-endurance UAV; the Joint Unmanned Air Combat System will perform stealthy ISR and strike off the decks of future aircraft carriers; the LCS force alone will carry over 200 vertically-launched tactical UAVs. Future Large and Small Battle Network Combatants will carry offboard mine-hunting and neutralization systems. Unmanned surface vehicles like SPARTAN will be used to expand the force protection envelop around surface ships. The future TFBN will include hundreds, if not thousands, of these increasingly capable unmanned systems, which will have a dramatic impact on every facet of naval operations.

*Getting payload* is one design criteria in which the TFBN now excels. As has been stated, because of its emphasis on large ships with great payload capacity, the contemporary TFBN carries more payload that the next 17 largest navies combined. The metrics have been repeatedly covered: total number of targets held at risk per day by the aviation power projection fleet; total number of VLS cells; number of war shots carried per submarine; total battle force missile capacity; total number of offboard systems carried by the LCS fleet; total number of brigade equivalents lifted by the Expeditionary Maneuver Fleet; etc. As a result, consistent with the *Strategy of the Second Move*, initiatives to dramatically increase overall TFBN payload capacity are passed over in favor of moves to improve the payloads themselves—the weapons and systems carried by TFBN platforms—or to improve other TFBN components, such as the Sea as Base Expeditionary Maneuver Fleet or the TFBN's "fleet train." That said, however, payload capacity will remain a major driver for the design of future TFBN platforms such as the Undersea Warfare System and the next generation of Large Battle Network Combatants, which will be introduced toward the end of next decade.

Some might observe that the platforms highlighted in Figure Ten are not unlike those found in the Total Ship Battle Force of today, and therefore do not represent a "transformational" change in the DoN's naval platform architecture. However, just because the ships that make up the TFBN look the same on the outside does not mean that the way they are employed will not be transformational. It bears remembering that the ships of the early Carrier Era looked similar in every way to the ships of the late Battleship Era. By restructuring the naval platform architecture around the carrier instead of the battleship, naval officers built a Battle Force entirely different in form and function, and transformed naval warfare in the process. Restructuring the naval platform architecture to form Naval Battle Networks will similarly transform naval warfare, since the process itself will cause different and new ways of thinking about the employment of naval power, and lead to the use of legacy platforms for missions that they were never designed to perform.

For example, designing networks to exploit fully Navy, Marines, and Coast Guard capabilities will demand that the TFBN *Get Integrated* to a degree not seen since World War II. The Navy and Marine Corps, which effectively filed for divorce during the Garrison Era, will need to reconcile their differences in order to help defeat radical Islamist extremists and their irregular allies, and to prepare the TFBN for potential confrontations with regional powers with small numbers of nuclear weapons. Taking Marine Corps aviation back to sea; junking the MPF(F) program as it now exists and instead building up the Amphibious Landing Fleet; pursuing new advances in naval surface fires on cheaper platforms; and developing Irregular Warfare Maritime Support Bases will help to forge a common DoN operational vision missing since World War II and Korea. This vision will once against provide the TFBN and Joint Multidimensional Battle Networks with a robust, viable forcible entry capability from the sea—the foundation for global freedom of action—and improve the TFBN's ability to support expeditionary maneuver from the sea.

Similarly, given the overlap between their missions to secure the maritime approaches to the United States and to protect the homeland from direct attack, as well as the important contributions the Coast Guard can make prosecuting the global irregular war in distant theaters, the Navy and the Coast Guard need to make the idea of a *National Fleet* a reality. If the Coast Guard did not intend to build the 155 cutters and patrol boats associated with their Integrated Deepwater program, TFBN planners would be compelled to do so. However, recognizing the contributions that the Coast Guard platforms make to the National TFBN by explicitly counting their platforms is just one tentative step toward forging a true National Fleet. Expending the necessary resources to ensure that Navy and Coast Guard ships are interoperable and operationally and logistically compatible is the much more important one.

Creating a naval platform architecture designed to assemble scalable and tailorable Naval Battle Networks will also demand new thinking about training and selection methods for TFBN officers, chief petty officers, staff non-commissioned officers, and Sailors and Marines. In essence, Battle Network operations will demand TFBN personnel to *Get Quick* in mind and action. That is to say, the men and women who employ a flexibly reconfigurable and adaptable network must be comfortable with *rapid*, concise assessment of situations, *quick* decisions and *quick* execution, even under conditions of great uncertainty. Improving platform speed, while certainly desirable, will be far less important than improving the speed of thinking and action of the men and women who will employ rapidly reconfigurable Naval Battle Networks, and who may someday have to fight an opponent with similarly networked capabilities.

The design of the TFBN naval platform architecture will also spur new thinking about the need for Naval Battle Networks to *Get Distributed*. As they have been in the past, distributed operations will be a common characteristic of future naval warfare: to fight and defeat an irregular foe that practices global, distributed operations will compel the TFBN to distribute its strike and maneuver power; confronting an adversary with nuclear weapons will also demand distributed operations, since concentrating forces will be too risky; and when fighting against future opponents with near-battle network parity, Naval Battle Networks will need to disperse over broad geographical areas in order to survive and prevail.

The basic components of the National TFBN are nine deployable Carrier Strike Groups; four Joint Escort Carrier Strike Groups; eight Distributed Expeditionary Strike Bases; nine Ballistic Missile Defense Units; and six SSGNs. These 36 basic groups will allow the TFBN to conduct widely distributed, networked operations. However, they represent only the TFBN's "basic playbook," since they can themselves be aggregated and mixed in a variety of combinations based on the environment, enemy, and situation. Indeed, the Eight DESBs are themselves designed to disaggregate and operate as four, 2-ship groups. A modular, reconfigurable architecture, employed by men and women quick in mind and action, will be limited only by the imagination of those who will wield it in combat.

Both the *Strategy of the Second Move* and the new naval platform architecture design should lead to new ways of thinking about how to better collaborate with allied navies and how to better interoperate with and leverage their platforms and capabilities—that is to say, how to *Get Combined*. Securing the broad ocean commons from terrorism, piracy, and smuggling will require far more ships than the United States can ever afford to build. However, of the 17 next largest naval powers, 14 are our outright allies and one is a new strategic partner. Most of these navies are now shifting to VLS systems; indeed, soon they will carry approximately 2,000 US Mk-41 cells, filled with US-designed weapons. Four of the navies have adopted the AEGIS combat system and will soon operate 17 state-of-the art first- and second-rate warships inherently interoperable with TFBN operations. Several of the navies are also developing impressive amphibious capabilities. A key goal of US naval strategy should be to try to leverage these capabilities if at all possible. For example, our allies operate 14 nuclear-powered attack submarines and over a 100 diesel-electric and AIP diesel-electric submarines, this might help to take the ISR burden of US SSNs if appropriate burden-sharing arrangements could be agreed to.

However, the idea of burden *sharing* points to a key theme associated with combined Battle Network operations. It is one thing to claim leadership of a world-wide naval coalition, and another to exercise leadership judiciously and fairly. To improve the TFBN's ability to leverage allied naval capabilities, the DoN may need to be more willing to share TFBN data with allies, and to expend more of its own scarce resources in order to devise network interface protocols and communication systems that will allow allied navies to slot into future Naval Battle Networks.

Finally, declarations by DoN officials that the decision to close shipyards is to be a purely business decision, made by commercial shipbuilders, are inconsistent with a *Strategy of the Second Move*. Indeed, the Strategy demands that the seven TFBN stakeholders—the Executive Branch, the Legislative Branch, the Office of the Secretary of Defense, the Department of the Navy, the Navy, the Marine Corps, and the Shipbuilding Industry—agree on plans to *Get Properly Configured, Industrially*. This will require that they support and resource a robust research and development effort, preserve US submarine and surface combatant design expertise, and maintain a shipbuilding industrial base up to any future maritime challenge.

Indeed, eliminating to the greatest degree possible the friction associated with having seven disparate TFBN stakeholders will be especially important given the expected austere budget requirements. All of the stakeholders must be willing to compromise, or moves to "transform" the TFBN's naval platform architecture will be difficult, if not impossible, to make.

## BUILDING—AND PAYING FOR—THE TFBN

The 30-year shipbuilding plan reflected in Figure Eleven summarizes the steps needed to build the naval platform architecture developed in this report. As can be seen, it outlines the steady production of large, complex aviation power-projection ships at the rate of one nuclear-powered aircraft carrier every five years and one escort carrier or big-deck amphibious ship every three years. With expected service lives of 50 and 39 years respectively, this build rate supports the architecture targets of ten nuclear-powered carriers and 13 escort carriers or big-deck amphibs.

Consistent with a *Strategy of the Second Move*, note that the shipbuilding plan aims to introduce disruptive submarine and surface combatant designs in the middle to later years of the next decade. With regard to submarines, it plans to build the first new Undersea Warfighting System in 2018. In the interim, it maintains the submarine industrial base by continuing to build one *Virginia* per year through FY 18, and helps maintain submarine design experience until the USW(X) moves to detailed design by converting two additional SSGNs. An option, not shown, is to convert two more SSBNs into prototype UUV tenders to test UWS(X) technologies and ocean interfaces. To save money and to free up resources for this new design effort, submarine production is consolidated in one yard.

Note that the plan builds two submarines per year for a period of seven years from FY 18 through FY 24, and then drops down to one boat per year. This building profile will see the submarine force contract to 33 boats before climbing back up to a steady state force of 40 boats. Given no major expansion in the Russian and Chinese submarine fleets, this force will provide between a "1.5- and 2-navy" submarine standard using historical US-ROW submarine force ratios. However, holding the force to 40 boats also reflects the fact that the nature of the undersea competition is changing; undersea superiority in the future will be decided by combat between undersea warfighting networks consisting of ubiquitous undersea sensors, large manned submarines, small manned submarines, autonomous underwater vehicles, and a host of supporting systems. The number of large manned submarines operated by a navy will not, in and of itself, reflect the full extent of the navy's undersea combat power. To maintain its commanding degree of undersea superiority over time, the US TFBN must explore a variety of new undersea systems, including small manned submarines and autonomous underwater vehicles.

## Figure Eleven: 30 Year TFBN Shipbuilding Plan

| NEW CONSTRUCTION | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVN-21 | | 1 | | | | | 1 | | | | | 1 | | | |
| J-CVE | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | |
| LHD(X) | | | | | | | | | | | | | | | |
| SSN-774 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| USW(X) | | | | | | | | | | | | 1 | 2 | 2 | 2 |
| SSBN(X) | | | | | | | | | | | | | | | |
| DDG79 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | |
| LBNC | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| IFS | | | 1 | 1 | 1 | 1 | | | | | | | | | |
| LCS | 2 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 4 |
| LPD-17 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T-AKE | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | |
| T-JLKA | | | | | | | 1 | 1 | 1 | | | | | | |
| T-AO | | | | | | | | | | | | | | | |
| AAHSS | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 |
| JHSV | | 2 | 2 | 2 | 2 | 2 | | | | | | | | | |
| TOTAL | 7 | 11 | 13 | 14 | 13 | 13 | 12 | 10 | 10 | 11 | 10 | 12 | 12 | 11 | 9 |
| **CONVERSION** | | | | | | | | | | | | | | | |
| CVN RCOH | | | 1 | | | 1 | | | 1 | | | 1 | | | 1 |
| SSBN ERO | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| SSN ERO | 1 | 1 | | | | | | | | | | | | | |
| SSGN | 2 | | | | | | | | | | | | | | |
| MPF | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | |
| TENDER/REPAIR | | | | | | | 1 | 1 | 1 | 1 | 1 | | | | |
| TOTAL | 6 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 0 | 0 | 1 |

| NEW CONSTRUCTION | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY35 | FY36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVN-21 | | 1 | | | | | 1 | | | | | 1 | | | |
| J-CVE | | | | | | | | | | | | | | | |
| LHD(X) | 1 | | | 1 | | | 1 | | | 1 | | | 1 | | |
| SSN-774 | | | | | | | | | | | | | | | |
| USW(X) | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| SSBN(X) | | | | | | | | | | | | | | | |
| DDG79 | | | | | | | | | | | | | | | |
| LBNC | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| IFS | | | | | | | | | | | | | | | |
| LCS | | | | | | | | | | | | | | 1 | 1 |
| LPD-17 | 1 | | | | | | | | | | | | | | |
| T-AKE | | | | | | | | | | | | | | | |
| T-JLKA | | | | | | | | | | | | | | | |
| T-AO | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | |
| AAHSS | 1 | 1 | | | | | | | | | | | | | |
| JHSV | | | | | | | | | | | | | | | |
| TOTAL | 7 | 6 | 6 | 6 | 5 | 5 | 8 | 6 | 6 | 7 | 5 | 7 | 6 | 5 | 4 |
| **CONVERSION** | | | | | | | | | | | | | | | |
| CVN RCOH | | | 1 | | | 1 | | | | | | | | | |
| SSBN ERO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSN ERO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSGN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MPF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TENDER/REPAIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The surface combatant plan follows a similar approach. The current US surface battle line is already far ahead of its peers. Introducing new, powerful surface combatants is premature. Therefore, the production of a new first-rate, modular Large Battle Network Combatant is delayed until at least FY 15. The ship will benefit from lessons learned during the LCS and DD(X) programs, the building of a DD(X) technology demonstrator, and a design competition perhaps involving the construction of additional prototypes. In the interim, eight additional DDG-79s are built, at a rate of one per year, from FY 07 to FY 15. As these eight ships are commissioned, eight DDG-51s would be taken out of service. Six would be modernized and then replace the eight FF7 AWS seventh-rates now in the Naval Reserve; two DDGs would be retired without modernization. This would expand the surface battle line to 90 first- and second-rates, where it would remain.

Note that four Inshore Fire Support Ships are built as part of a DD(X) technology migration plan. The ships would be relatively inexpensive platforms optimized for the single mission of providing fire support to Joint maneuver forces ashore. The ships would be equipped with two to four Advanced Gun Systems, and a battery of 28-inch diameter VLS cells. This would be a designed-to-cost ship, with a target cost of .75 ASEs, or $1.1 billion. This would likely require that the ships be variants of hulls already in production, like the LPD-17 or T-AKE. The IFS would be perhaps the most visible component of a TFBN DD(X) technology migration plan designed to exploit as much of the technology developed for that ship as possible. For example, putting the Multi-function Radar on the second flight of 12 LPD-17s might get that new radar into TFBN service at a reasonable cost.

In addition to preserving surface combatant design expertise, the building of a DD(X) technology demonstrator, four IFSs, and eight DDG-79s should provide enough work to maintain two Large Battle Network Combatant yards for the foreseeable future. This would allow time to further review the nation’s shipbuilding needs before settling on the most efficient combatant industrial base.

For the next 15 years, the newest modular Small Battle Network Combatant, the LCS, will be a key part of TFBN shipbuilding production. A total of 84 of these platforms will be built, in two different variants. In addition to prosecuting the global irregular war, this ship will facilitate operational experimentation on a variety of TFBN design issues, such as control of large numbers of unmanned systems, and exploiting modularity in tactical scenarios.

The Sea as Base Expeditionary Maneuver Fleet will be thoroughly improved. Improvements start with the Amphibious Landing Fleet, which will ultimately consist of eight LHDs and 24 LPD-17s. When augmented with escort carrier groups, this force carries 2.93 MEB equivalents on protected amphibious *war*ships, with proven and effective surface and aerial connector interfaces. Fifteen LPD-17s, built at a steady state rate of one per year through FY 22, will support the force. As the last 12 LPD-17s are brought into the fleet, LSDs would be retired on a one-for-one basis, freeing up useful hulls for TFBN conversions.

In addition, ten legacy MPF ships are modified to perform as Irregular Warfare Maritime Support Bases, and eight Austere Access High Speed Ships are bought to replace the aging Fast Sealift Ships now in the Surge Sealift Fleet. With planned improvements to the Army’s Combat

Prepositioning Force, the Sea as Base Expeditionary Maneuver Fleet will be able to inject six to seven ready-to-fight brigades over transoceanic distances, immediately reinforce them with four to six brigades on prepositioning ships, and reinforce them with a further ten brigades from the continental United States. Not shown in the shipbuilding plan is a new Joint program called MULBERRY 21. This program aims for the capability to create an artificial harbor and theater logistics portal anywhere in the world, which would help to break the dependence that the maritime prepositioning and surge fleets now have on existing deep water ports.

The TFBN's Combat and Mobile Logistics Forces will be upgraded to improve the TFBN's ability to sustain Battle Network operations in both defended and contested access conditions. The T-AKE buy would be increased from 11 to 15 ships, and be augmented by at least three additional ships that are a variant of the T-AKE—a selective offload assault cargo ship called the T-JLKA. This ship, part of a new Joint Offshore Logistics Support Base, would help provide logistics support for Joint forces operating ashore until a working theater logistics infrastructure could be established. The three T-JLKAs in the plan represent only the ships needed to support two Marine Expeditionary Brigades ashore for 14-15 days. Ships to meet the requirements for the Defense Logistics Agency's Afloat Distribution Center, the Army's Supply Activity Afloat, and the US Air Force would be additive to this basic plan. Additionally, the Joint Offshore Logistics Support Base would see the addition of three aviation support platforms: a fifth J-CVE purchased in FY 19, and two T-JAVBs, modifications of two Maersk S-class ships. Together these ships would provide three large offshore platforms dedicated to the support of Joint and TFBN aviation needs, especially Joint rotary-wing assets.

As mentioned above, shifting the Amphibious Landing Fleet to and LHD/LPD-17 force will free up 12 LSD hulls for possible conversion. This plan converts five of them: three into multipurpose Battle Network Tenders to augment the two Submarine tenders now in the fleet, and providing a station tender for each of the five new Fleet Stations; and two into Battle Network Repair Ships for landing craft and unmanned vehicles. Given the low relative cost, more of the ships might be converted for other TFBN uses.

Augmenting both the Sea as Base Expeditionary Maneuver Fleet *and* the Combat and Mobile Logistics Forces will be ten new Joint High-Speed Vessels. These new ships can serve either as ship-to-shore surface connectors or logistics support ships for Joint sea bases. The ten shown in the plan reflect only DoN requirements. The additional 22 JHSVs reflected in Figure Ten are ships that will be bought and paid for by the Department of the Army for their service needs.

Similarly, the exact building sequence associated with the Coast Guard's 155 new cutters and patrol boats called for in the Integrated Deepwater Program is not reflected in the 30-year shipbuilding plan. The costs for these ships and craft will be paid for out of the Department of Homeland Security budget.

Even though the plan does not include the 22 Army JHSVs, 155 Coast Guard cutters and patrol boats, and other service and agency additions to the Joint Offshore Logistics Support Base, it still builds a total of 259 ships over a 30-year period, and conducts 38 additional conversions or major overhauls. This works out to a 30-year average new-build construction rate of 8.63 ships per year. This build rate is possible due to the reduction in the price for an average ship equivalent, which stands today at $1.4 billion for all ships except for large, complex aviation power projection platforms. The ASE associated with this plan is $1.1 billion—over 20 percent lower. That is because this plan generally rejects the DoN's penchant for ever more capable and increasingly expensive individual ships in favor of more cost-effective moves that result in important improvements in overall TFBN capabilities.

The reduction in the ASE helps to keep the average steady-state shipbuilding budget at approximately $12 billion a year—barely (see Figure Twelve). A projected 30-year average comes in at $11.8 billion, just within and at the very top of the desired target range of $8-12 billion a year. As can be seen, however, the plan actually exceeds $12 billion in 16 of the 30 years. The problem is most acute during the seven years in which two submarines are built—a reflection of the high unit costs of these systems, and an indicator why the DoN is having so much difficulty increasing the submarine production rate to two boats per year. However, by having a long-term, stable and relatively consistent shipbuilding blueprint, chances are that DoN leaders might be able to make internal budget adjustments to account for some yearly increases, or to convince Congress for occasional additions to shipbuilding funds.

As this report makes clear, maintaining the TFBN on no more than a $12 billion average shipbuilding budget requires painful tradeoffs. For example, this plan reduces the aircraft carrier fleet from 12 to ten carriers; it allows the attack submarine fleet to fall to 33 boats before building back up to a steady-state force of 40; and it cancels the DD(X). The rationale behind each of these decisions is found in the body of the report. However, if this rationale demonstrates nothing else, it is that any naval platform architecture redesign effort will require a careful balancing of all TFBN needs and be very challenging. All the more reason for DoN leaders to resolve any lingering intra-DoN debates and to include all seven TFBN stakeholders in their major architectural decisions.

It is important to note, as those who disagree with this alternative architecture will undoubtedly point out, that this plan does *not* account for several key TFBN systems. The most important are the replacements for the 12 current SSBNs and the six SSGNs found in the National TFBN figures. Each future SSBN might cost as much as $5 billion. Replacements for the SSGNs will depend entirely on whether or not they are variants of the *Virginia*, or the UWS(X), or a completely new platform. In any case, it is a sure bet that they will cost more than the $2.2 billion budgeted for either a *Virginia* or USW(X). Replacing 12 SSBNs and six SSGNs thus might add an additional $70+ billion tab to the shipbuilding plan.

Given the uncertainty over the size and character of future US nuclear deterrent forces, over the possible design of the UWS(X), and whether or not future submarines will carry "mixed loads" of conventional and nuclear weapons, this report was unable to develop a credible plan to replace these ships. However, what the resulting plan does make clear is that *any* replacement plan for the SSBN force is sure to have a major disruptive impact on the overall shipbuilding plan.

## Figure Twelve: 30 Year TFBN Shipbuilding Budget (in Billions, FY 05 $)

| NEW CONSTRUCTION | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVN-21 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 |
| J-CVE | | | | | | | | | | | | | | | |
| LHD(X) | | | | | | | | | | | | | | | |
| SSN-774 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 0 | 0 | 0 |
| USW(X) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.2 | 4.4 | 4.4 | 4.4 |
| SSBN(X) | | | | | | | | | | | | | | | |
| DDG79 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LBNC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| IFS | 0 | 0 | 1.1 | 1.1 | 1.1 | 1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LCS | 0.44 | 0.88 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 0.88 |
| LPD-17 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| T-AKE | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| T-JLKA | 0 | 0 | 0 | 0 | 0 | 0 | 0.68 | 0.68 | 0.68 | 0 | 0 | 0 | 0 | 0 | 0 |
| T-AO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AAHSS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| JHSV | 0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 9.5 | 10.54 | 12.08 | 12.08 | 12.08 | 12.08 | 10.66 | 10.66 | 10.86 | 10.93 | 10.93 | 13.13 | 13.13 | 13.13 | 12.69 |
| **CONVERSION** | | | | | | | | | | | | | | | |
| CVN RCOH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSBN ERO | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0 | 0 | 0 |
| SSN ERO | 0.2 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSGN | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MPF | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TENDER/REPAIR | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 |
| TOTAL | 1.35 | 0.55 | 0.35 | 0.35 | 0.35 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0 | 0 | 0 |
| **TOTAL COST*** | 10.85 | 11.09 | 12.43 | 12.43 | 12.43 | 12.38 | 11.06 | 11.06 | 11.26 | 11.33 | 11.33 | 13.43 | 13.13 | 13.13 | 12.69 |

| NEW CONSTRUCTION | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | FY30 | FY31 | FY32 | FY33 | FY34 | FY35 | FY36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CVN-21 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 | 3.56 |
| J-CVE | | | | | | | | | | | | | | | |
| LHD(X) | | | | | | | | | | | | | | | |
| SSN-774 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USW(X) | 4.4 | 4.4 | 4.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| SSBN(X) | | | | | | | | | | | | | | | |
| DDG79 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LBNC | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 6 | 6 | 6 | 4 | 6 | 4 | 6 | 4 |
| IFS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LCS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.22 | 0.22 |
| LPD-17 | 1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| T-AKE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| T-JLKA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| T-AO | 0 | 0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0 |
| AAHSS | 0.75 | 0.75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| JHSV | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 13.81 | 12.71 | 12.46 | 10.26 | 10.26 | 10.26 | 12.26 | 12.26 | 12.26 | 12.26 | 10.26 | 12.26 | 10.26 | 11.98 | 9.98 |
| **CONVERSION** | | | | | | | | | | | | | | | |
| CVN RCOH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSBN ERO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSN ERO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSGN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SSUN(X) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TENDER/REPAIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL COST*** | 13.81 | 12.71 | 12.46 | 10.26 | 10.26 | 10.26 | 12.26 | 12.26 | 12.26 | 12.26 | 10.26 | 12.26 | 10.26 | 11.98 | 9.98 |

Moreover, the ship costs associated with the plan are based on several key assumptions. For example, the plan assumes that current construction costs for the *Virginia* SSN can be reduced by up to $200 million, and that the USW(X) can be built for roughly the cost of a *Virginia*. The plan assumes that the cost for a new LBNC can be held to $2 billion in FY 05 dollars. It also assumes that the Department of the Army would share the costs of the new AAHSS equally with the DoN. Any of these assumptions can be questioned. However, they are consistent with the designed-to-cost philosophy that informs this report, and are made to emphasize how important cost control is for DoN programs if a viable shipbuilding plan is to be assembled. The two-century long DoN search for ever more capable individual platforms is out of touch with both expected budget climates, as well as the design principles behind Naval Battle Networks.

This naval platform architecture may result in higher O&S costs. By 2020, the aggregate crew for the TFBN will be reduced by approximately 18,000 officers and Sailors. Although impressive, these reductions are somewhat less than those projected in the DoN's current plans. Recall that the battle line is programmed to grow to 84 first-and second-rates in 2011. In the plan outlined in this report, the battle line grows from 84 to 90 ships, and the TFBN adds four Inshore Fire Support Ships. Assuming the six additional DDGs are transferred into the Naval Reserve Force, and assuming crews of no more than 150 for the IFSs, the active duty manning requirement for warships outlined herein might be 1,000 to 1,500 more officers and Sailors on top of the 2011 manning requirement. However, these numbers are not much different than current DoN transition plans, which call for the battle line to climb to a high of 101 ships in FY 24 before falling to 92 ships in FY 35, and are not the cause of the increase.

Instead, the major difference between the manning requirements associated with this report and those with current DoN plans is that the 15 Military Sealift Command ships associated with the DoN's Future Maritime Prepositioning Force squadron are replaced by 15 active LPD-17s in the Amphibious Landing Force. Because MSC ships are manned by civilian contract mariners and the LPD-17s are manned by active-duty officers and Sailors, this results in an active-duty manning requirement approximately 3,400 higher than currently planned. Given the much better alignment of LPD-17 capabilities with TFBN requirements, this report judges the increased O&S costs to be well worth it.

## "To Take and Keep the Lead"

This report tried to answer three basic questions. First, given the national security roles assigned to the US armed forces in general and the Department of the Navy in particular, what is the most appropriate competition strategy for the enduring global naval "race?" Second, is the DoN's "competition racer"—its naval fleet platform architecture, the collection of ships and capabilities used by the United States Navy and Marine Corps in pursuit of DoN competition goals—optimally designed and on the right course and speed to execute the strategy? Third, if not, what architecture design or course changes are necessary?

Consistent with the answers to these three questions, the report aimed to outline a practical architectural transformation roadmap that marked a course somewhere between current DoN plans and the architecture for the "Navy After Next" developed by the Office of Force Transformation. A key requirement was that any architecture developed had to be able to be built on a steady-state naval construction and conversion budget of between $10 and $12 billion a year, in FY 05 dollars.

The naval platform architecture outlined in Figure Ten—the National Total Force Battle Network—reflects this report's *tentative* answers to the three important questions, and its *tentative* attempt to achieve its stated goals. There are no "final" answers to these questions. Neither is there a single, "perfect" naval platform architecture. Hopefully, however, this report—through its development of one alternative National Total Force Battle Network—will help contribute to the debate over how the United States should best act to "Take and Keep the Lead" in the enduring naval competition.

# GLOSSARY

| | |
|---|---|
| A2/AD | Anti-Access/Area-Denial |
| AABCT | Air Assault Brigade Combat Team |
| AASDS | Austere Access Shallow Draft Ship |
| AAV | Amphibious Assault Vehicle |
| ACE | Air Combat Elements |
| ACS | Airborne Common Sensor |
| ADS | Advanced Deployable System |
| AEF | Aerospace Expeditionary Force |
| AEGIS | AEGIS Anti-Air Warfare Combat and Weapon System |
| AESA | Active Electronically Scanned Array |
| AFSB | Afloat Forward Staging Base |
| AGS | Advanced Gun System |
| AIP | Air Independent Propulsion |
| AMRAAM | Advanced Medium Range Air to Air Missile |
| AOA | AEGIS Open Architecture |
| APOD | Air Point of Debarkation |
| ARCI | Acoustic Rapid Commercial Off-the-Shelf Technology (COTS) Insertion Program |
| ARG | Amphibious Ready Groups |
| ASCM | Anti-Ship Cruise Missile |
| ASDS | Advanced SEAL Delivery System |
| ASE | Average Ship Equivalent |

| | |
|---|---|
| ASF | Army Strategic Flotilla |
| ASW | Anti-Submarine Warfare |
| ASuW | Anti-Surface Warfare |
| ATACMS | Army Tactical Missile System |
| AVF | All Volunteer Force |
| BAMS | Broad Area Maritime Surveillance |
| BIW | Bath Iron Works |
| BLT | Battalion Landing Team |
| BMDS | Ballistic Missile Defense System |
| BSP | Ballistic Missile Signal Processor |
| BUBL | Broaching Universal Buoyant Launcher |
| BUR | Bottom Up Review |
| CAIG | Cost Analysis Improvement Group |
| CAP | Combat Air Patrol |
| CAW | Carrier Air Wing |
| CBA | Capabilities Based Assessment |
| CBO | Congressional Budget Office |
| CEC | Cooperative Engagement Capability |
| CG | Guided Missile Cruiser |
| CIWS | Close In Weapon System |
| CJCS | Chairman, Joint Chiefs of Staff |
| CLF | Combat Logistics Force |
| CMC | Commandant of the Marine Corps |

| | |
|---|---|
| CNA | Center for Naval Analysis |
| CNO | Chief of Naval Operations |
| COD | Carrier Onboard Delivery |
| CONUS | Continental United States |
| COTS | Commercial Off the Shelf Technology |
| CPF | Combat Prepositioning Force |
| CPS | Collective Protective System |
| CRS | Congressional Research Service |
| CSBA | Center for Strategic and Budgetary Assessments |
| CSG | Carrier Strike Group |
| CV | Fleet Carriers |
| CVBG | Carrier Battle Groups |
| DADC | DLA Afloat Distribution Centers |
| DARPA | Defense Advanced Research Project Agency |
| DoD | Department of Defense |
| DoN | Department of the Navy |
| DD | General Purpose Destroyer |
| DDG | Guided Missile Destroyer |
| DDS | Dry Deck Shelter |
| DESB | Distributed Expeditionary Sea Base |
| DEW | Directed Energy Weapon |
| DHS | Department of Homeland Security |
| DLA | Defense Logistics Agency |

| | |
|---|---|
| DSB | Defense Science Board |
| E-Craft | Expeditionary Craft |
| E-2C | A five-seat carrier airborne battle management aircraft (with a large radar enclosed in a rotating radome) known as the *Hawkeye* |
| EA-6B | A four-seat carrier electronic attack aircraft (with multiple pod mounted jammers and other electronic attack systems) known as the *Prowler* |
| EA-18G | A two-seat carrier electronic attack aircraft known as the *Growler* |
| EB | Electric Boat |
| EEZ | Exclusive Economic Zone |
| EFV | Expeditionary Fighting Vehicle |
| EP-3E ARIES II | Airborne Reconnaissance Integrated Electronic System II |
| ERAM | Extended Range Active Missile |
| ERGM | Extended Range Guided Munitions |
| ERM | Enhanced Range Munitions |
| ERO | Engineering and Refueling Overhaul |
| ESG | Expeditionary Strike Group |
| ESL | Expected Service Life |
| ESSM | Evolved Sea Sparrow Missile |
| F/A-18 | A carrier strike fighter. Earlier versions included the F/A-18 A and C (single seat) and F/A-18D (twin seat). Current versions include the substantially larger F/A-18E (single seat) and F/A-18F (twin seat) |
| FCS | Future Combat Systems |
| FDP | Flexible Deployment Plan |
| FF | Frigate |
| FFG | Guided Missile Frigate |

| | |
|---|---|
| FFRDC | Federally Funded Research and Development Center |
| FLD | Full Load Displacement (in tons) |
| FPB | Fast Patrol Boats |
| FPM | Flexible Payload Modules |
| FRP | Fleet Response Plan |
| FSS | Fast Sealift Ship |
| FY | Fiscal Year |
| FYDP | Future Year Defense Program |
| GWOT | Global War on Terrorism |
| HSSDS | High-Speed Shallow-Draft Ship |
| HSV | High-Speed Vehicle |
| HULA | Hybrid Ultra Large Aircraft |
| ICBM | Intercontinental Ballistic Missile |
| IDA | Institute for Defense Analysis |
| IDS | Integrated Deepwater System |
| IFS | Inshore Fire Support Ship |
| IJN | Imperial Japanese Navy |
| IMA | Intermediate Maintenance Activity |
| IO | Information Operations |
| IPS | Integrated Power System |
| ISB | Intermediate Staging Bases |
| ISR | Intelligence, Surveillance, and Reconnaissance |
| JASSM | Joint Air to Surface Standoff Missile |

| | |
|---|---|
| JCC | Joint Command & Control |
| JCIDS | Joint Capabilities & Integration & Development System |
| JCS | Joint Chiefs of Staff |
| JCTN | Joint Composite Track Network |
| JDAM | Joint Direct Attack Munitions |
| JETA-SPOD | Joint Enable Theater Access – Sea Ports of Debarkations |
| J-FAB | Joint Forward Aviation Base |
| JFEO | Joint Forcible Entry Operation |
| JHSV | Joint High Speed Vehicle |
| JIC | Joint Integrating Concept |
| JLOTS | Joint Logistics Over the Shore |
| JMIDS | Joint Modular Intermodal Distribution System |
| JMSDF | Japanese Maritime Self Defense Force |
| JOA | Joint Operations Area |
| JOLSB | Joint Offshore Logistics Support Base |
| JROC | Joint Requirements Oversight Council |
| JSF | Joint Strike Fighter |
| JSTARS | Joint Surveillance & Target Attack Radar System |
| JTF | Joint Task Force |
| JUCAS | Joint Unmanned Combat Air System |
| JUCAV | Joint Unmanned Combat Air Vehicle |
| KEI | Kinetic Energy Interceptor |
| LAM | Loitering Attack Missile |

| | |
|---|---|
| LBNC | Long Battle Network Combatants |
| LCAC | Landing Craft Air Cushion |
| LCS | Littoral Combat Ship |
| LMSR | Large Medium Speed Roll on/Roll off |
| LPF | Logistics Prepositioning Force |
| LRLAP | Long-range Land Attack Projectile |
| LRS&T | Long-range Search and Track |
| LSM | Landing Ship Medium |
| LST | Landing Ship Tank |
| LSV | Vehicle Landing Ship |
| MAB | Marine Amphibious Brigade |
| MAC | Multiple All-Up Round Canister |
| MAF | Marine Amphibious Force |
| MAGTF | Marine Air-Ground Task Force |
| MAU | Marine Amphibious Unit |
| MAW | Marine Air Wing |
| MCM | Mine Countermeasure Ship |
| MCO | Major Combat Operation |
| MDA | Missile Defense Agency |
| MEB | Marine Expeditionary Brigade |
| MEF | Marine Expeditionary Force |
| MEU | Marine Expeditionary Unit |
| MEU(SOC) | Marine Expeditionary Unit (Special Operations Capable) |

| | |
|---|---|
| MFR | Multi-function Radar |
| MHC | Minehunter, Coastal |
| MIO | Maritime Interdiction Operations |
| MIRV | Multiple Independent Reentry Vehicles |
| MLF | Mobile Logistics Force |
| MMA | Multi-mission Maritime Aircraft |
| MOB | Mobile Offshore Base |
| MPF | Maritime Prepositioning Force |
| MPF(F) | Maritime Prepositioning Force of the Future |
| MRC | Major Regional Contingencies |
| MRF | Multi-Function Radar |
| MRV | Multi Role Vessel |
| MSC | Military Sealift Command |
| NALMEB | Norway Air-Landed Marine Expeditionary Brigade |
| NASSCO | National Steel and Shipbuilding Company |
| NATO | North Atlantic Treaty Organization |
| NDP | National Defense Panel |
| NEO | Non Combatant Evacuation Operations |
| NFAF | Naval Fleet Auxiliary Force |
| NLOS-LS | Non Line of Sight Launch System |
| NMBN | National Maritime Battle Network |
| NORAD | North American Air Defense Command |
| NPR | Nuclear Posture Review |

| | |
|---|---|
| NSDF | National Sealift Defense Fund |
| NSSM | NATO Sea Sparrow Missile |
| NSW | Naval Special Warfare |
| O&S | Operations & Support |
| OFT | Office of Force Transformation |
| OIF | Operation Iraqi Freedom |
| OIS | Ocean Interface Section |
| OMFTS | Operational Maneuver from the Sea |
| OPN | Other Procurement, Navy |
| OSA | Open Systems Architecture |
| OSD | Office of the Secretary of Defense |
| PA&E | Program Analysis & Evaluation |
| PAM | Precision Attack Missile |
| PLAN | People's Liberation Army Navy |
| PPBS | Planning, Programming & Budgeting System |
| PRC | People's Republic of China |
| PT | Patrol Torpedo |
| PVLS | Peripheral Vertical Launch System |
| QDR | Quadrennial Defense Review |
| R&D | Research & Development |
| RAM | Rolling Airframe Missile |
| RCIP | Rapid Capability Insertion Process |
| RCOH | Refueling & Complex Overhaul |

| | |
|---|---|
| RDO | Raid Decisive Operation |
| RHIB | Rigid Hulled Inflatable Boat |
| RORO | Roll on / Roll off |
| RMA | Revolution in Military Affairs |
| ROV | Remotely Operated Vehicle |
| ROW | Rest of the World |
| RRF | Ready Reserve Fleet |
| RSOI | Reception, Staging, Onward Movement & Integration |
| SACS | Stealthy Affordable Capsule System |
| SAM | Surface-to-Air Missiles |
| SCN | Shipbuilding & Conversion |
| SDD | Systems Development & Demonstration |
| SDHSS | Shallow Draft High Speed Ship |
| SDV | Swimmer Delivery Vehicle |
| SEAL | Sea-Air-Land Commando |
| SecDef | Secretary of Defense |
| SEWIP | Surface Electronic Warfare Improvement Program |
| SIAP | Single Integrated Air Picture |
| SLBM | Submarine Launched Ballistic Missile |
| SLEP | Service Life Extension Program |
| SOCOM | Special Operations Command |
| SOF | Special Operations Forces |
| SOSUS | Sound Surveillance System |

| | |
|---|---|
| SPMAGTF | Special Purpose MAGTF |
| SPOD | Sea Ports of Debarkation |
| SSAA | Supply Support Activity Afloat |
| SSN | Nuclear-powered Attack Submarine |
| SSBN | Nuclear-powered Strategic Ballistic Missile Submarine |
| SSGN | Nuclear-powered Guide Missile and Special Operations Submarine |
| SSUN | Nuclear-powered UUV Submarine |
| STABO | Stability Operation |
| STF | Storage & Transportation Frames |
| STOAL | Short Take-off and Arrested Landing |
| STOM | Ship to Objective Maneuver |
| STOVL | Short Take-off and Vertical Landing |
| SWATH | Small Waterplane Area Twin Hull |
| T-AVBs | Aviation Logistics Ships |
| TBM | Tactical Ballistic Missile |
| TEU | Twenty Equivalent Units |
| TFBN | Total Force Battle Network |
| THAAD | Terminal High Altitude Area Defense system |
| TSBF | Total Ship Battle Force |
| TSV | Theater Support Vessel |
| TTWCS | Tactical *Tomahawk* Weapons Control System |
| UA | Unit of Action |
| UAV | Unmanned Aerial Vehicle |

| | |
|---|---|
| UCAV | Unmanned Air Combat Vehicle |
| USCG | United States Coast Guard |
| UWS(X) | Undersea Warfighting System (Experimental) |
| USMC | United States Marine Corps |
| USN | United States Navy |
| USV | Unmanned Surface Vehicle |
| UUV | Unmanned Underwater Vehicle |
| VLS | Vertical Launch System |
| VSR | Volume Search Radar |
| V-STFs | Vehicle Storage & Transportation Frames |
| VTOL | Vertical Take-off and Landing |
| VTUAV | Vertically Launched Tactical Unmanned Aerial Vehicle |
| WMD | Weapons of Mass Destruction |