United States Government Accountability Office

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Report to Congressional Committees

May 2008

FORCE STRUCTURE

Ship Rotational Crewing Initiatives Would Benefit from Top-Level Leadership, Navy-wide Guidance, Comprehensive Analysis, and Improved Lessons-Learned Sharing

GAO-08-418

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Highlights

Highlights of GAO-08-418, a report to congressional committees

Why GAO Did This Study

The Navy faces affordability challenges as it supports a high pace of operations and increasing ship procurement costs. The Navy has used multiple crews on some submarines and surface ships and has shown it to increase a ship's operational availability. GAO was asked to evaluate the extent to which the Navy, for ship rotational crewing, has (1) employed a comprehensive management approach, (2) developed and implemented guidance, (3) systematically collected, analyzed data, and reported findings, and (4) systematically collected and used lessons learned. To conduct this work, GAO analyzed Department of Defense (DOD) and Navy documentation and best practices for transformation, conducted focus groups, and interviewed DOD and Navy officials.

What GAO Recommends

GAO recommends that DOD take several actions, including assigning leadership; establishing an implementation team; promulgating guidance; developing a systematic data-collection and analysis plan; assessing crewing options in analyses of alternatives; and developing guidance for rotational crewing lessons learned. DOD partially agreed with three recommendations but disagreed with five others. To facilitate transformation of the Navy's ship crewing culture, GAO included a matter for congressional consideration that would require DOD to establish clear leadership; an implementation team; and overarching guidance.

To view the full product, including the scope and methodology, click on GAO-08-418. For more information, contact Janet St. Laurent at (202) 512-4402 or stlaurentj@gao.gov.

What GAO Found

Rotational crewing represents a transformational cultural change for the Navy. While the Navy has provided leadership in some rotational crewing programs, the Navy has not fully established a comprehensive management approach to coordinate and integrate rotational crewing efforts across the department and among various types of ships. GAO's prior work showed that sound management practices for implementing transformational programs include ensuring top leadership drives the change and dedicating an implementation team. The Navy has not assigned clear leadership and accountability for rotational crewing or designated an implementation team to ensure that rotational crewing receives the attention necessary to be effective. Without a comprehensive management approach, the Navy may not be able to lead a successful transformation of its crewing culture.

The Navy has promulgated crew exchange instructions for some types of ships that have provided some specific guidance and increased accountability. However, the Navy has not developed an overarching instruction that provides high-level guidance for rotational crewing initiatives and it has not consistently addressed rotational crewing in individual ship-class concepts of operations. Defense best practices hold that key aspects of a concept of operations include how a set of capabilities may be employed to achieve objectives and identifies by whom, where, and how it is to be accomplished.

The Navy has conducted some analyses of rotational crewing; however, it has not developed a systematic method for analyzing, assessing and reporting findings on the potential for rotational crewing on current and future ships. Despite using a comprehensive data-collection and analysis plan in the Atlantic Fleet Guided Missile Destroyer Sea Swap, the Navy has not developed a standardized data-collection plan that would be used to analyze all types of rotational crewing, and life-cycle costs of rotational crewing alternatives have not been evaluated. The Navy has also not adequately assessed rotational crewing options for future ships. As new ships are in development, DOD guidance requires that an analysis of alternatives be completed. These analyses generally include an evaluation of the operational effectiveness and estimated costs of alternatives. In recent surface ship acquisitions, the Navy has not consistently assessed rotational crewing options. In the absence of this, cost-effective force structure assessments are incomplete and the Navy does not have a complete picture of the number of ships it needs to acquire.

The Navy has collected and disseminated lessons learned from some rotational crewing experiences; however, some ship communities have relied on informal processes. The Atlantic Sea Swap initiative used a systematic process to capture lessons learned. However, in other ship communities the actions were not systematic and did not use the Navy Lessons Learned System. By not systematically recording and sharing lessons learned from rotational crewing efforts, the Navy risks repeating mistakes and could miss opportunities to more effectively implement crew rotations.

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Abbreviations

CG(X)	guided missile cruiser, new design or class
DDG	guided missile destroyer
DOD	Department of Defense
HSV	high speed vessel
LCS	littoral combat ship

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United States Government Accountability Office
Washington, DC 20548

May 29, 2008

Congressional Committees

At a time when the federal government is facing a large and growing fiscal imbalance, the Department of Defense (DOD) and Congress will be asked to make important program and investment decisions on Navy surface ships. At costs ranging from $500 million to $5 billion each,[1] the Navy's surface combatants represent a significant capital investment. The Navy consistently faces affordability challenges as it attempts to provide necessary forward presence while supporting a high pace of operations, rising personnel costs, and cost growth in new ship classes. The Navy has traditionally maintained overseas presence by using standard deployments whereby individual ships and their permanently assigned crews are deployed for approximately 6 months out of a 27-month cycle that includes time for training and ship maintenance. To maximize its return on investment while maintaining forward presence, the Navy is examining different means for employing its surface ships. Rotational crewing is one of many alternatives the Navy is pursuing to increase the utilization and operational availability of Navy ships. Recently, the Chief of Naval Operations cited rotational crewing as a cost-effective means of increasing forward presence while maintaining current force structure levels.[2]

Rotational crewing has been and is a part of today's Navy; however, this practice is not widespread and is still evolving. Since the 1960s, the Navy has used "Blue-Gold" rotational crewing on its ballistic missile submarines, whereby two complete crews are assigned to a single ship, and they rotate deployments. The Navy also uses this "Blue-Gold" rotational crewing alternative on its high speed vessel (HSV) experimental ship, the HSV-2 *Swift*, and plans on using this crewing alternative for its four newly converted guided missile submarines. In recent years, the United States Pacific and Atlantic Fleets have both completed "Sea Swap" efforts that demonstrated the ability to rotate the crews of destroyers. The "Sea Swap" crewing alternative uses one deploying ship but multiple

[1]See Congressional Budget Office Testimony, *The Navy's 2008 Shipbuilding Plan and Key Ship Programs* (Washington, D.C., July 24, 2007) and Congressional Budget Office Testimony, *Current and Projected Navy Shipbuilding Programs* (Washington, D.C., Mar. 14, 2008).

[2]Testimony of Admiral Michael Mullen, U.S. Navy, Chief of Naval Operations, during a Hearing of the Seapower Subcommittee of the Senate Committee on Armed Services on Navy Force Structure Requirements, May 3, 2007.

sequentially deploying crews. Newly deploying crews swap ships with the crew on the forward-deployed ship and nondeployed crews train and perform maintenance on a ship in the home port. Currently, the Navy uses similar rotational crews to employ mine warfare and patrol coastal ships in the Persian Gulf. The Navy also plans to rotationally crew its new Littoral Combat Ship (LCS) class, implementing a "Blue-Gold" alternative on the first two ships and additional approaches in the future. Appendix I provides a description of all the ships included in our evaluation.

In a November 2004 report, we examined the Navy's implementation of rotational crewing in the U.S. Pacific Fleet Destroyer Sea Swap effort, as well as the Navy's other ongoing rotational crewing programs.[3] Our report found that the Navy had not (1) established an analytical framework for evaluating rotational crewing efforts, (2) provided effective guidance, (3) systematically leveraged lessons learned to support rotational crewing implementation, and (4) fully assessed the effect on ship maintenance on ships with extended deployments with rotating crews. Recognizing the Navy's need to explore ways to improve the use of its surface ships and its plan to employ rotational crews on several types of surface ships in the current and planned force, the John Warner National Defense Authorization Act for Fiscal Year 2007[4] directed us to report on the Navy's Atlantic guided missile destroyer (DDG) Sea Swap initiative as well as lessons learned from recent ship rotational crew experiments and the extent to which these lessons are systematically collected and shared. The mandate refers specifically to the Atlantic Fleet Sea Swap demonstrations, but at times collectively refers to other rotational crewing efforts, current or planned. We provided a briefing to the Committee on Armed Services of the Senate and the Committee on Armed Services of the House of Representatives to meet the mandate on March 4, 2008. In this report we assess the extent to which the Navy has: (1) employed a comprehensive management approach to coordinate and integrate rotational crewing efforts; (2) developed and implemented guidance and concepts of operations for rotational crewing; (3) systematically collected and analyzed data on rotational crewing efforts for current and future ships; and (4) collected and used lessons learned.

[3]See GAO, *Force Structure: Navy Needs to Fully Evaluate Options and Provide Standard Guidance for Implementing Surface Ship Rotational Crewing*, GAO-05-10 (Washington, D.C.: Nov. 10, 2004).

[4]Pub. L. No. 109-364, § 342 (2006).

To assess the extent to which the Navy employed a comprehensive management approach to coordinate and integrate rotational crewing efforts, we compared the Navy's approach with our prior work on best practices for organizational transformations; reviewed relevant Navy practices; and interviewed DOD, Navy, and fleet headquarters officials. To assess the extent to which the Navy has developed, disseminated, and implemented guidance and concepts of operations for rotational crewing on surface ships, we obtained and analyzed relevant documentation including, but not limited to, concepts of operations,[5] directives, instructions, and procedures from the Navy, and we interviewed fleet and Navy headquarters officials. To assess the extent to which the Navy has analyzed, evaluated, and assessed potential rotational crewing efforts for current and future ships, we reviewed and analyzed the Atlantic Fleet DDG Sea Swap data-collection and analysis plan and final report;[6] collected and analyzed recent ship-class acquisition documents, including analyses of alternatives; interviewed fleet and Navy headquarters officials; and conducted 19 focus groups with rotational crews. To assess the extent to which the Navy has systematically collected, disseminated, and capitalized on lessons learned from past and current rotational crewing experiences, we obtained and reviewed Navy Lessons Learned System instructions, queried the Navy Lessons Learned System, and interviewed Navy officials. We assessed the Navy Lessons Learned System data and determined the data were sufficiently reliable for our analysis. We conducted this performance audit from February 2007 to May 2008, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. The scope and methodology used in our review are described in further detail in appendix II.

[5]A concept of operations provides an overview of the vision, purpose, and plan required to develop and implement a specific initiative such as rotational crewing on surface ships. By design, the concept of operations provides the information and high-level guidance needed to enable managers and decision makers to perform their duties consistent with and in support of the initiative being implemented.

[6]Commander Naval Surface Force, U.S. Atlantic Fleet, *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan* (Norfolk, Va., Mar. 3, 2005) and U.S. Fleet Forces Command, *U.S. Fleet Forces DDG Sea Swap Initiative Final Report* (Norfolk, Va., June 21, 2007).

Results in Brief

While the Navy has taken action to provide leadership in some specific rotational crewing programs, it has not fully established a comprehensive management approach to coordinate and integrate rotational crewing efforts—from ship concept design through employment—throughout the department. We have identified several key management practices at the center of implementing transformational programs. These key management practices include ensuring that top leadership drives the change and dedicating an implementation team that will be responsible for the day-to-day management and coordination of the transformation.[7] The Navy has provided leadership in some specific rotational crewing efforts. For example, Commander, Naval Surface Forces, has provided effective leadership to the LCS community by setting the direction, pace, and tone for the transformation of the ship-crewing culture, while institutionalizing accountability. However, there is not a designated leader to manage all rotational crewing efforts in the Department of the Navy. Additionally, the Navy has not designated an implementation team to ensure that rotational crewing efforts throughout the department receive the focused attention necessary to be sustained and effective by keeping efforts coordinated, and integrating and applying their results to the fleet. As a result, numerous separate rotational crewing efforts continue with little, if any, top-down leadership and coordination, and no team or steering group exists within the Navy to manage the transformation of the Navy's ship-crewing culture. Without a comprehensive management approach, the Navy may not be able to effectively coordinate and integrate rotational crewing efforts or develop rotational crewing in an efficient manner. As a result, the Navy can not be assured that it will lead a successful transformation of its crewing culture.

Although the Navy has developed guidance for some rotational crewing efforts, the development, dissemination, and implementation of rotational crewing guidance has been inconsistent, which could hinder rotational crewing efforts. The Navy has developed and promulgated crew exchange instructions that have provided some specific guidance and increased accountability; however, the Navy has not developed overarching guidance that provides high-level policy and guidance for rotational crewing initiatives and has been inconsistent in addressing rotational crewing in individual ship-class concepts of operations. According to

[7]See GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, GAO-03-669 (Washington, D.C.: July 2, 2003).

defense best practices, key aspects of a concept of operations include a description of how a set of capabilities may be employed to achieve desired objectives or a particular end state and identifies who, where, and—most importantly—how it is to be accomplished, employed, and executed. Some existing instructions and concepts of operations have improved management of and accountability for ship operations during crew rotations and provided a plan for implementing rotational crewing on some existing and future surface ship classes. However, ship squadron commands have not consistently addressed rotational crewing initiatives in individual ship-class concepts of operations because no one has taken the lead in coordinating rotational crewing efforts and no guidance requires such efforts. Without overarching guidance and consistent treatment of rotational crewing in individual ship-class concepts of operations to ensure effective management, execution, and evaluation of rotational crewing efforts, the Navy may not efficiently and effectively implement current and future surface-ship rotational crewing initiatives.

The Navy has completed some analyses of rotational crewing for its surface ships; however, it has not developed a systematic method for data collection and analysis of rotational crewing on current surface ships, including the cost-effectiveness of rotational crewing options. Additionally, the Navy has not fully analyzed or systematically assessed rotational crewing options in the analysis of alternatives for surface ships in development, including life-cycle costs. The Navy's Atlantic Fleet DDG Sea Swap initiative included a data-collection and analysis plan that identified much of the information needed to assess a rotational crewing initiative. However, the plan did not include a comprehensive cost-effectiveness analysis that included an evaluation of life-cycle costs. In addition, the Navy has collected some data from its other rotational crewing efforts but has not established a standardized data-collection and analysis plan to guide data collection and analysis, assessment, and reporting of findings for each of the different types of rotational crewing efforts. Furthermore, the Navy has not fully and systematically evaluated rotational crewing options for future ship classes. DOD and Navy guidance requires an analysis of alternatives during the acquisition process of weapon systems, and these analyses generally contain an evaluation of the performance, operational effectiveness, operational suitability, and estimated costs of alternatives that satisfy established capability needs. However, the guidance does not specifically require consideration of rotational crewing alternatives as part of this analysis even though the use of rotational crewing may affect the life-cycle cost or mission effectiveness

of the various alternatives. Without a systematic approach for collecting relevant rotational crewing-related data and analyzing, evaluating, and assessing rotational crewing for current and future ships, Navy decisionmakers will not have the ability to compare rotational crewing concepts with the traditional crewing concept of one crew for one ship. Consequently, the Navy may not be able to determine if particular rotational crewing alternatives have the potential for fulfilling operational needs and maximizing return on investment. In the absence of this knowledge the Navy's force structure assessments may be incomplete and the Navy may not have a complete picture of the number of ships it needs to acquire.

The Navy has made progress in systematically collecting and disseminating lessons learned from rotational crewing experiences. However, some ship communities have relied on informal processes. The Atlantic Fleet DDG Sea Swap initiative used a systematic process to capture lessons learned and enter them into Navy Lessons Learned System. Other ship communities, such as the LCS, have also taken actions to collect and leverage lessons learned from rotational crewing experiences, both within and across individual commands. However, most ship communities did not submit or use the Navy Lessons Learned System to enhance knowledge sharing or learn from others' experiences. The Navy lacks overarching systematic processes and requirements for the collection and dissemination of lessons learned pertaining specifically to rotational crewing. By not systematically collecting, recording, and disseminating lessons learned from all rotational crewing experiences, the Navy unnecessarily risks repeating mistakes and could miss opportunities to more effectively plan and conduct crew rotations.

To facilitate increased ship utilization in an effective and efficient manner, we recommend that the Secretary of Defense direct the Secretary of the Navy to take the following actions with respect to ship rotational crewing: assign clear leadership and establish an overarching implementation team to provide day-to-day management oversight; develop and promulgate overarching rotational crewing guidance; develop a systematic data-collection and analysis plan with assessments and reporting of findings, including life-cycle costs; assess rotational crewing options in analysis of alternatives; develop and implement concepts of operations for all rotational crewing initiatives; and institutionalize lessons learned collection and dissemination.

DOD, in its comments on a draft of this report, partially agreed with our three recommendations regarding concepts of operations, data collection and analysis, and rotational crewing assessments during surface-ship analysis of alternatives. DOD disagreed with our five other recommendations that would assign clear leadership and accountability for managing rotational crewing efforts; establish an overarching implementation team; develop and promulgate overarching guidance to provide the high-level vision and guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts; ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing; and incorporate components of the lessons-learned approach outlined in the Atlantic Fleet DDG Sea Swap Concept of Operations. In its comments, DOD stated that measures are already in place that address the issues raised by the report. We disagree that the actions taken by the Navy to date fulfill the intent of our recommendations and are complete. While the Navy has taken some positive actions on these issues, we do not believe that the Navy's actions go far enough in providing leadership, management, and guidance in transforming the Navy's surface-ship-crewing culture; in collecting and analyzing data, including cost-effectiveness and full life-cycle cost; nor in documenting and acting on lessons it has learned during implementation of different rotational crewing alternatives. For example, the Navy does not have a designated leader to manage all rotational crewing efforts or a Navy-wide implementation team to ensure that rotational crewing efforts throughout the department receive the focused attention necessary to be sustained and effective by keeping efforts coordinated, and integrating and applying their results to the fleet. Additionally, although some ship communities involved in rotational crewing have developed policies and procedures specific to their communities, the Navy does not have an overarching directive that would designate a clear leader and an implementation team; assign responsibilities; establish procedures, guides, functions, and reporting requirements, such as concepts of operations and data collection, analysis and reporting; and develop guidance on collecting and using lessons learned. As such, the Navy may be missing opportunities to improve its transformational capabilities and cost-effectively increase surface-ship operational availability. Therefore, we are suggesting that Congress consider requiring the Secretary of Defense to direct the Secretary of the Navy to implement our recommendations and report to Congress on its progress when the President's budget for fiscal year 2010 is submitted to Congress. The department's comments and our evaluation

of them are discussed on pages 45–50. DOD's comments are reprinted in their entirety in appendix III.

Background

Rotational Crewing Proven to Provide Greater Forward Presence

Maintaining an overseas military presence that is prepared to deter threats and engage enemies remains an enduring tenet of U.S. national military strategy and priorities. For example, the National Military Strategy notes that an overseas presence supports the ability of the United States to project power against threats and support establishment of an environment that reduces the conditions that foster extremist ideologies. By being forward-deployed, maritime forces can enable familiarity with the environment and behavior patterns of regional actors. The Navy has traditionally maintained overseas presence by using standard deployments whereby individual ships and their permanently assigned crews are deployed for approximately 6 months out of a 27-month cycle. However, the amount of time a ship ultimately spends forward-deployed in a theater of operations is affected by several factors in its employment cycle. These factors include length of deployment, transit speeds to and from operating areas, port calls, crew training and certification, ship maintenance requirements, and maintaining sufficient readiness for surging forces during nondeployed periods. The result is that a ship homeported in the United States and deploying to the Persian Gulf area for 6 months will normally spend less than 20 percent of its 27 month cycle in-theater and that the Navy would need about six ships to maintain a continuous presence in the region over a 2-year period.

Rotational crewing has been proven to provide greater forward presence for Navy ships by eliminating ship transits and maintaining more on-station time in distant operating areas. Specifically, the 2004 Pacific Fleet Destroyer Sea Swap initiative demonstrated that rotational crewing provides more forward presence with fewer ships. For example, one Pacific Fleet destroyer, rotationally crewed with three sequentially-deployed crews, produced an additional 16 days of forward presence compared with a standard four-ship/four-crew deployment. The Atlantic Fleet DDG Sea Swap initiative produced similar results. For example, one Atlantic Fleet destroyer, rotationally crewed with three crews, produced 25 days more of forward presence than a standard four-ship/four-crew deployment. Assessments completed by the Center for Naval Analyses and

the Office of the Chief of Naval Operations confirmed the results of the Pacific and Atlantic Sea Swap initiatives. Using the Blue-Gold alternative, the HSV-2 *Swift* has achieved an operations tempo of more than 80 percent and the four newly converted guided missile submarines expect to spend two-thirds of their operational cycles forward-deployed in the operations area.

Pressure on Shipbuilding Procurement

At costs ranging from $500 million to $5 billion each, the Navy's surface combatants represent a significant capital investment. Facing cost growth in new ship classes[8] and federal fiscal challenges,[9] rotational crewing may be one alternative the Navy could utilize to meet mission requirements and mitigate the effects of cost growth on ship requirements as embodied in the Navy's long-range shipbuilding plan and maritime strategy. The Congressional Budget Office and Center for Naval Analysis have also noted the procurement savings achieved as a result of using rotational crewing on ships.[10] In 2007, the Chief of Naval Operations recognized the challenge of accomplishing the Navy's missions within its budget. The Chief of Naval Operations explained that there is extraordinary pressure to balance the Navy's personnel, operations, and procurement accounts in today's fiscal environment. Meanwhile, the Navy has faced increased criticism for rising shipbuilding costs. The increasing cost of surface ships has led the Navy to reduce procurements, and the resulting loss of economies of scale has driven costs of individual surface ships even higher. We have reported that significant cost growth and long schedule delays are persistent problems in both new and follow-on ships.[11] We also reported that the Navy has developed and implemented several initiatives

[8]See GAO, *Defense Acquisitions: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs*, GAO-07-943T (Washington, D.C.: July 24, 2007).

[9]See GAO, *A Call For Stewardship: Enhancing the Federal Government's Ability to Address Key Fiscal and Other 21st Century Challenges*, GAO-08-93SP (Washington, D.C.: Dec. 17, 2007); GAO, *Fiscal Stewardship: A Critical Challenge Facing Our Nation*, GAO-07-362SP (Washington, D.C.: January 2007); and Steven M. Kosiak, *Analysis of the FY 2009 Defense Budget Request* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 2008).

[10]See Congressional Budget Office, *Crew Rotation in the Navy: The Long-Term Effect on Forward Presence* (Washington, D.C., October 2007) and Center for Naval Analyses, *Cost Implications of Sea Swap* (Alexandria, Va., November 2005).

[11]GAO-07-943T.

to increase the operational availability of Navy and Marine Corps fleet forces, including the Fleet Response Plan and rotational crewing.[12] Navy officials have cited these initiatives as ways to increase readiness and reduce the numbers of ships needed in the Navy's force structure, thereby freeing funding for other priorities.

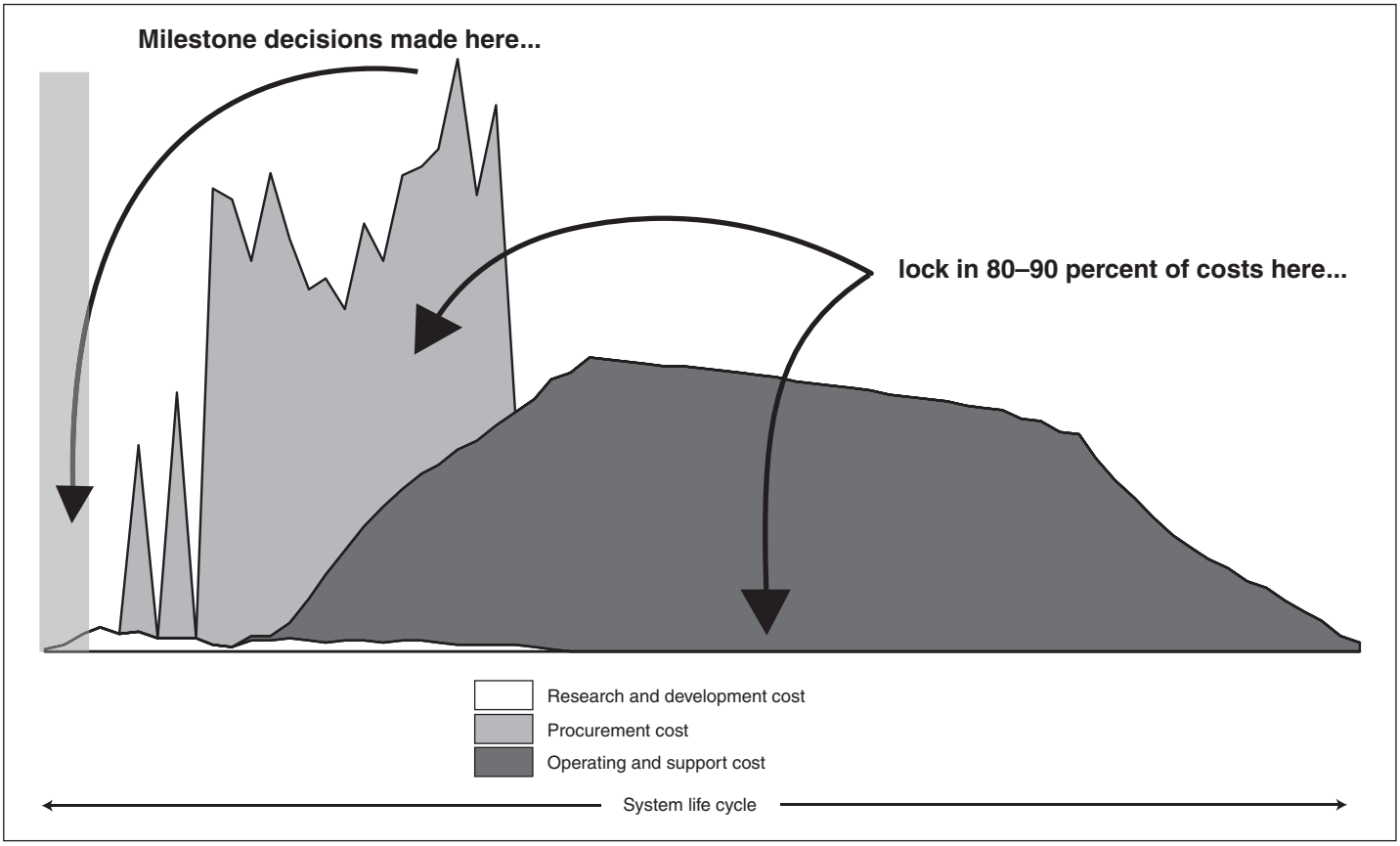
Life-Cycle Costs Are Determined Early in a System's Development

Decisions made in setting requirements very early in a ship's development have enormous effect on the cost of the system over its life.[13] Life-cycle costs include the costs to research, develop, acquire, own, operate, maintain, and dispose of weapon and support systems. These costs include the facilities and training equipment, such as simulators, unique to the system. Navy analyses show that by the second acquisition milestone (which assesses whether a system is ready to advance to the system development and demonstration phase), roughly 85 percent of a ship's life-cycle cost has been "locked in" by design, production quantity, and schedule decisions while less than 10 percent of its total costs has actually been expended. (See fig. 1.)

[12]See GAO, *Defense Acquisitions: Challenges Associated with the Navy's Long-Range Shipbuilding Plan*, GAO-06-587T (Washington, D.C.: Mar. 30, 2006).

[13]In another report we recommended that DOD treat total ownership costs as a performance requirement equal in priority to any other performance requirement prior to beginning the acquisition program. See GAO, *Best Practices: Setting Requirements Differently Could Reduce Weapon Systems' Total Ownership Costs*, GAO-03-57 (Washington, D.C.: Feb. 11, 2003).

Figure 1: Life-Cycle Costs Are Determined Early in a System's Development



Source: U.S. Navy.

Figure 1 depicts the relative apportionment of research and development, procurement, and operating and support costs over the typical life cycle of a ship program (the complete life cycle of a ship, from concept development through disposal, typically ranges from 40 to 60 years). Research and development funds are spent at program initiation and generally constitute only a small fraction of a new ship's costs. Then, in the next acquisition phase, procurement funds are spent to acquire the new ship. The vast majority of the life-cycle costs is comprised of operating and support costs and is incurred over the life of the ship.

Defense Acquisition Policy Requires Setting Goals to Optimize Performance and Minimize Cost

Recognizing that fiscal constraints pose a long-term challenge, DOD policy states that life-cycle costs of new military systems should be identified and that all participants shall plan programs based on realistic projections of the dollars and manpower likely to be available in future years.[14] This approach, referred to as treating cost as an independent variable, requires program managers to consider cost-performance trade-offs in setting program goals. During the acquisition process, program managers are held accountable for making progress toward meeting established goals and requirements at checkpoints, or milestones, over a program's life cycle. These goals and requirements are contained in several key documents, including the initial capabilities document and the analysis of alternatives. An initial capabilities document describes an operational gap or deficiency, or opportunity to provide new capabilities, in operational terms and identifies possible material and nonmaterial solutions, including approaches involving, among other things, personnel and training, that may be used to satisfy the need. These capabilities and constraints are examined during a study called the analysis of alternatives.

The DOD instruction outlining the process on how to acquire major weapons systems establishes the requirement for developing an analysis of alternatives to support major acquisition milestones and decision reviews.[15] An analysis of alternatives is a documented analytical evaluation of the performance, operational effectiveness, operational suitability, and estimated costs (including full life-cycle costs) of alternative systems to meet a mission capability that has been identified through the department's capabilities and requirements process.[16] Preparation of an analysis of alternatives is generally required during the Concept Refinement Phase, which is early in the defense acquisition process—even prior to formal initiation of a program—as shown in figure 2. An analysis

[14]Department of Defense Directive 5000.01, *The Defense Acquisition System* (May 12, 2003, and certified current as of Nov. 20, 2007).

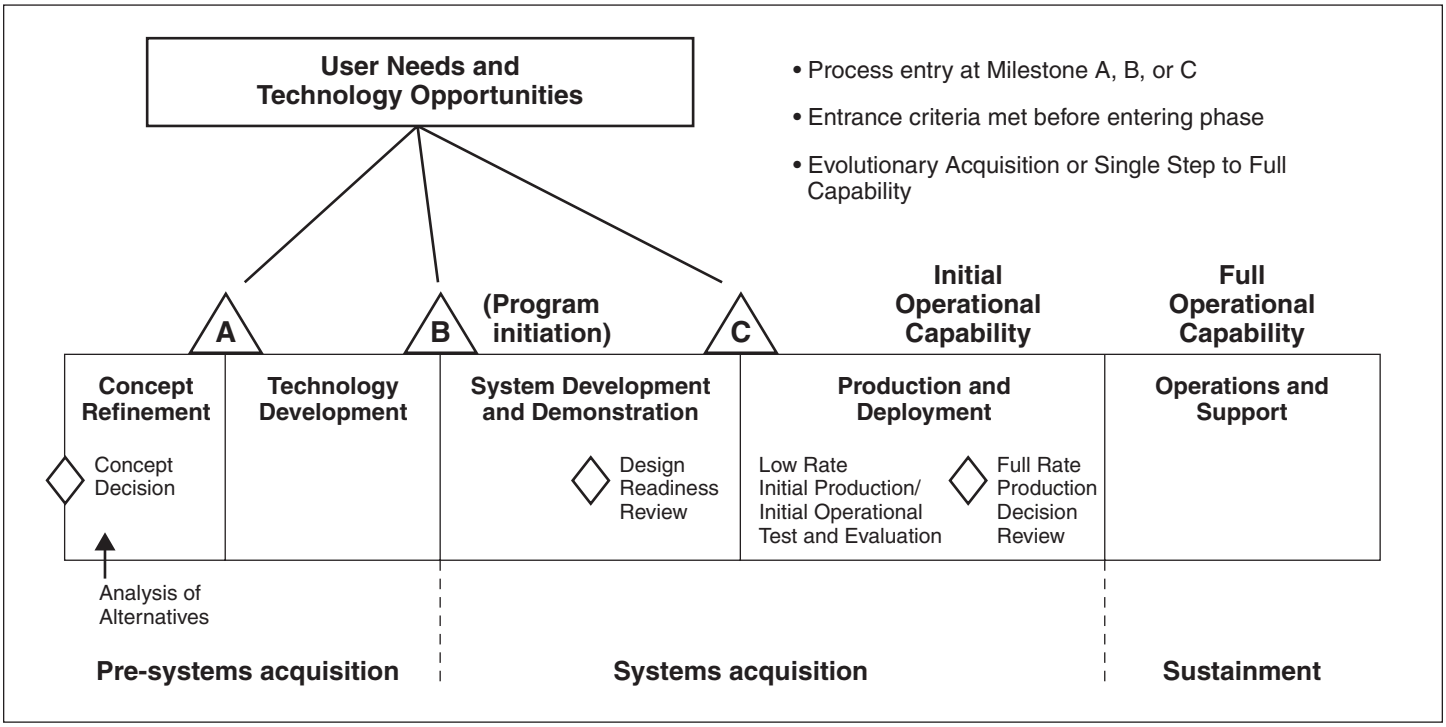
[15]Department of Defense Instruction 5000.2, *Operation of the Defense Acquisition System* (May 12, 2003). Additionally, the Department of the Navy issues mandatory procedures to implement DOD's acquisition instruction and process including requirements for completing an analysis of alternatives in the Secretary of the Navy Instruction 5000.2C, *Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System* (Nov. 19, 2004).

[16]This process is called the Joint Capabilities Integration Development System. This formal DOD process defines acquisition requirements and evaluation criteria for future defense programs.

of alternatives is required at an early stage to ensure that all potential alternative means of satisfying the stated capability are considered. The analysis of alternatives assesses the advantages and disadvantages of various alternatives being considered to satisfy the needed capability, including the sensitivity of each alternative to possible changes to key assumptions (e.g., threat) or variables (e.g., performance capabilities). The analysis is intended to aid decision makers in judging whether or not any of the proposed alternatives to an existing system offer sufficient military or economic benefit, or both, to be worth the cost. In preparation for subsequent milestones, the analysis is updated, or a new one conducted, depending on then-existing circumstances. Additionally, the Department of the Navy has issued guidance containing mandatory procedures for implementation of DOD's acquisition instruction and process.[17] The Navy's guidance requires an analysis of alternatives to include an analysis of doctrine, organization, training, materiel, management, leadership, personnel, and facilities as well as joint implications.

[17]Secretary of the Navy Instruction 5000.2C.

Figure 2: The Defense Acquisition Management Framework



Source: GAO analysis of DOD data.

Ship-Crewing Alternatives

In addition to the standard ship and crew employment cycle, the range of Navy crewing alternatives falls into three major categories: (1) Sea Swap, (2) Horizon, and (3) Blue-Gold. Each of these alternatives can be implemented in varying ways and may have different advantages and disadvantages and effects on life-cycle costs, but the Navy's actual experience with nonstandard crewing alternatives on surface ships is limited. Sea Swap is the only crewing alternative that has been used on ships as large as surface combatants.

Standard Crew

Standard crews use one crew per ship. Most of the crewmembers are assigned to the ship for 4 years, and it is common for crewmembers to deploy overseas on the same ship more than once. Ships deploy to forward operating areas for periods of 6 or more months on average. On a 6 month deployment to the Arabian Gulf ships spend 3 to 4 months of that

deployment actually on station depending on whether the ship deploys from the east or west coast of the United States.[18] When not deployed, the ships fulfill surge deployment requirements, undergo maintenance availabilities and conduct training and certifications to maintain mission capability. Most Navy ships and their crews employ the standard crew deployment option.

Sea Swap

The Sea Swap option uses one deploying ship but multiple sequentially deploying crews. Newly deploying crews swap ships with the crew on the forward-deployed ship. Nondeployed crews train and perform maintenance on a ship in the home port. Sea Swap normally operates in a multiple of two, three, or four ships and crews. The crews rotate through the ships in the assigned group. Notionally under this option, one of the ships deploys two, three, or four times longer than the standard time by rotating crews every 6 months at an overseas location. Ideally, all of the Sea Swap ships share an identical configuration, so crew performance and capability are not degraded because of ship differences.[19] Because crews do not return to the ships on which they trained, under a four-ship Sea Swap option, some crews could serve on three different ships in just over 6 months and be expected to demonstrate combat proficiency on each one. A limited number of destroyers have employed the Sea Swap option in recent years.

Horizon

The Horizon option involves one or two more crews than ships, such as four crews for three ships or five crews for three ships. Crews serve for no more than 6 months on ships that are deployed for 18 months or more. Under a three-ship Horizon option, crews could serve on at least two ships in just over 6 months and be expected to demonstrate combat proficiency on each one. In addition, each crew would be without a ship for a period

[18]A ship based on the west coast of the United States would spend a greater portion of its deployment in transit to the Persian Gulf operating area than a ship based on the east coast, because of the distance. For example, a ship based on the west coast uses about 90 days of its deployment in transit to and from the Persian Gulf area compared to a ship based on the east coast that would spend about 56 days in-transit.

[19]Surface ships are continuously having their combat and other systems upgraded or replaced so maintaining "identical" configurations can be a challenge if not managed and documented through a careful configuration control and change order process. Also, despite surface ships with the same "design" being built within a few years of each other, no two ships are exactly alike and even more differences are likely when these ships are built in different shipyards.

of time and stay ashore at a readiness, or training, center. This crewing option was employed on mine countermeasure and patrol coastal ships in recent years.

Blue-Gold

The Blue-Gold option assigns two complete crews, designated "Blue" and "Gold," to a single ship. Most of the crewmembers are assigned to a ship for several years, and it is common for them to deploy overseas on the same ship more than once. Crew deployments would not exceed 6 months and are often of much shorter duration. An advantage with this option includes the crews' familiarity with the ship. However, a disadvantage is that the proficiency can degrade since crews sometimes do not have a ship on which to train when not deployed and must rely on mock-ups and simulators at a training facility. The strategic and guided missile submarine forces and the HSV-2 *Swift* have employed the Blue-Gold alternative.

History of Rotational Crewing Initiatives

Rotational crewing has been a part of the Navy for over 40 years, but the Navy's experience with this crewing concept on its surface fleet has been more recent and limited to a small number of ships and ship types. The Navy has used the Blue-Gold crewing approach on its ballistic missile submarines since the 1960s; however, until the mid-1990s, rotational crewing was not practiced on surface ships. In the mid-1990s, the Navy was in search of a new operational approach that allowed the Navy to meet forward-presence requirements and surge capability. The Navy developed the Horizon approach that sustained readiness by maintaining people and platforms in a continually ready state. This concept was originally used on Mine Countermeasure ships in the mid-1990s, and was later adopted by coastal minehunter and patrol coastal ships in 2003. In the same year, the Navy employed the Blue-Gold rotational crewing approach on the HSV-2 *Swift*. Beginning in 2007 with the U.S.S. *Ohio*'s deployment as a guided missile submarine, the Navy has implemented the Blue-Gold rotational crewing alternative on the four *Ohio*-class strategic missile submarines converted to guided missile submarines. Rotational crewing experiments have also been conducted on Navy destroyers in the Pacific and Atlantic Fleets. Beginning in 2002, seven Pacific Fleet destroyers and their crews participated in the Sea Swap rotational crewing demonstration. This rotational crewing approach was tested again in 2005, this time using three of its 22 Atlantic Fleet destroyers in what is known as the Atlantic Fleet DDG Sea Swap initiative. Rotational crewing has not been used on the Navy's cruisers, amphibious ships, aircraft carriers, or

support ships (other than the HSV-2 *Swift*). Table 1 shows the rotational crewing alternatives employed by the Navy during the 1990s and through the present.

Table 1: Navy's Rotational Crewing Alternatives and Initiatives

Rotational crewing alternative and ratio of crews to ships	Navy rotational crewing initiatives
Sea Swap (2:2, 3:3, 4:4)	• 2002–2004 Pacific Sea Swap: *Spruance*-class destroyers and *Arleigh Burke*-class destroyers • 2005–2007 Atlantic Sea Swap: *Arleigh Burke*–class destroyers
Horizon (3:2, 4:3, 5:3 or a similar ratio)	• 1990s: Mine countermeasure ships in Japan and Persian Gulf • 2003–2006: Mine countermeasure ships and coastal minehunter ships in North Arabian and Persian Gulfs • 2003–Present: *Cyclone*-class patrol coastal ships in North Arabian and Persian Gulfs • Future: Littoral Combat Ships (LCS) plan to transition from Blue-Gold to Horizon
Blue-Gold (2:1)	• 1960s–Present: Ballistic missile submarines (multiple classes) • 2003–Present: HSV-2 *Swift* • 2007–Present: *Ohio*-class guided missile submarines • 2006–Present: Mine countermeasure ships in North Arabian and Persian Gulfs[a] • Future: Crews are in place for the first two LCSs

Source: GAO analysis of Navy data.

[a]The mine countermeasure ships are using a variation of "Blue-Gold" that includes a "Silver" crew that acts as the training crew for the ships homeported in Texas.

The Navy Has Not Fully Established a Comprehensive Management Approach to Coordinate and Integrate Rotational Crewing Efforts

Although the Navy has taken action to provide leadership in specific rotational crewing programs and transform its ship-crewing culture, the Navy has not fully established a comprehensive management approach to coordinate and integrate rotational crewing efforts throughout the department. Specifically, the Navy has not fully incorporated key management practices to manage the transformation of the Navy's ship-crewing culture—such as providing top-down leadership and dedicating an overarching implementation team—that our prior work has shown critical to successful transformations.[20]

[20]See GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, GAO-03-669 (Washington, D.C.: July 2, 2003).

Rotational Crewing Is a Transformational Cultural Change

Rotational crewing represents a transformational cultural change for the Navy. An organization's culture encompasses the values and behaviors that characterize its work environment. The Navy has a long history devoted to the one crew, one ship model whereby individual ships and their permanently assigned crews are deployed approximately 6 months out of a 27-month cycle. Rotational crewing on surface ships is a relatively new concept for the Navy, with only one use before 2002. Sailors in several focus groups told us that rotational crewing stands in stark contrast to the normal deployment cycle of the Navy. They added that, in order to be successful, the Navy's crewing culture would have to be transformed. Then–Chief of Naval Operations Admiral Vern Clark echoed this message in 2005, stating that rotational crewing has changed the face of the Navy, and that in any organizational transformation, people are almost always not in favor of change. If rotational crewing efforts are not properly managed, rotational crewing can have a negative effect on mission performance and retention. For example, we reported in 2004 that the Pacific Sea Swap experiments lacked proper management, including effective guidance and oversight. Focus groups with Pacific Sea Swap sailors reported training deficiencies, increased maintenance tasks, and a degraded quality of life. Further, lower reenlistments rates were found for sailors with less than 6 years of service. Successful rotational crewing efforts require management practices that lead a transformation of the Navy's ship-crewing culture.

Navy Has Not Assigned Responsibility for Overall Management of Rotational Crewing

While the Navy has provided leadership in some specific rotational crewing programs, the Navy has not provided top-down leadership to manage and integrate all rotational crewing efforts throughout the Department of the Navy. We reported in 2003 that key practices and implementation steps for successful transformations include ensuring top leadership drives the transformation.[21] The Commander, Naval Surface Forces, has been clearly and personally involved in leading the transformation of the Navy's ship-crewing culture in the implementation of Littoral Combat Ship (LCS) rotational crewing. The Commander has set the direction, pace, and tone for the transformation, while institutionalizing accountability. For example, the Commander has instituted a set of cardinal rules that emphasize seizing the opportunity and embracing change as part of the transformation. One of these cardinal

[21]GAO-03-669.

rules is not to compare the LCS to legacy platforms because the LCS cannot be manned, trained, equipped, maintained, or tactically employed in the same way. Further, the Commander has presented a clear and compelling picture of what the LCS community needs to achieve, helping to build morale and commitment to the rotational crewing concept. For example, the Commander has articulated a succinct and compelling reason for adopting rotational crewing, demonstrating conviction to making the change. Command officials explained that this has helped sailors and personnel throughout the LCS and Surface Forces command understand and share the Commander's expectations, engendering both their cooperation and ownership of these outcomes. In addition, the Vice Chief of Naval Operations provided top-down leadership in the Atlantic Fleet DDG Sea Swap initiative, recognizing shortcomings in the Pacific Sea Swap initiative. Citing recommended actions in our 2004 report on the Pacific Sea Swap,[22] the Vice Chief of Naval Operations directed Naval Surface Forces Atlantic to develop goals, standardized guidance, metrics, and a comprehensive strategy for future rotational crewing initiatives.

This transformational leadership, however, has been limited to the implementation of the LCS and Atlantic Fleet DDG Sea Swap rotational crewing efforts. The Navy has not provided top-down, sustained leadership to manage and integrate all rotational crewing efforts. The Chief of Naval Operations has noted the success of rotational crewing programs and their potential to increase forward presence without buying more ships. However, with six rotational crewing efforts currently underway, Navy leadership has not assigned clear leadership and accountability for managing rotational crewing efforts, including designating responsibility for integrating and applying program results to the fleet, an action necessary to guide the transformation of the Navy's ship-crewing culture. For example, the Atlantic Fleet DDG Sea Swap initiative successfully increased forward presence and generated total operational cost savings of nearly $10 million. However, Fleet Forces Command,[23] in its final report on the Atlantic Fleet DDG Sea Swap initiative, stated that no future Sea Swaps are planned. The report states that only if an expansion of missions and roles for the destroyer class

[22]GAO-05-10.

[23]U.S. Fleet Forces Command was established in 2001 to serve as the single voice for Fleet requirements and to coordinate standardized policy for manning, training, and maintaining Atlantic and Pacific Fleet operating forces.

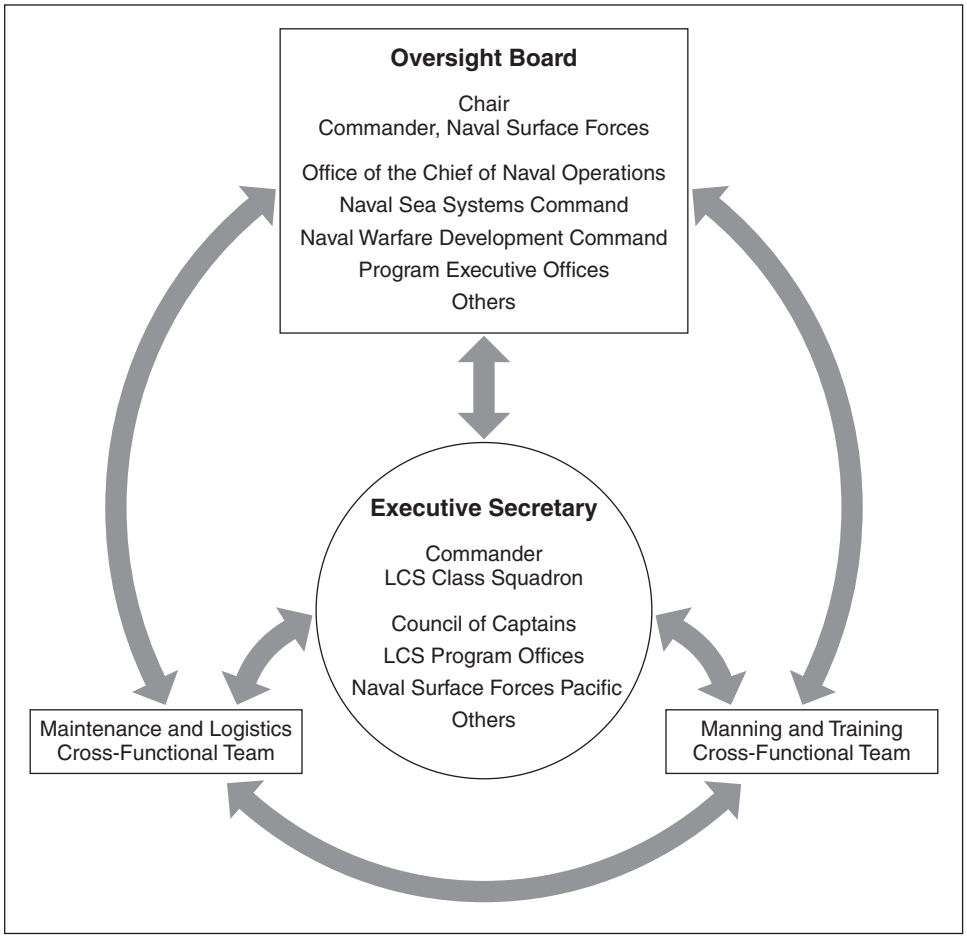
(such as the addition of a missile defense capability) decreased the total number of destroyers available, would rotational crewing be considered. According to Navy sailors and officials, Navy leadership also has not identified incentives for rotational crewing necessary to lead the transformation. Several sailors in focus groups with rotational crews reported that port calls and defined employment periods were critical to successful rotational crewing programs. To date, Navy leadership has not consistently managed these incentives and implemented them in each rotational crewing program. For example, mine warfare ship sailors in focus groups reported that their deployment schedules were unpredictable, resulting in poor quality of life. The Navy does not have top-down leadership because the Navy does not have overarching guidance for rotational crewing that assigns leadership within the Chief of Naval Operations. Without top-down, sustained Navy leadership, including assigning responsibility for managing rotational crewing efforts, the Navy cannot be assured that rotational crewing is developed in an efficient or sustainable manner.

Navy Has Not Established an Implementation Team for Rotational Crewing

Although the Navy has established implementation teams for selected rotational crewing initiatives, it has not established an implementation team for managing all rotational crewing programs. We reported in 2003 that key practices for successful transformations include that an implementation team should be responsible for the day-to-day management of transformation to ensure various initiatives are integrated.[24] Such a team would ensure that rotational crewing receives the focused, full-time attention necessary to be sustained and effective by keeping efforts coordinated, and integrating and applying implementation results to the fleet. The LCS community demonstrates the structure of an implementation team. The LCS team is led by an Oversight Board, chaired by the Commander, Naval Surface Forces, with executive-level representatives from program executive offices, program sponsors, and other major stakeholders. Two cross-functional teams report directly to the Oversight Board: one addresses manning and training issues, and the other addresses logistics and maintenance issues. Additional LCS team members include representatives from the LCS community, Naval Surface Forces Pacific, other appropriate functional disciplines, and a senior level executive working group, the Council of Captains (see fig. 3).

[24] GAO-03-669.

Figure 3: The Littoral Combat Ship Community Implementation Team



Source: GAO analysis of DOD data.

Naval Surface Forces officials explained that, together, the implementation team groups review issues and barriers associated with the LCS program and jointly develop solutions. The process is documented in detailed Plans of Action and Milestones[25] that list barriers, solutions, and planning goals.

[25]Both cross-functional teams in the LCS Community have a Plan of Action and Milestones. There is a Manning and Training Plan of Action and Milestones and a Maintenance and Logistics Plan of Action and Milestones.

Other rotational crewing initiatives have benefited from implementation teams. For example, Naval Surface Forces established an implementation team to coordinate all involved activities and organizations in the Atlantic Fleet DDG Sea Swap initiative. The team included Naval Surface Forces Atlantic staff from multiple directorates, regional support organization representatives, ship commanding and executive officers, Board of Inspection and Survey[26] members, a public affairs officer, and others. The team ensured that the execution of the initiative ran smoothly and provided a communications structure to facilitate coordination among all participants and support organizations. Submarine Group Trident[27] command officials also benefited from implementation teams in preparing for swapping Blue and Gold crews overseas to support newly converted guided missile submarines. Submarine Group Trident command officials explained that they conducted multiple tabletop exercises to address maintenance support teams, overseas repairs, and travel logistics. Command officials further noted that working groups were formed to address specific challenges associated with forward-deployed crew swaps, such as selecting the type of aircraft to move the crews and procedures for storing spare parts, and to develop a preexercise plan. Drawing on the tabletop exercises, working group preparation, and the preexercise plan, the guided missile submarine U.S.S. *Ohio* completed the first forward-deployed submarine crew swap in over 15 years, successfully transporting supplies, paperwork, and the crew.

[26]The Board of Inspection and Survey's mission is to develop and establish Chief of Naval Operations policy and procedures for trials, material inspections, and surveys of ships and service craft, examine Naval vessels periodically by a board of Naval officers to determine fitness for further service, conduct material inspections and surveys of ships and service craft and provide assessment of the material readiness of these vessels, provide independent verification of a newly constructed ship's readiness for acceptance/delivery, conduct environmental protection and Navy Safety and Occupational Health oversight and inspection of Naval ships to include equipment, program compliance, and training, and compile statistical information and analyses on material deficiencies.

[27]The Commander, Submarine Group Trident, provides policy and guidance input on all matters pertaining to strategic missile and guided missile submarine operations and readiness.

Implementation teams, however, have not been utilized in all rotational crewing initiatives.[28] Navy officials explained that no implementation team exists to manage the patrol coastal or mine warfare ship rotational crewing efforts. In focus groups, patrol coastal and mine warfare ship sailors reported poor quality of life, insufficient training and professional development time, inconsistent accountability during ship turnovers, and little, if any, support for the crewing transformation. Without an implementation team to devote focused attention, provide a communication structure, and apply lessons from other rotational crewing efforts, the Navy may not effectively resolve these issues on patrol coastal and mine warfare ships.

There are several groups within the Navy with key roles in rotational crewing programs; however, none of these groups has the overall authority, responsibility, and accountability to coordinate and integrate all rotational crewing efforts. For example, Fleet Forces Command serves as the single voice for fleet requirements and coordinates standardized policy for manning, training, and maintaining fleet operating forces. A key strategic priority for Fleet Forces Command is delivering optimal readiness and operational availability of forces at best cost, managed through best practices and shared information supporting informed decisions by Commanders. The Office of the Chief of Naval Operations, Integration of Capabilities and Resources directorate, is responsible for optimizing Navy investments through centralized coordination of Navy warfighting and warfighting support analysis and assessments, Navy capability development and integration, joint and Navy requirements development, and resource programming. Naval Sea Systems Command builds, buys, and maintains the Navy's ships and submarines and their combat systems, as well as directs resources from program sponsors into the proper mix of manpower and resources to properly equip the fleet. Recently established Class Squadrons are functional command organizations specific to particular ship classes (e.g., Patrol Coastal, LCS) and are responsible for the manning, training, equipping and maintaining processes. Class Squadrons use metric-based analysis to assess readiness,

[28]The Blue-Gold rotational crewing alternative implemented in the ballistic missile submarine community has been successful without an implementation team. This underscores a number of factors that influence the management of rotational crewing efforts including shared experience, the type of rotational crewing, the number of crews, and leadership.

examine class trends, establish lessons learned, and provide recommendations and solutions. Other groups with critical involvement in the implementation of rotational crewing efforts include Naval Surface Forces, Naval Submarine Forces, and many others. However, none of these groups has the overall authority, responsibility, and accountability to coordinate and integrate all rotational crewing efforts because the Navy has not specified how this will be accomplished in an overarching guidance document for rotational crewing. Without formally designating an overarching implementation team with diverse representation to provide day-to-day management oversight of rotational crewing efforts, the Navy can not be assured that rotational crewing programs will be coordinated and integrated, and their results applied to the rest of the fleet. As a result, the Navy may fail to lead a successful transformation of its ship-crewing culture.

Navy's Development, Dissemination, and Implementation of Rotational Crewing Guidance Has Been Inconsistent

The Navy's development, dissemination, and implementation of rotational crewing guidance has been inconsistent, which could hinder rotational crewing efforts. The Navy has not developed an overarching directive that provides high-level vision and guidance for rotational crewing initiatives and has been inconsistent in addressing rotational crewing in individual ship-class concepts of operations. However, the Navy has developed and promulgated crew-exchange instructions that have provided some specific guidance for crew turnovers and increased accountability.

The Navy Lacks an Overarching Directive to Guide All Rotational Crewing Efforts

The Navy has not developed and promulgated an overarching directive that provides the high-level vision and guidance needed to ensure that all rotational crewing efforts are effectively managed, thoroughly evaluated, and successfully implemented. Some communities involved in rotational crewing efforts have developed policies and procedures specific to their community; whereas others have implemented rotational crewing without the benefit of these instructions. For example, the Navy established specific policies and procedures for the execution of the Atlantic Fleet DDG Sea Swap initiative. However, as discussed throughout this report, there is no Navy-wide vision or policy on when and why to consider rotational crewing as an alternative; how to develop implementation plans; and how to share and use lessons learned. As a result, rotational crewing has been inconsistently implemented and assessed across the Navy.

According to DOD guidance on directives,[29] an overarching directive for rotational crewing should provide essential policy and guidance to achieve the desired outcome and should delegate authority and assign responsibilities. According to Navy guidance,[30] a directive could be used to do a number of things including: assign a mission, function, or task; initiate or govern a course of action or conduct; establish a procedure, technique, standard, guide, or method of performing a duty, function, or operation; and establish a reporting requirement. Without this overarching directive, the Navy may not have the high-level guidance to effectively manage, implement, and evaluate rotational crewing as a means of increasing capabilities and reducing costs.

Inconsistent Development and Implementation of Concept of Operations Could Hinder Rotational Crewing Efforts

The Navy has inconsistently addressed rotational crewing in concepts of operations for ship classes employing rotational crewing. A concept of operations is an important leadership and management tool because it provides critical high-level information that describes how a set of capabilities may be employed to achieve desired objectives or a particular end state for a specific scenario and identifies with whom, where, and most importantly, how an activity or function should be accomplished, employed, and executed. In addition, determination of these details enables the development of metrics that support rigorous assessment of the real or proposed capabilities.[31] While the guided missile submarine, LCS, and DDG communities relied on a concept of operations,[32] other

[29]DOD Instruction 5025.01, *DOD Directives Program* (Oct. 28, 2007).

[30]Chief of Naval Operations Instruction 5215.17, *Navy Directives Issuance System* (Jun. 13, 2005).

[31]Best practices for developing a concept of operations were derived from a number of sources, including: Commander U.S. Fleet Forces Command Instruction 5401.1, *Fleet Concept of Operations Development* (Sept. 4, 2007); Naval Warfare Development Command concepts of operations briefings and fact sheets; Sholom Cohen, *Guidelines for Developing a Product Line Concept of Operations*, Software Engineering Institute, Carnegie Mellon University (Pittsburgh, Pa., August 1999), under a contract sponsored by DOD; Department of Transportation, *Systems Engineering Guidebook for ITS*, Version 2.0, (Jan. 2, 2007), and others.

[32]U.S. Fleet Forces Command, *Nuclear-Powered Guided Missile Submarine (SSGN) Concept of Operations* (February 2006); Commander, Naval Surface Force, U.S. Atlantic Fleet, *Atlantic Fleet DDG Sea Swap Concept of Operations* (Oct. 19, 2005); and U.S. Fleet Forces Command, *Littoral Combat Ship Platform Wholeness Concept of Operations (Revision B)* (Mar. 8, 2007).

commands supporting operations conducted by rotationally crewed surface ships have not developed or used a concept of operations. The guided missile submarine community relied on a concept of operations that addressed the platform's operational capabilities and challenges while indicating the importance of leveraging the existing maintenance and training infrastructure. This concept of operations also described how operational availability would be increased by using two alternating crews and the special factors that need to be considered in a ship's employment. The *Atlantic Fleet DDG Sea Swap Concept of Operations* provided stakeholders[33] with a high-level description of the rotational crewing alternative it employed, the principles that drove its execution, the rationale behind key decisions, and the roles and responsibilities of individual decision makers, managers, and leaders involved in its execution.

Although the guided missile submarine, LCS, and DDG communities utilized concept of operations, the Patrol Coastal and Mine Countermeasures ship communities lacked the benefit of a concept of operations. While these communities relied on existing policies and procedures to address some aspects of rotational crewing, such as the exchange of command guidance, they did not have a concept of operations that articulated the vision, purpose, and plan for rotationally crewed surface ships and their crews. They also did not benefit from access to the high-level information and guidance needed specifically for rotational crewing to address critical personnel, supply, maintenance, and training issues. During focus group discussions with crewmembers representing both surface-ship communities, discontent was voiced about the lack of training, particularly the lack of advanced schools needed to increase technical proficiency; personnel shortages that affected crew cohesiveness; minimal maintenance support provided by teams overseas; and inadequate supply support that was to deliver critical equipment when it was needed.

These inconsistencies in developing concepts of operations that address rotational crewing have occurred because the Navy does not have overarching guidance for rotational crewing and because it has not

[33]The stakeholders included, but were not limited to, the Fleet Forces Command, Second Fleet, Fifth Fleet, and Navy Surface Forces commanders and staff officials; ship squadrons; fleet training group; and Sea Swap ship commanders and crews.

developed concepts of operations to guide individual rotational crewing initiatives. Without Navy-wide overarching guidance on rotational crewing and individual ship-class concepts of operations to ensure effective management, execution, and evaluation of rotational crewing efforts, current and potential surface ship rotational crewing initiatives may not be efficiently and effectively implemented. As a result, the Navy increases the risk that it will be unable to effectively communicate its vision of this transformational effort, and will be unable to effectively implement, manage, and institutionalize rotational crewing.

Crew Exchange Instructions Promulgated for Increased Guidance and Accountability

In February 2005, the Commander of Naval Surface Forces promulgated specific guidance detailing how the crew exchange process should be conducted to ensure accountability during crew exchanges and for individual ship communities to use as a model for developing instructions tailored to their specific needs.[34] By developing, disseminating, and implementing an exchange of command instruction, the Navy recognized that effective guidance is a key management tool needed to overcome challenges associated with change such as rotational crewing on surface ships and to facilitate efficient operations while establishing and maintaining oversight and accountability. The guidance stipulated that (1) the crew exchange process should nominally take 4 days; (2) the crews involved in the transition process should familiarize themselves with turnover guidance well in advance of the actual transition; and (3) when possible, an advance team should complete as much of the turnover process as possible before the crew exchange begins. Additionally, to promote accountability and to ensure that individuals assuming duties on a new ship are properly prepared to discharge their responsibilities, the guidance requires the commanding officer transitioning off the ship to initiate an exchange of command letter that addresses specific issues, including the material condition of the ship; equipment issues and deficiencies noted in casualty reports; inspection results; logistical issues, including the status of shipboard equipment identified in the ship's consolidated shipboard allowance list; classified material inventories; and supply and budgetary issues affecting the ship's financial posture.

[34]Commander Naval Surface Forces Instruction 5440.1, *Exchange of Command Guidance* (Feb. 14, 2005). This instruction addressed several concerns identified in the 2004 reports by GAO and the Center for Naval Analyses. See GAO-05-10 and Center for Naval Analyses, *Sea Swap Assessment* (Alexandria, Va., September 2004).

Furthermore, individual commands involved in or preparing to engage in rotational crewing on surface ships also have developed or are in the process of developing guidance, similar in format and content to the Naval Surface Forces crew exchange guidance, but tailored to their specific needs (for example, their unique missions, operations, or equipment). For example, the Mine Warfare Command issued an instruction addressing crew swap checklists to be used during crew rotations conducted aboard HSV-2 *Swift*.[35] Likewise, Mine Countermeasures Squadron Two issued detailed guidance to address crew rotations occurring aboard Mine Countermeasures Ships,[36] and the Patrol Coastal Class Squadron issued guidance to provide procedures covering crew rotations.[37] These instructions addressed the unique requirements associated with rotationally crewed surface ships by discussing multicrew training, advance correspondence between crews, and training exercises needed to prepare crews to effectively conduct operations within a specific operational area. In addition, LCS squadron officials are overseeing the creation of a combined directives manual[38] containing directives, procedures, and policies that address issues such as the rotational crewing turnover process, training, maintenance, and logistical requirements. The LCS guidance intends to divide responsibilities for those stationed ashore and afloat, define daily operations, promote teamwork, and support continuity of command. These crew exchange instructions have addressed some of the unique requirements associated with rotational crewing, but without overarching guidance and individual ship-class concepts of operations to ensure effective management, execution, and evaluation of rotational crewing efforts, the Navy increases the risk that it will not effectively implement current and future surface-ship rotational crewing initiatives.

[35]Commander Mine Warfare Command Instruction 5400.2, *Crew Swap Checklist* (July 23, 2004).

[36]Commander Mine Countermeasures Squadron Two Instruction 5400.3, *Exchange of Command Guidance* (Apr. 9, 2007).

[37]Patrol Coastal Class Squadron (PCRON) Instruction 5440.1A, *Patrol Coastal (PC) Employment Guide Manual* (Aug. 28, 2007).

[38]*Littoral Combat Ship Class Squadron Combined Directives Manual* (Draft) (February 2008).

The Navy Has Not Implemented a Systematic Approach for Analyzing Rotational Crewing on Current and Future Ships

The Navy has completed some analyses of rotational crewing for its surface ships; however, unlike the Atlantic Fleet DDG Sea Swap initiative, the Navy has not developed a systematic method for data collection and analysis, assessment, and reporting of rotational crewing on current surface ships, including the cost-effectiveness of rotational crewing options. Additionally, the Navy has not fully analyzed or systematically assessed rotational crewing options in the analysis of alternatives for surface ships in development, including life-cycle costs.

The Navy Has Not Developed a Systematic Method for Data Collection, Analysis, and Reporting of Rotational Crewing on Current Surface Ships

The Atlantic DDG Sea Swap initiative used a comprehensive data-collection and analysis plan for collecting, analyzing, and evaluating data and for reporting results. However, other Navy rotational crewing initiatives have not developed data-collection and analysis plans, collected and analyzed that data, and reported their findings. According to military best practices, developing a data-collection and analysis plan is essential to any experimental initiative by determining what needs to measured, what data will be necessary to collect, and how the data are to be analyzed. A data-collection and analysis plan consists of all data to be collected, the content of the data (type, periodicity, and format), the collection mechanism (automated or nonautomated processes, time frame, location, and method), the data handling procedures, and relationships of the data to the initiative itself. Additionally, data-collection and analysis plans are important to transformational initiatives because they ensure valid and reliable data are captured and understood, and that the analysis undertaken addresses the key issues in the initiative. If properly prepared and implemented, the data-collection and analysis plan aids subsequent analysis efforts and helps analysts maintain the focus needed to transform data collected into information that supports future decisions. In accordance with military best practices, the *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan*[39] identified areas that needed to be measured (for example, morale and retention, training proficiency, operational performance, operational performance for supporting the Fleet Response Plan, long-term effect on ships' material condition, cost of implementation, and cost-performance trade offs), specific areas from

[39]Commander Naval Surface Force, U.S. Atlantic Fleet, *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan*.

which to collect the data (Navy reports, messages, and survey data), and how the data were to be analyzed (issues and subissues). Additionally, the Atlantic Fleet DDG Sea Swap plan identified overarching goals and key analysis issues; developed an experimental design; and defined measures and metrics. As a result, the Atlantic Fleet DDG Sea Swap final report[40] was well organized, thoughtfully designed, and provided the reader relevant information based on the original data-collection and analysis plan. By clearly identifying the areas needed for measurement, determining specific issues and subissues to be analyzed for each area, and systematically collecting data in accordance with the original analysis approach, the plan provided analysts and decision makers most of the data needed to conduct comparative analyses and support future decisions.

Although the *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan* was nearly comprehensive it did not include a thorough cost-effectiveness analysis of the Sea Swap alternative, or any forms of rotational crewing. The plan included a marginal-cost analysis that examined shorter-term trade-offs between the Sea Swap concept and more traditional crewing concepts; however, it did not specify a comprehensive cost-effectiveness analysis that would determine the least costly crewing method to satisfy Navy requirements. According to best practices, cost-effectiveness is a method used by organizations seeking to gain the best value for their money and to achieve operational requirements while balancing costs, schedules, performance, and risks. The best value is often not readily apparent and requires an analysis to maximize value. A cost-effectiveness analysis is used where benefits cannot be expressed in monetary terms but, rather, in "units of benefit," for example, days of forward presence. According to Office of Management and Budget guidance,[41] a comprehensive cost-effectiveness analysis would include a comparison of alternatives, in this case, crewing options, based on a life-cycle cost analysis of each alternative. The plan called for a cost analysis using categories based on the major issues it identified in the plan; however, the plan acknowledges that these costs are limited, and a more detailed cost model is needed so costs that differ between crewing options can be identified and broken out for comparison. Additionally, the plan did not

[40]U.S. Fleet Forces Command. *U.S. Fleet Forces DDG Sea Swap Initiative Final Report.*

[41]Office of Management and Budget Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs* (Oct. 29, 1992).

call for an analysis of full life-cycle cost data, although it stated that future rotational crewing concept analyses should consider life-cycle or total ownership costs as a part of examining future force structure options.

While the Navy is collecting and compiling some data for the current surface ships involved in rotational crewing initiatives (patrol coastal ships, mine countermeasure ships, and HSV-2 *Swift*), there are no systematic metrics or methods for collecting and evaluating rotational crewing specific data similar to the *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan*. According to Navy officials, the Navy routinely collects retention, morale, material condition, training, cost, operational performance, and Fleet Response Plan–related data for all surface ships. Data collection and analysis for surface ships falls under the direction of the Surface Warfare Enterprise,[42] an arm of the Commander, Naval Surface Forces. One of the major tenets of the Surface Warfare Enterprise and its cross-functional teams is to help recapitalize the future Navy by managing with metrics, and reducing the total cost of doing business. To that end, high-ranking Navy officials led by the Commander, Naval Surface Forces, meet monthly to review and discuss the effectiveness of various manning, training, equipping, and maintaining processes. Although much of these data are similar to those collected in the Atlantic Fleet DDG Sea Swap plan, the data are not as comprehensive and are not consistent from initiative to initiative. Additionally, the Surface Warfare Enterprise data collection and analyses did not link to the effectiveness of different crewing alternatives. Currently, there are no standard metrics or systematic methods for collecting rotational crewing–related data from surface ships because the Navy has not developed and promulgated overarching guidance that requires a systematic data-collection, analysis, and reporting methodology. Consequently, the potential value of rotational crewing is unknown and the Navy is hindering its ability to determine optimal crewing concepts for ship classes.

[42]The Surface Warfare Enterprise integrates all surface warfare stakeholders together in order to provide one voice for policy, waterfront execution, and requirements. The Surface Warfare Enterprise consists of a board of high-ranking Navy officials led by the Commander, Naval Surface Forces, and three cross-functional teams: Sustainment and Modernization, Personnel Readiness, and Strategic Financial Management.

The Navy Has Not Fully Analyzed or Systematically Assessed Rotational Crewing Options in the Analysis of Alternatives for Surface Ships in Development, Including Life-Cycle Costs

Navy surface-ship classes currently under development, the LCS, Joint High Speed Vessel, and the DDG-1000 *Zumwalt*-class guided missile destroyer,[43] have not fully analyzed or systematically assessed rotational crewing in their analysis of alternatives.[44] Early in the development of a new weapons system, DOD and the Navy require that an analysis of alternatives be completed that identifies the most promising alternatives. The analysis of alternatives process is intended to refine the initial weapon systems concept and requires an evaluation of the performance, operational effectiveness, operational suitability, and estimated costs, including full life-cycle costs, of alternatives that satisfy established capability needs. The analysis of alternatives assesses the advantages and disadvantages of alternatives being considered to satisfy capabilities, including the sensitivity of each alternative to possible changes in key assumptions or variables. In at least three recent surface-ship acquisitions, the Navy has not consistently applied these principles because it did not thoroughly analyze and evaluate rotational crewing options and because the Navy's acquisition instruction does not explicitly require evaluating rotational crewing in the Navy's ship analysis of alternatives.[45] However, according to the Navy's acquisition instruction, all analysis of alternatives should include analysis of doctrine, organization, training, materiel, management, leadership, personnel, and facilities as well as joint implications. An evaluation of rotational crewing alternatives could affect all of these things, including force-structure requirements. A comprehensive evaluation could also show whether rotational crewing meets forward presence requirements with fewer ships and lower life-cycle costs. Additionally, the Navy did not have specific overarching

[43]The origin of the DDG-1000 ship dates back to January 1995 when the Navy developed a strategy for acquiring a next-generation destroyer called DD-21. In May 2001, the Under Secretary of the Navy suspended the DD-21 program; however, in November of that same year, the program was restructured and renamed the DD(X) program. The ship program remained under the name DD(X) until April 2006 when the Navy announced that the class and lead ship of the destroyer would carry the designation and ship number DDG-1000 *Zumwalt*-class.

[44]We were unable to determine to what extent the Navy assessed rotational crewing for a fourth ship class in development, the next generation guided missile cruiser, because the analysis of alternatives had not been completed.

[45]Secretary of the Navy Instruction 5000.2C, *Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System* (Nov. 19, 2004). The instruction states that an analysis of alternatives shall be conducted to assess how alternative approaches to a proposed Navy or Marine Corps system contribute to the total mission capability of a system of systems or family of systems.

rotational crewing guidance that would require such analysis and assessments. As a result, Navy officials will not have sufficient information to make informed investment decisions affecting future obligations of billions of dollars.

The Navy identified rotational crewing as a crewing option for the LCS early in the acquisition process; however, the Navy did not complete any comprehensive analyses of rotational crewing alternatives in the ship's analysis of alternatives.[46] The LCS analysis of alternatives included assumptions that rotational crewing would be used on the ship; however, the analysis did not identify and assess a range of rotational crewing alternatives. Because the analysis did not identify a range of alternative crewing options the Navy was not in position to assess the relative operational effectiveness, suitability, and life-cycle costs of the rotational crewing alternatives. For example, the Navy did not evaluate and compare the relative forward presence and warfighting capabilities for standard and rotational crewing alternatives and the potential effects on manpower, training, and facilities. Without adequately analyzing and systematically assessing different rotational crewing alternatives in the analysis of alternatives, the Navy was not able to determine the optimal crewing alternative for fulfilling its operational needs and maximizing returns on investment. Additionally, without considering rotational crewing options as part of the analysis of alternatives, cost-effective force structure assessments are incomplete.

The Joint High Speed Vessel, a ship based on the operational successes of other high-speed surface ships, including the HSV-2 *Swift*, did not include rotational crewing in its analysis of alternatives despite highly successful experiences with rotational crews on the *Swift*, an explicit need for forward presence, and its classification as a high-demand, low-density asset. The *Swift* has employed Blue-Gold rotational crewing while conducting a range of missions, including experimentation, humanitarian

[46]The Navy performed an analysis of multiple concepts between June 2002 and January 2004 to satisfy the DOD acquisition instruction requirement to conduct an analysis of alternatives prior to Milestone A decision. The study name, analysis of multiple concepts, reflected an earlier interim policy. The Navy also commissioned and completed as part of the analysis of multiple concepts a functional solutions analysis. The functional solutions analysis study addressed a broad range of potential solutions and the results are consistent with the study.

operations, and Global Fleet Station deployments.[47] According to focus groups, HSV-2 *Swift* sailors praised the predictability of the operating cycle and Blue-Gold rotational crewing. Additionally, Fleet Commanders and the commanding officers of the HSV-2 *Swift* Blue and Gold crews provided positive feedback on the *Swift* mission performance. High demand for the ship and its capabilities has been met because rotational crewing enabled the ship to maintain a high operational availability and a sustained forward presence. The Joint High Speed Vessel analysis of alternatives considered some data and specifications from the *Swift* design and operational experiences. However, the Joint High Speed Vessel analysis of alternatives does not include any discussion of the *Swift*'s rotational crewing experiences, despite their successes with maintaining a very high operational availability. In the analysis of alternatives, the Joint High Speed Vessel force structure requirements and basing options are driven by forward presence and the need for critical response time, but rotational crewing was not included as an option that may increase Joint High Speed Vessel forward presence.

During the analysis of alternatives for the DDG-1000 guided missile destroyer, rotational crewing was not thoroughly analyzed despite statements by Navy officials early in the acquisition process and in the original operational requirements document[48] that linked rotational crewing to the ship. The analysis of alternatives for the DDG-1000 compared the effects of rotational crewing and traditional crewing on the number of ships required to generate forward presence requirements. The evaluation showed that using rotational crewing alternatives, in place of the traditional single crew approach, produces a higher forward presence with fewer ships. Although the analysis of alternatives acknowledged that

[47]The global fleet station is envisioned to be a persistent sea base of operations from which to coordinate and employ adaptive force packages within a regional area of interest. Focusing primarily on theater security cooperation, global maritime awareness, and tasks associated specifically with the War on Terror, the concept offers a means to increase regional maritime security through the cooperative efforts of joint, interagency, and multinational partners, as well as nongovernmental organizations. The *Swift* has participated in two of these missions, the Global Fleet Station Pilot 2007 in the U.S. Southern Command area of operations and the Africa Partnership Station initiative along the western coast of Africa.

[48]The DD(X) Operational Requirements Document provided descriptions of the ship's multimission capabilities to effectively support the national strategy and global military operations.

rotational crewing met forward presence requirements, while requiring fewer ships, the analysis of alternatives omitted further analyses of rotational crewing for DDG-1000. Furthermore, the analysis of alternatives addressed the rotational crewing concept, but did not analyze the effect of different rotational crewing schemes on force structure, training, materiel, and other aspects that would affect overall life-cycle costs. With a total of seven planned ships, the DDG-1000 destroyer meets the high-demand, low-density benchmark for rotational crewing recommended by Naval Surface Forces in the Atlantic Fleet DDG Sea Swap report.[49] According to Navy officials, the Navy has no plans to utilize rotational crewing on the DDG-1000, despite a lack of thorough analyses and the acknowledgement that rotational crewing meets operational requirements with the use of fewer ships. Without analyzing the costs and benefits of rotational crewing alternatives, as compared to the traditional single crewing approach, the Navy will not be able to make informed decisions about DDG-1000 procurements and future force structure.

Lastly, the analysis of alternatives for the next generation guided missile cruiser, CG(X), is currently in the review process and had not been released as of April 2008.[50] Navy officials have identified the CG(X) ship as a good candidate to be rotationally crewed. According to DOD documentation, the analysis of alternatives for the CG(X) ship will analyze and document major sustainment alternatives including variations in service life, reliability, operating profiles, maintenance concepts, manpower and crewing concepts (including crew rotation and Sea Swap), and other relevant sustainment factors to fully characterize the range of sustainment options. Although it is planned that the analysis of alternatives for CG(X) will analyze different crewing options, a Naval Sea

[49]Since the program's origin the program requirement has changed from 16–24 ships to 8–12 ships, and finally to 7 ships. The DDG-1000 program is essentially a restructured continuation of the earlier DD-21 program, and the DDG-1000 will resemble the DD-21 in terms of mission orientation and ship design. TheDDG-1000 is to be a multimission ship with an emphasis on land-attack operations, reflecting a Navy desire to replace the large-caliber naval gunfire support capability that the Navy lost in 1990–1992, when it removed its four reactivated *Iowa*-class battleships from service.

[50]The Navy had expected to complete the analysis in 2007. However, in response to a question about the timing of the analysis during a Senate Armed Services Committee hearing on February 28, 2008, the Secretary of the Navy stated "we're still in the process of going through that right now. I will say that based on the preliminary reviews I've had, we still have a ways to go and I would be hard-pressed to give you a definitive date at this point in time."

Systems Command official could not provide us any information as to the content of the study until it is completed.

Some Actions Have Been Taken to Collect and Use Lessons Learned from Rotational Crewing Experiences

The Navy has taken some actions to collect and use lessons-learned from rotational crewing experiences. For example, the Atlantic Fleet DDG Sea Swap initiative developed and implemented a robust lessons-learned plan. Despite some progress in collecting and sharing lessons learned within individual ship communities, the Navy's efforts in many cases were not systematic and did not use the Navy Lessons Learned System. Additionally, the Navy has not developed overarching processes for the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing.

The Navy Has Taken Actions to Collect, Disseminate, and Capitalize on Lessons Learned from Rotational Crewing Experiences

The Navy has taken actions to collect, disseminate, and capitalize on lessons learned pertaining to rotational crewing within individual commands, using methods both formal and informal. For example, as part of the Atlantic Fleet DDG Sea Swap initiative, the Navy implemented a robust lessons learned plan to actively collect feedback from destroyer crews. The plan outlined a formal lessons learned process and established a team to collect, review, and analyze lessons learned and ensure that they were incorporated into policies and procedures. The team systematically collected lessons learned from destroyer rotational crews by, among other things, conducting interviews with crew members, reviewing ship message traffic, and examining turnover observation reports. According to the Atlantic Fleet DDG Sea Swap initiative report, draft lessons-learned submissions underwent a well-defined review process to ensure quality, completeness, and consistency. Lessons learned that were of immediate utility were disseminated to Sea Swap initiative crews. Those relating to management and oversight were vetted with the goal of supporting future rotational crewing decision making and policy development. In addition, the Atlantic Fleet DDG Sea Swap initiative leveraged lessons learned from the 2002–2004 Pacific Fleet Destroyer Sea Swap effort, incorporating them into the development of operational plans.

Other ship communities, using less systematic processes, have also captured and shared lessons learned within their communities. For example, the mine warfare community compiled lessons learned following a crew turnover in February 2007, when this community began using a "Blue-Gold" rotational crewing alternative. The guided missile submarine

community, in planning for its implementation of rotational crewing, developed lessons learned from a crew rotation exercise in Hawaii. These lessons learned were disseminated to command officials and other ships within this community and also can be accessed from an internal submarine forces Web site's lessons-learned page. In addition, LCS officials stated that the LCS community shares lessons learned within the command through direct feedback from crew members and in class squadron, cross-functional team, and Oversight Board meetings. These meetings provide a forum to identify potential barriers and propose actions to resolve them, resulting in the development of lessons learned. The LCS community also has conducted a series of crew swap exercises to collect lessons learned regarding logistical support requirements in forward-deployed locations. Officials stated that the lessons learned would be incorporated into LCS standard operating procedures.

Lessons learned were shared between individual ship communities through direct interaction and, on a more limited basis, the Navy Lessons Learned System. Individual ship communities collected and shared lessons learned primarily through direct interaction, such as meetings and site visits. Table 2 highlights examples of direct actions taken to collect and leverage lessons learned from rotational crewing experiences between ship communities. In addition, lessons learned were collected and disseminated through the Navy Lessons Learned System, which is a central repository for the collection and dissemination of lessons learned and a means to correct problems identified from fleet operations.[51] The Atlantic Fleet DDG Sea Swap initiative lessons-learned plan explicitly incorporated into its goals the submission of lessons learned into this system. Twenty-six lessons learned were recorded in the system, which can be accessed by Navy personnel ashore and at sea through a classified Internet site.

[51]Ship communities submit proposed lessons learned to their respective fleet commands, which process and validate the proposed lessons learned. Approved lessons learned are then forwarded to be officially entered into the system. Those identified as deficiencies requiring corrective measures are tracked and closed out when resolved.

Table 2: Examples of Actions Taken, outside of the Navy Lessons Learned System, to Collect and Leverage Lessons Learned between Ship Communities

Ship community	Actions taken to collect and leverage lessons learned
Patrol Coastal	Patrol coastal community officials visited the mine warfare community to discuss lessons learned from rotational crewing experiences.
Mine Warfare	Mine warfare community officials stated that the decision to implement a "Blue-Gold" alternative with a Silver training ship was based on lessons learned from the rotational crewing experiences of the HSV-2 *Swift* and Trident submarines, which demonstrated the advantages—such as an increased sense of ownership and greater training opportunities—of the alternative. According to officials, the training ship maintained by the Silver crew is intended to be the mine warfare community's lower-cost version of the Trident Training Facility.
Guided Missile Submarine	The guided missile submarine community, according to officials, based its implementation of the "Blue-Gold" alternative on the best practices of the ballistic missile submarine community, thereby capitalizing upon lessons learned from over 40 years of rotational crewing. For instance, this community is heavily leveraging off existing ballistic missile submarine shore infrastructure and, according to officials, will adopt applicable rotational crewing policies and procedures from the Ballistic Missile Submarine Combined Directives Manual.
Littoral Combat Ship (LCS)	LCS community officials collected lessons learned in rotational crewing across ship communities by visiting the submarine and mine warfare communities and observing a crew turnover on the HSV-2 *Swift*. • According to LCS officials, the Trident submarine base site visit highlighted the importance of configuration control and the need for shore infrastructure and training simulators for the on-shore crew. • One of the primary purposes of the HSV-2 *Swift* was to validate and develop lessons learned for the LCS program. Although the focus was primarily on testing mission module operations, lessons learned on rotational crewing were captured by LCS crewmembers when they observed a crew turnover. According to the LCS Concept of Operations, the HSV-2 *Swift* validated elements of the LCS rotational crewing model, such as the use of small crews and a 4-month rotation policy. Lessons learned, according to LCS officials, are also shared through the LCS Council of Captains meetings. The council is comprised of officers from numerous ship communities, including representatives from the DDG-1000 *Zumwalt*-class. Officials stated that the council provides a forum to share lessons learned on rotational crewing and other LCS issues. The LCS command also obtained lessons learned from the Atlantic Fleet DDG Sea Swap initiative. Lessons learned from other ship communities were explicitly incorporated into the LCS Concept of Operations and, according to officials, should be incorporated into a combined directives manual, modeled after the one used by the submarine community. In addition, officials stated that LCS standard operating procedures, which are currently in development, would be based on patrol coastal, mine warfare, and HSV-2 *Swift* crew instructions.

Source: GAO analysis of Navy data.

Despite Progress in Collecting and Sharing Lessons Learned, the Navy's Efforts in Many Cases Were Not Systematic and Did Not Use the Navy Lessons Learned System

Despite the Navy's progress in collecting and sharing lessons learned within ship communities, its efforts in many cases were not systematic and did not use the Navy's Lessons Learned System. Instead, the development and sharing of lessons learned relied on informal processes that are left to individual ship commands, and thus were not done consistently across all ship communities that use rotational crewing. For example, the mine warfare and patrol coastal communities lack formal written processes to collect lessons learned related specifically to rotational crewing, according to command officials. Focus group responses from both these communities indicate that efforts to gather lessons learned from crewmembers and communicate them up the chain of command have been inconsistent. A mine warfare community official stated that the collection of lessons learned is largely dependent on the commanding officer and is typically shared by word of mouth or e-mail. Furthermore, while the LCS and guided missile submarine communities have taken steps to collect and capitalize upon lessons learned before they operationally deploy, officials stated that these communities have yet to develop formal processes—such as written procedures or data-collection plans—to gather and share lessons learned specifically related to rotational crewing within their ship communities. LCS officials stated that their community is small at present, allowing lessons learned to be effectively shared informally, but acknowledged the need for formal processes in the future. Without formal processes, the LCS and guided missile submarine communities may be less likely to systematically collect lessons learned—similar to the mine warfare and patrol coastal communities—and therefore, miss opportunities to improve rotational crewing implementation.

While ship communities have collected lessons learned among individual commands through direct interaction, such as meetings and site visits, they have not fully used the Navy Lessons Learned System to enhance knowledge sharing. As of October 30, 2007, lessons learned directly related to rotational crewing have yet to be recorded in the Navy Lessons Learned System by the mine warfare, patrol coastal, HSV-2 *Swift*, guided missile submarine, and LCS communities. In addition, ship command officials from the mine warfare, patrol coastal, and LCS commands have indicated that they have not used the Navy Lessons Learned System to access lessons learned pertaining to rotational crewing. The following are examples where difficulties experienced by current rotational crewing efforts may have been addressed in previous lessons learned:

- Issues such as personnel gaps and training deficiencies, lack of accountable inventory control measures during the crew turnovers, mitigating ship configuration differences, and the effect of limited port visits on crew morale were identified as problem areas in focus group discussions with mine warfare, patrol coastal, and guided missile submarine rotational crews. However, lessons learned recorded by the Atlantic Fleet DDG Sea Swap initiative in the Navy Lessons Learned System had already addressed these issues.

- As previously mentioned in this report, rotational crewing efforts have been implemented in separate, disjointed efforts across ship communities without top-down leadership because the Navy has not established a management team to oversee and integrate rotational crewing efforts. However, lessons learned from the Atlantic Fleet DDG Sea Swap initiative recommended the creation of a management team to, among other things, help define performance measures for rotational crewing efforts and ensure that lessons learned are documented and incorporated into existing policies and procedures.

- The LCS community is trying to resolve barriers in transportation logistics that are addressed by lessons learned from the guided missile submarine community's exercise to help solve transportation logistics issues for forward-deployed crew turnovers. However, guided missile submarine community officials stated that they have not entered lessons learned from their rotational crewing experiences into the Navy Lessons Learned System. Consequently, the LCS community has not been able to capitalize on these lessons learned in its efforts to address transportation logistics issues. Officials from both the guided missile submarine and LCS communities stated that their experiences are likely to be pertinent to current and future ship classes and recognized the importance of recording lessons learned in the system to benefit the rest of the Navy.

As the above examples demonstrate, by not fully utilizing the Navy Lessons Learned System, the Navy may continue to experience difficulties similar to those that previously recorded lessons learned sought to correct. Until the system is used to leverage past lessons learned, ship communities may miss opportunities to more effectively plan and conduct crew rotations, and may be unable to potentially prevent problems that were addressed in past rotational crewing experiences.

The Navy Has Not Developed Overarching Processes for the Systematic Collection and Dissemination of Lessons Learned Pertaining Specifically to Rotational Crewing

Lessons learned are not developed and shared consistently across all ship communities that use rotational crewing because the Navy has not developed overarching processes to help ensure that ship commands systematically collect and disseminate lessons learned from their rotational crewing experiences. While the Chief of Naval Operations instruction for the Navy Lessons Learned System[52] establishes a process for the collection, validation, and distribution of unit feedback, Navy Lessons Learned Program officials stated that the collection and sharing of lessons learned is not required and, instead, is left to the discretion of individual ship commands. Nonetheless, the Navy Warfare Development Command, which is responsible for administering the Navy's system, has launched an initiative to actively collect lessons learned for major exercise and events, using, for example, a lessons learned team and data-collection plan to collect information. Navy Warfare Development Command officials stated that, with the proper resources, it would be possible to employ similar active collection methods specifically for rotational crewing efforts. However, aside from the Atlantic Fleet DDG Sea Swap initiative, the Navy has not developed processes to guide the active and systematic collection of lessons learned pertaining specifically to rotational crewing. The initiative's concept of operations stressed the importance of high-quality lessons learned in implementing new crewing concepts. It also expressly incorporated the Navy Lessons Learned System into lessons learned processes. However, these processes applied only to the Atlantic Fleet DDG Sea Swap initiative and were not used in other ship communities. According to the concept of operations, the risks of not taking a proactive approach to lessons learned include failing to document policy changes and preserve process improvements, which is important given the high turnover of personnel during the time frame of the initiative. Similar turnover issues may apply to other ship communities that employ rotational crewing. Without overarching guidance to promote the systematic collection and dissemination of lessons learned across all ship communities, knowledge about rotational crewing may be lost and crews will be unable to benefit from the Navy's collective experiences.

Conclusions

Given the fiscal environment facing the Navy and the rest of the federal government, decision makers must make investment decisions that

[52]Chief of Naval Operations Instruction 3500.37C, *Navy Lessons Learned System* (Mar. 19, 2001).

maximize return on investment at the best value for the taxpayer. Rotational crewing can be a viable alternative to mitigate affordability challenges in the Navy while supporting a high pace of operations and an array of mission requirements. As a result, the Navy must be in a better position to make informed decisions about the potential for applying rotational crewing to current and future ships. As new ships become increasingly expensive it is imperative that rotational crewing alternatives are fully considered early in the acquisition process when the department conducts analysis of alternatives. Without comprehensive analysis of alternatives, cost-effective force structure assessments are incomplete and the Navy does not have a complete picture of the number of ships it needs to acquire.

While the Navy has made progress in refining rotational crewing concepts, the Navy has not taken all of the steps that would be helpful to effectively manage rotational crewing efforts and assess crewing options for current and future ships. The Navy has made significant progress since our November 2004 report on rotational crewing. For example, the Atlantic Fleet DDG Sea Swap benefited from an implementation team that developed and implemented a nearly comprehensive experiment analysis plan, promulgated a detailed concept of operations, and recorded and disseminated lessons learned. Further, several ship commands have promulgated their own crew-exchange instructions and concepts of operations.

Progress has been limited, however, to specific rotational crewing efforts and has not been systematically integrated across the Navy. Without a comprehensive management approach that includes top-level leadership and an implementation team to guide and assess rotational crewing, the Navy can not be assured that rotational crewing efforts are coordinated and integrated as it attempts to lead a successful transformation of its ship-crewing culture. Further, without an overarching instruction to guide rotational crewing initiatives, the Navy may limit the potential for successfully managing, implementing, and evaluating rotational crewing as a transformational means of increasing capabilities in a cost-effective manner.

The Navy has also not developed a systematic approach to analyzing rotational crewing alternatives or collecting and sharing related lessons learned. Without a systematic approach to analyzing rotational crewing alternatives on current and future ships, the Navy may not be able to

determine if particular alternatives are successful in, or have the potential for, fulfilling operational needs and maximizing return on investment. As a result, the Navy may not develop and procure the most cost-effective mix of ships to meet operational needs. Additionally, by not systematically collecting and using lessons learned from rotational crewing experiences, the Navy risks repeating mistakes and could miss opportunities to more effectively plan and conduct crew rotations.

Recommendations for Executive Action

To facilitate the successful transformation of the Navy's ship-crewing culture, we recommend that the Secretary of Defense direct the Secretary of the Navy to take the following three actions:

- assign clear leadership and accountability for managing rotational crewing efforts;
- establish an overarching implementation team to provide day-to-day management oversight of rotational crewing efforts, coordinate and integrate efforts, and apply their results to the fleet; and
- develop and promulgate overarching guidance to provide the high-level vision and guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts.

To ensure effective management, implementation, and evaluation of rotational crewing efforts, we recommend that the Commander, U.S. Fleet Forces, direct the development and promulgation of concepts of operations by all ship communities using or planning to use rotational crewing, that include a description of how rotational crewing may be employed and the details of by whom, where, and how it is to be accomplished, employed, and executed.

To ensure that the Navy assesses the potential of different rotational crewing alternatives for improving performance and reducing costs for ship classes, we recommend that the Secretary of Defense direct the Secretary of the Navy, under the purview of the implementation team, to take the following two actions:

- develop a standardized, systematic method for data collection and analysis, assessment, and reporting on the results of rotational crewing efforts, including a comprehensive cost-effectiveness analysis that includes life-cycle costs, for all rotational crewing efforts; and

- require, as part of the mandatory analysis of alternatives in the concept refinement phase of the defense acquisition process, assessments of potential rotational crewing options for each class of surface ship in development, including full life-cycle costs of each crewing option.

To ensure that the Navy effectively leverages lessons learned, we recommend that the Secretary of Defense direct the Secretary of the Navy to take the following two actions:

- develop overarching guidance to ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing; and

- incorporate components of the lessons-learned approach outlined in the *Atlantic Fleet DDG Sea Swap Concept of Operations*, including, among other things, establishing a lessons-learned team, developing a data-collection plan, and increasing use of the Navy Lessons Learned System.

Matter for Congressional Consideration

Because DOD disagreed with our recommendations dealing with assigning clear leadership, establishing an implementation team, developing and promulgating overarching guidance, and improving the use of lessons learned, we are suggesting that Congress consider requiring the Secretary of Defense to direct the Secretary of the Navy to

- assign clear leadership and accountability for managing rotational crewing efforts;

- establish an overarching implementation team to provide day-to-day management oversight of rotational crewing efforts, coordinate and integrate efforts, and apply their results to the fleet;

- develop and promulgate overarching guidance to provide the high-level vision and guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts;

- develop overarching guidance to ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing; and

- incorporate components of the lessons-learned approach outlined in the *Atlantic Fleet DDG Sea Swap Concept of Operations*, including, among

other things, establishing a lessons-learned team, developing a data-collection plan, and increasing use of the Navy Lessons Learned System.

Congress should also consider requiring Secretary of Defense to direct the Secretary of the Navy to report to Congress on its progress when the President's budget for fiscal year 2010 is submitted to Congress.

Agency Comments and Our Evaluation

DOD, in its comments on a draft of this report, partially agreed with our three recommendations regarding concepts of operations, data collection and analysis, and rotational crewing assessments during surface-ship analysis of alternatives. DOD disagreed with our five other recommendations that would assign clear leadership and accountability for managing rotational crewing efforts; establish an overarching implementation team; develop and promulgate overarching guidance to provide the high-level vision and guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts; ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing; and incorporate components of the lessons-learned approach outlined in the *Atlantic Fleet DDG Sea Swap Concept of Operations*. DOD stated that measures are already in place to manage ship and submarine manning, training, and equipping. However, as discussed below, we do not believe that the Navy's actions go far enough in providing leadership, management, and guidance in transforming the Navy's surface-ship-crewing culture; collecting data, analyzing, reporting, and integrating the results of different rotational crewing efforts; and in documenting and acting on lessons it has learned during implementation of different rotational crewing alternatives. As such, the Navy may be missing opportunities to improve its transformational capabilities and cost-effectively increase surface-ship operational availability. Therefore, we are suggesting that Congress consider requiring the Secretary of Defense to direct the Secretary of the Navy to implement our recommendations and report to Congress on its progress when the President's budget for fiscal year 2010 is submitted to Congress. The department also provided technical comments which were incorporated as appropriate. DOD's comments are reprinted in their entirety in appendix III. Our specific comments follow.

DOD disagreed with our recommendation that the Navy facilitate the successful transformation of its ship-crewing culture by assigning clear leadership and accountability for managing rotational crewing efforts. DOD stated that the Department of the Navy has existing clear leadership

and accountability for the manning of ships and submarines and that this management structure includes oversight and leadership within both operational and administrative chains of command. It further noted that additional organizational structure dedicated to rotational crewing is unnecessary and potentially counterproductive. We have identified several key management practices at the center of implementing transformational programs, which include ensuring that top leadership drives the transformation. While the Navy has administrative and operational management structures, there is not a designated leader to manage all rotational crewing efforts in the Department of the Navy. As a result, numerous separate rotational crewing efforts continue with little, if any, top-down leadership and coordination, and no team or steering group exists within the Navy to manage the transformation of the Navy's ship-crewing culture. We continue to believe that our recommendation merits further action and have included this issue in a matter for congressional consideration.

DOD disagreed with our recommendation that the Navy should establish an overarching implementation team to provide day-to-day management oversight of rotational crewing efforts, coordinate and integrate efforts, and apply their results to the Fleet. DOD stated that the Navy already exercises day-to-day management to support ship and submarine manning and training and that an implementation team dedicated to rotational crewing is unnecessary and potentially counterproductive. We reported in 2003 that key practices for successful transformations include that an implementation team should be responsible for the day-to-day management of transformation to ensure various initiatives are integrated. Although the Navy has established implementation teams for selected rotational crewing initiatives and has other existing management structures, it has not established an implementation team for managing all rotational crewing programs to ensure successful transformation of the Navy's ship-crewing culture. As a result, the Navy does not have a dedicated team or steering group that can devote focused attention, provide a communication structure, apply lessons learned, and execute other key practices that would build on its successful efforts and ensure consistent management of rotational crewing across the fleet. We continue to believe that our recommendation merits further action and have included this issue in a matter for congressional consideration.

DOD disagreed with our recommendation that the Navy should develop and promulgate overarching guidance to provide the high-level vision and

guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts. DOD stated that the Navy has sufficient guidance in place to provide the high-level vision necessary to manage ship and submarine manning. As discussed in the report, the Navy has developed guidance for some rotational crewing efforts. However, the development, dissemination, and implementation of rotational crewing guidance has been inconsistent and fragmented. As noted in this report, an overarching directive for rotational crewing would provide essential and consistent Navy-wide policy and guidance on rotational crewing efforts; establish leadership, delegate authority, and assign responsibilities; assign missions, functions, or tasks; and establish a reporting requirement. DOD also stated that, although rotational crewing includes some unique crew considerations and support requirements, the training and support of sailors involved in rotational crewing are little different than those for sailors in the standard crewing process. We agree that the goals and objectives of ship and crew training and support are little different between rotational and standard crews. However, as shown in some of the concepts of operations and in the Navy Lessons Learned System, crew exchange guidance for rotational crewing and the execution of training and support for rotational crewing efforts can provide many unique challenges for sailors, in addition to the challenge of adapting sailors to a change in ship-crewing culture. We continue to believe that our recommendation merits further action and have included this issue in a matter for congressional consideration.

DOD partially agreed with our recommendation that the Commander, U.S. Fleet Forces, direct the development and promulgation of concepts of operations by all ship communities using or planning to use rotational crewing. DOD stated that the Navy already uses appropriate concepts for fleet operations and, when or if additional rotational crewing is warranted, the Navy will issue specific guidance, instructions, and concepts of operations. While we strongly support the Navy's efforts to develop concepts of operations that guide fleet rotational crewing efforts, its efforts have been inconsistent. For example, ship communities, such as patrol coastal and mine warfare, have experienced implementation challenges because they lacked key information such as the roles and responsibilities of individual decision makers, managers, and leaders involved in rotational crewing execution. For these reasons, we continue to believe that our recommendation merits further action and that the Commander, U.S. Fleet Forces, should direct the development and promulgation of concepts of operations by all ship communities using or

planning to use rotational crewing, using the *Atlantic Fleet DDG Sea Swap Concept of Operations* as a model for other rotational crewing initiatives.

DOD partially agreed with our recommendation that the Navy develop a standardized, systematic method for data collection and analysis, assessment, and reporting on the results of rotational crewing efforts, including a comprehensive cost-effectiveness analysis that includes life-cycle costs, for all rotational crewing efforts. DOD stated that the Navy has no plans for broad general application of rotational crewing to all ship classes, and a standing implementation team and data collection is unnecessary. DOD also stated that the Navy will conduct appropriate studies to determine if and when additional rotational crewing is appropriate based on cost effectiveness. While we support DOD's efforts to proactively conduct studies, based on cost effectiveness, to determine if and when rotational crewing is appropriate to use on surface ships, we urge the Navy to take steps to develop a standardized, systematic method for collecting data and analyzing, assessing, and reporting results, including cost-effectiveness analysis, on all rotational crewing efforts, including those currently underway. As discussed in the report, the Surface Warfare Enterprise is collecting data from surface ships, including those participating in rotational crewing initiatives; however, the data they collect is not consistent from initiative to initiative, and none of the data are tied to the effectiveness of different crewing schemes or rotational versus traditional crewing schemes. DOD also stated that the LCS is the only new ship class that currently plans on implementing rotational crewing. While we agree that the LCS is the only new ship class with definitive plans to rotationally crew its ships, several other future ship classes, including the Joint High Speed Vessel, DDG-1000, and CG(X), still fit the requirements of potential rotationally crewed ships, as described by Fleet Forces Command. Therefore, we continue to believe, as we have recommended, that DOD should direct the Navy to develop a standardized, systematic method for data collection and analysis, assessment, and reporting on the results of rotational crewing efforts, including a comprehensive cost-effectiveness analysis that includes life-cycle costs, so that the potential value of rotational crewing will be known and the Navy will be able to determine optimal crewing concepts for current and future ship classes.

DOD partially agreed with our recommendation that the Navy require, as part of the mandatory analysis of alternatives in the concept refinement phase of the defense acquisition process, assessments of potential

rotational crewing options for each class of surface ship in development, including full life-cycle costs of each crewing option. DOD agreed that all feasible crewing options should be considered during the concept refinement phase of the defense acquisition process. Ships determined to have a potential advantageous rotational crewing application will assess and include this option among the various crewing alternatives reported by the analysis of alternatives. We support DOD's assessment that all feasible rotational crewing options should be considered during the concept refinement phase in the analysis of alternatives.

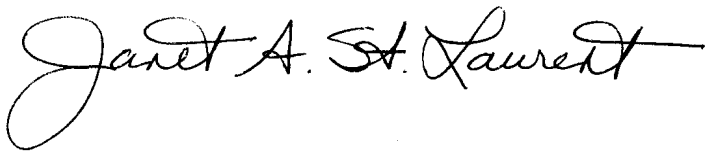
DOD disagreed with our recommendation that the Navy develop overarching guidance to ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing. DOD stated that the Navy already uses "lessons learned" tools as part of the rotational crewing and that further guidance to use these tools is not needed. We support the progress the Navy has made in collecting lessons learned and documenting these lessons in the Navy Lessons Learned System. However, as discussed in the report, most ship communities did not submit or draw on lessons in the Navy Lessons Learned System to enhance knowledge sharing or learn from others' experiences. For example, the mine warfare, patrol coastal, LCS, and guided missile submarine communities lack formal written processes to collect lessons learned related specifically to rotational crewing. Without guidance to ensure collection and dissemination of lessons learned, the Navy unnecessarily risks repeating past mistakes and could miss opportunities to more effectively plan and conduct crew rotations. Therefore, we continue to believe that our recommendation merits further action and have included this issue in a matter for congressional consideration.

DOD disagreed with our recommendation that the Navy incorporate components of the lessons-learned approach outlined in the *Atlantic Fleet DDG Sea Swap Concept of Operations*, including, among other things, establishing a lessons-learned team, developing a data-collection plan, and increasing use of the Navy Lessons Learned System. DOD stated that the Navy already relies on data collection and analysis from ships and that requiring already implemented rotational crewing efforts to adopt experimental data collection procedures is unnecessary. DOD further stated that procedures are already in place for crews, rotational or standard, to provide data to the chain of command to identify improvements. As discussed in the report, the Navy has taken some

actions to collect, disseminate, and capitalize on lessons learned from its crew rotation experiences. However, despite some progress in collecting and sharing lessons learned within individual ship communities, the Navy's efforts in many cases were not systematic and did not use the Navy Lessons Learned System. Instead, the development and sharing of lessons learned relied on informal processes that are left to individual ship commands, and thus were not done consistently across all ship communities that use rotational crewing. The initiative ensured documentation of lessons learned by outlining a requirement and a process in the *Atlantic Fleet DDG Sea Swap Concept of Operations*. The concept of operations also noted that the risks of not taking a proactive approach to lessons learned include failing to document policy changes and preserve process improvements, which is important given the high turnover of personnel during the time frame of the initiative. We believe that our recommendation merits further action and have included this issue in a matter for congressional consideration.

We are sending copies of this report to the Secretary of Defense; the Secretary of the Navy; the Chairman, Joint Chiefs of Staff; and the Director, Office of Management and Budget. We will also make copies available to other congressional committees and interested parties on request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-4402 or stlaurentj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix IV.



Janet St. Laurent
Managing Director
Defense Capabilities and Management

List of Committees

The Honorable Carl Levin
Chairman
The Honorable John McCain
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Ike Skelton
Chairman
The Honorable Duncan L. Hunter
Ranking Member
Committee on Armed Services
House of Representatives

Appendix I: Ships Included in Our Evaluation

Ohio-class Ballistic Missile Submarine

Nuclear-powered *Ohio*-class ballistic missile submarines, also known as Trident submarines, provide the sea-based leg of the triad of U.S. strategic deterrent forces and the most survivable nuclear strike capability. The ballistic missile submarine force consists of 14 submarines—6 homeported in Kings Bay, Georgia, and 8 in Bangor, Washington. Each submarine has about 15 officers and 140 enlisted personnel.

To maintain a constant at-sea presence, a Blue-Gold rotational crewing concept is employed on these submarines. Each ship has a "Blue" Crew and a "Gold" Crew, each with its own respective ship command. The ship deploys with one of these crews for 77 days, followed by a 2- to 3-day crew turnover and a 35-day maintenance period. For example, after a Blue Crew deployment, the Gold Crew takes command of the boat following a 3-day turnover process. The Blue Crew assists the Gold Crew in conducting maintenance repairs. During the Gold Crew's patrol, the Blue Crew stands down and enters a training cycle in its homeport.

Figure 4: U.S.S. *Nevada*, an *Ohio*-class Ballistic Missile Submarine

Source: U.S. Navy.

Ohio-class Guided Missile Submarine

The first four of the *Ohio*-class Trident fleet ballistic missile submarines are being converted to nuclear-powered guided missile and special-operations submarines. Two submarines will be homeported in Kings Bay, Georgia, and two will be homeported in Bangor, Washington. Each submarine has about 15 officers and 144 enlisted personnel and can carry up to 66 Special Operations Forces personnel.

According to Navy officials, in order to provide greater operational availability, Blue-Gold rotational crewing is employed on these submarines. Each submarine has a "Blue" crew and a "Gold" crew and each crew has its own respective command. The operating cycle consists of four alternating Blue and Gold crew deployments averaging about 73 days followed by a homeport maintenance period of 100 days. Two- to 3-day crew turnovers will take place overseas at sites such as Guam and Diego Garcia and coincide with a 23-day voyage-repair period.

Figure 5: U.S.S. *Ohio*, an *Ohio*-class Guided Missile Submarine, with a Drydeck Shelter, Arrives at Naval Station Pearl Harbor before Continuing on Its Maiden Deployment to the Western Pacific

Source: U.S. Navy.

Arleigh Burke–class Guided Missile Destroyer

The *Arleigh Burke*–class guided missile destroyers provide multimission offensive and defensive capabilities, operating independently or as part of other naval formations. The guided missile destroyer force consists of 52 ships—with primary homeports in San Diego, California, and Norfolk, Virginia. Each destroyer has about 24 officers and 250 enlisted personnel.

The Commander, Naval Surface Force, U.S. Atlantic Fleet, conducted a Sea Swap initiative during 2005–2007, as a follow-on to the 2002–2004 proof-of-concept demonstration conducted by the Commander, Naval Surface Force, U.S. Pacific Fleet. Both Sea Swap experiments involved three guided missile destroyers and three crews, with crews rotating every 6 months to the forward-deployed ship.

Figure 6: The U.S.S. *Benfold*, an *Arleigh Burke*–class Guided Missile Destroyer, with a Rigid Hull Inflatable Boat Passing in the Foreground

Source: U.S. Navy.

Cyclone-class Patrol Coastal

The *Cyclone*-class patrol coastal ships are small Navy vessels used to conduct surveillance and shallow-water interdiction operations in support of maritime homeland security operations and coastal patrol of foreign shores. The patrol coastal force consists of eight ships—five homeported in Bahrain and three in Little Creek, Virginia. Five additional ships will be returned from loan to the U.S. Coast Guard over the next 3 years. Each patrol coastal has about 4 officers and 26 enlisted personnel.

According to Navy officials, the Navy is using a Horizon rotational crewing model on patrol coastal ships in which 13 crews rotate among the eight ships in order to increase operation days in the Arabian Gulf. Each crew spends 6 months deployed to Bahrain and then 10 months training in homeport in Virginia.

Figure 7: The *Cyclone*-class Coastal Patrol Craft U.S.S. *Whirlwind* (PC 11) Protects Iraq's Oil Terminals in the Northern Persian Gulf

Source: U.S. Navy.

Avenger-class Mine Countermeasure

The *Avenger*-class mine countermeasure ships are mine hunter-killers capable of finding, classifying, and destroying moored and bottom mines. The mine countermeasure ship force consists of 14 ships—8 homeported in Ingleside, Texas, 4 homeported in Bahrain, and 2 homeported in Sasebo, Japan. Each mine countermeasure ship has about 8 officers and 76 enlisted personnel.

According to Navy officials, in order to increase operation days in the Arabian Gulf, the Navy utilizes a Blue-Gold-Silver rotational crewing model on mine countermeasure ships. A "Blue" crew and a "Gold" crew are assigned to each of the four ships in Bahrain and four of the eight ships in Texas. The "Blue" and "Gold" crews rotate by spending 4 months deployed in Bahrain and then 4 months back in Texas. Four remaining crews in Texas make up "Silver" crews assigned to the other four ships in Texas.

Figure 8: The U.S.S. *Pioneer*, a Mine Countermeasure Ship

Source: U.S. Navy.

High Speed Vessel (HSV) 2 *Swift*

The HSV-2 *Swift* is a high-speed wave-piercing aluminum-hulled catamaran that was acquired as an interim mine warfare command and support ship and a platform for conducting joint experimentation, including Littoral Combat Ship program development. The *Swift* has about 45 crew members (officer and enlisted). The Navy leased and accepted delivery of the *Swift* from the builder, Bollinger/Incat, in August 2003.

The *Swift* utilizes Blue-Gold crewing to maximize operational availability. The "Blue" crew is based in Ingleside, Texas, and the "Gold" crew in Little Creek, Virginia. Each crew operates the ship for about 117 days, with 3–4 day crew exchanges occurring wherever the ship happens to be at the end of that period whether homeport or at overseas locations.

Figure 9: The HSV-2 *Swift*

Source: U.S. Navy.

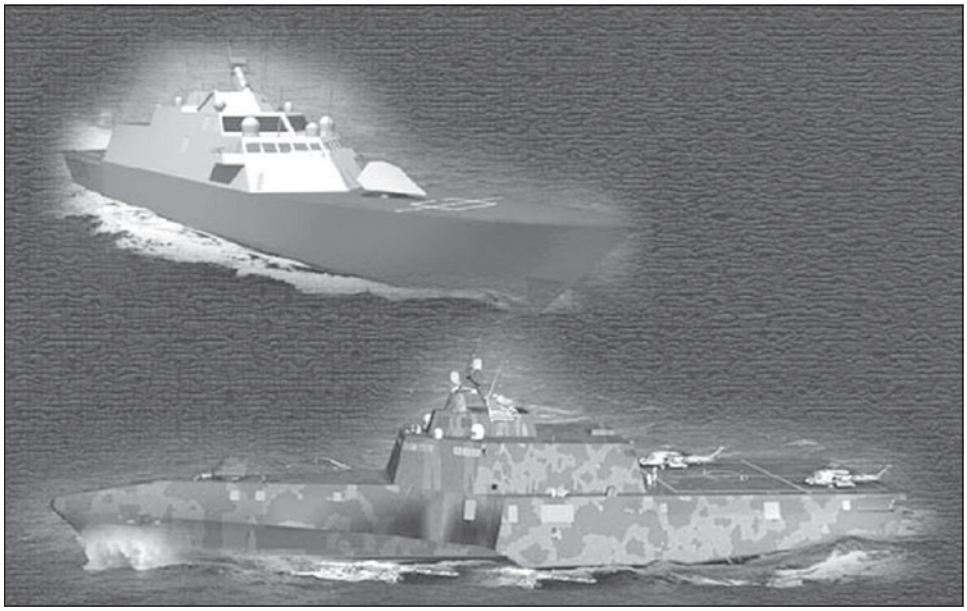
Littoral Combat Ship

The Littoral Combat Ship is a new class of Navy surface combatants that is intended to be fast, agile, and tailorable to the specific missions of antisurface warfare, antisubmarine warfare, and mine warfare in heavily contested littoral and near-shore waters. Interchangeable mission packages will be used to assure access to the littorals for Navy forces in the face of threats from surface craft, submarines, and mines. The Navy plans to build 55 of these ships over the life of the program, as well as 24 mine-warfare mission packages, 24 surface-warfare mission packages, and 16 anti-submarine-warfare mission packages. The Littoral Combat Ship core crew, which will man the seaframe, will have 40 crewmembers while each mission package will have a maximum of 15 personnel onboard, and the aviation detachment will have 23.

In order to increase operational availability, the Navy is exploring various rotational crewing options. The first two ships now under construction will utilize the Blue-Gold rotational crewing model. As more ships are commissioned, the Navy plans to use a rotational crewing concept similar to the one employed on mine warfare ships. Specifically, the Navy envisions using four crews to operate three ships based in the continental

United States, of which one ship would be forward-deployed at any given time.

Figure 10: Design Depictions of the Littoral Combat Ship



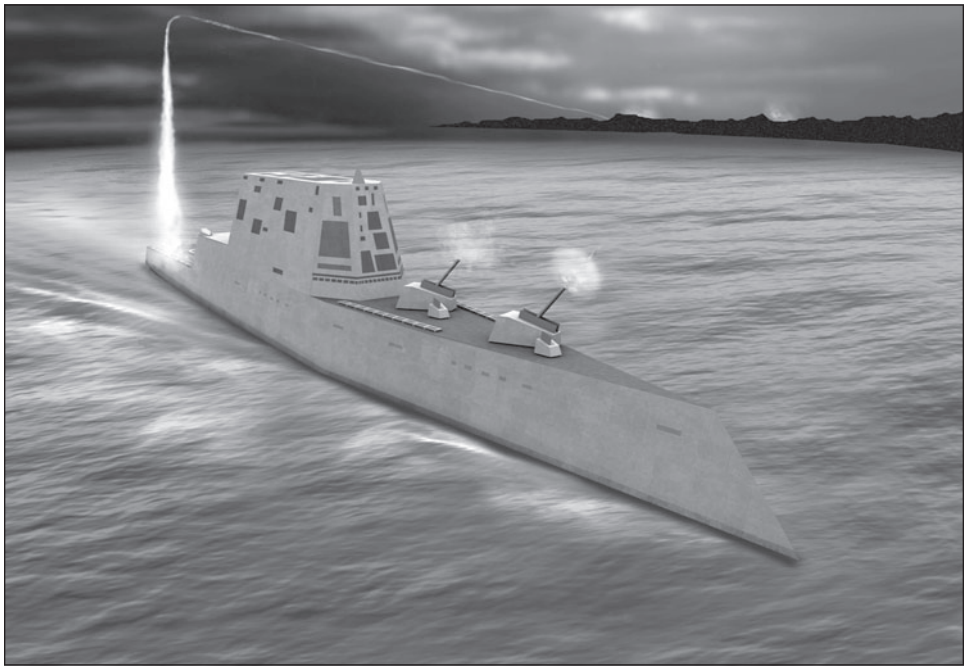
Source: U.S. Navy.

DDG-1000 *Zumwalt*-class Multimission Destroyer

Developed under the DD(X) destroyer program, the DDG-1000 *Zumwalt* is the lead ship of a class of next-generation multimission destroyers tailored for land attack and littoral dominance. The *Zumwalt*-class will provide forward presence and deterrence, and operate as an integral part of joint and combined expeditionary forces. The ship has not been built, but the first ship is planned for delivery to the Navy in 2013. The planned procurement of the DDG-1000 will be completed by fiscal year 2013 with a total of seven ships. Current DDG-1000 plans anticipate a crew size of 148 people including a 28 person aviation detachment.

The Navy currently plans to utilize the standard one-ship, one-crew model on the DDG-1000. However, in the Atlantic Fleet DDG Sea Swap report, Fleet Forces Command notes that rotational crewing models are being considered for the DDG-1000, likely due to their role as a high-demand, low-density asset.

Figure 11: Design Depiction of the Navy's Next Generation Destroyer, DDG-1000



Source: U.S. Navy.

Joint High Speed Vessel

The Joint High Speed Vessel will provide combatant commanders high-speed intratheater sealift mobility with inherent cargo handling and the capability of transporting personnel, equipment, and supplies over operational distances in support of maneuver and sustainment operations. The ship has not been built, but the first ship is planned for delivery to the Navy in 2011. According to Navy officials, there are eight ships in the current program of record—3 Navy and 5 Army. Current Navy plans anticipate a crew size of about 40 persons. Naval Sea Systems Command officials explained that crewing alternatives for the Joint High Speed Vessel are still under development. Officials also explained that the Navy has not selected a material solution for the Joint High Speed Vessel and is in source selection for multiple concept designs.

CG(X)-class Cruiser

The Navy is currently developing technologies and studying design options for a planned new air- and missile-defense surface combatant, the CG(X) cruiser. The Navy is currently reviewing an analysis of alternatives to determine what capabilities and design the CG(X) will have, including

nuclear power options. The Navy intends to begin buying the CG(X) cruiser in 2011 and amass a total ship force of 19 ships. Crew size has not been determined. Naval Sea Systems Command officials explained that crewing alternatives for the CG(X) are still under development. Officials also explained that the Navy has not selected a material solution for CG(X), as it is premilestone A and the Analysis of Alternatives is in review within the Navy.

Appendix II: Scope and Methodology

To assess the extent to which the Navy employed a comprehensive management approach to coordinate and integrate rotational crewing efforts and transform its ship-crewing culture, we interviewed officials from the Department of the Navy, Fleet headquarters, and the private sector; reviewed relevant Navy practices and speeches by Navy leadership; received briefings from relevant officials; and compared the Navy's approach with our prior work on best practices for managing and implementing organizational transformations. To identify these best practices, we reviewed our prior work including GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*. We reviewed key documents including the *Littoral Combat Ship Platform Wholeness Concept of Operations* and the *U.S. Fleet Forces DDG Sea Swap Initiative Final Report*. We also conducted focus groups with crews participating in rotational crewing initiatives to obtain views, insights, and feelings of Navy submarine and ship officers and enlisted personnel, as well as to determine the extent to which the Navy had transformed its ship-crewing culture. In addition, we examined key documents from the Navy's Fleet Training area to demonstrate the architecture of an overarching implementation team.

To assess the extent to which the Navy has developed, disseminated, and implemented guidance for rotational crewing on surface ships, we interviewed officials from the U.S. Fleet Forces Command; Commander, Naval Surface Forces; and Commander, Naval Submarine Forces. We also interviewed officials from the Patrol Coastal Class Squadron; Mine Countermeasures Squadrons One, Two, and Three; Submarine Group Trident; HSV-2 *Swift*; and the Littoral Combat Ship Class Squadron. In addition, we obtained and reviewed exchange of command guidance issued by Commander, Naval Surface Forces, and its subordinate commands, including the Commander, Mine Warfare Command, Commander Mine Countermeasures Squadron Two, Patrol Coastal Class Squadron, and Regional Support Organization Norfolk that provided oversight of the Atlantic Fleet DDG Sea Swap ships and crews. We also obtained and reviewed concept of operations for the Atlantic Fleet DDG Sea Swap, the Littoral Combat Ship, and guided missile submarine program. To assess the potential usefulness and application of concepts of

operations we reviewed best practices guidance in the Navy, Department of Defense, and the Department of Transportation.[1]

To assess the extent to which the Navy has analyzed, evaluated, and assessed potential rotational crewing efforts for current and future ships, we interviewed officials from the Department of the Navy, Fleet headquarters, and the private sector; and received briefings from relevant officials. We reviewed and analyzed the *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan* and the *U.S. Fleet Forces DDG Sea Swap Initiative Final Report.* We also reviewed the analysis of alternatives guidance contained in DOD and Navy acquisition instructions[2] and the *Defense Acquisition Guidebook*.[3] We also obtained and analyzed the analysis of alternatives for several ships in development, including the DDG-1000, Littoral Combat Ship, and Joint High Speed Vessel. To determine military best practices for data collection and evaluation, we reviewed several key documents including the *Guide for Understanding and Implementing Defense Experimentation* and the Navy Warfare Development Command's *Analysis in Sea Trial Experimentation*, and prior GAO reports.[4] In addition, we conducted focus groups with crews participating in rotational crewing initiatives to obtain views, insights, and feelings of Navy submarine and surface-ship officers and enlisted

[1]Best practices for developing a concept of operations were derived from a number of sources, including: Commander U.S. Fleet Forces Command Instruction 5401.1, *Fleet Concept of Operations Development* (Sept. 4, 2007); Naval Warfare Development Command concepts of operations briefings and fact sheets; Sholom Cohen, *Guidelines for Developing a Product Line Concept of Operations*, Software Engineering Institute, Carnegie Mellon University (Pittsburgh, Pa., August 1999), under a contract sponsored by DOD; Department of Transportation, *Systems Engineering Guidebook for ITS*, Version 2.0 (Jan. 2, 2007); and others.

[2]Department of Defense Instruction 5000.2, *Operation of the Defense Acquisition System*, (May 12, 2003) and Secretary of the Navy Instruction 5000.2C, *Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System* (Nov. 19, 2004).

[3]The *Defense Acquisition Guidebook* is an Internet-based resource maintained by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics Knowledge Sharing System program office at the Defense Acquisition University.

[4]See GAO, *Military Readiness: Navy's Fleet Response Plan Would Benefit from a Comprehensive Management Approach and Rigorous Testing*, GAO-06-84 (Washington, D.C.: Nov. 22, 2005) and *Force Structure: Joint Seabasing Would Benefit from a Comprehensive Management Approach and Rigorous Experimentation before Services Spend Billions on New Capabilities*, GAO-07-211 (Washington, D.C.: Jan. 26, 2007).

personnel, as well as to determine the extent to which the Navy collects, analyzes, and evaluates rotational crewing data.

To assess the extent to which the Navy has systematically collected, disseminated, and capitalized on lessons learned from past and current rotational crewing experiences, we interviewed officials from the following Navy commands: Navy Warfare Development Command, Naval Surface Forces Command, Mine Countermeasure Class Squadron, Patrol Coastal Class Squadron; from the guided missile submarine, HSV-2 *Swift*, and LCS communities; and we conducted 19 focus group meetings with rotational crews. We also obtained and reviewed the *Atlantic Fleet DDG Sea Swap Experiment Analysis Plan*, the *Atlantic Fleet DDG Sea Swap Concept of Operations*, the *U.S. Fleet Forces DDG Sea Swap Initiative Final Report*, the *Littoral Combat Ship Platform Wholeness Concept of Operations*, and documentation of lessons learned from the guided missile destroyer (DDG), mine warfare, and guided missile submarine communities. In addition, we queried the Navy Lessons Learned System for lessons learned pertaining directly to rotational crewing and reviewed Navy Lessons Learned System guidance. We assessed the Navy Lessons Learned System by interviewing program officials, requesting data queries by these officials and comparing the results of these queries with our own data queries, and determined the data were sufficiently reliable for our analysis.

We conducted this performance audit from February 2007 to May 2008, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We conducted our review at the following locations:

Washington, D.C.

- Offices of the Chief of Naval Operations, Deputy Chief of Naval Operations (Integration of Capabilities & Resources)
  - Director, Assessments
  - Director, Expeditionary Warfare
  - Director, Surface Warfare
  - Director, Submarine Warfare
- Naval Sea Systems Command
  - PEO Ships–Combatants

	• PEO Ships–Amphibious, Auxiliary and Sealift • Headquarters, U.S. Coast Guard • Center for Naval Analyses
Norfolk, Virginia	• U.S. Fleet Forces Command • Commander, Naval Submarine Forces • Deputy Commander, Naval Surface Forces • Navy Warfare Development Command • Navy Lessons Learned System Program Office • U.S.S. *Bainbridge* (DDG-96) • U.S. Coast Guard, Atlantic Area Command, Portsmouth, Virginia • Board of Inspection and Survey
Little Creek, Virginia	• Patrol Coastal Class Squadron • U.S.S. *Squall* (PC-7) • HSV-2 *Swift* Blue and Gold
San Diego, California	• Commander, Naval Surface Forces, San Diego, California • Offices of the Naval Surface Forces Command • Littoral Combat Ship Class Squadron • Littoral Combat Support Facility • Littoral Combat Ship Training Facility • Commander, U.S. Third Fleet • Naval Base San Diego • Naval Mine and Anti-Submarine Warfare Command
Ingleside, Texas	• Commander, Mine Countermeasure Class Squadron • Squadron One, Squadron Two, and Squadron Three • U.S.S. *Chief* (MCM-14)
Bangor, Washington	• Commander, Submarine Group Trident • Naval Intermediate Maintenance Facility, Pacific Northwest (formerly Trident Refit Facility) • Trident Training Facility • U.S.S. *Ohio* (SSGN-726)

We held group discussions with selected personnel such as commanding officers, executive officers, department heads, and crew members from the following units, in the locations noted above:

- Patrol Coastal Crew Kilo

- Patrol Coastal Crew Lima
- Mine Countermeasure officers and crews from *Constant*, *Conflict*, *Impervious*, and *Implicit* crews
- Ballistic Missile Submarine officers and crews from multiple crews
- Guided Missile Submarine officers and crews from *Ohio* and *Michigan* crews
- HSV-2 *Swift* Blue and Gold Crew commanding officers and executive officers and Gold Crew officers and enlisted crews

Focus Groups with Crews on Rotational Crewing Ships

We conducted focus group meetings with Navy submarine and ship officers and enlisted personnel who were involved in crew rotations. Focus groups involve structured small group discussions designed to gain more in-depth information about specific issues that cannot easily be obtained from single or serial interviews. As with typical focus group methodologies, our design included multiple groups with varying group characteristics but some homogeneity—such as rank and responsibility—within groups. Most groups involved 7 to 10 participants. Discussions were held in a structured manner, guided by a moderator who used a standardized list of questions to encourage participants to share their thoughts and experiences. Our overall objective in using a focus group approach was to obtain views, insights, and feelings of Navy submarine and ship officers and enlisted personnel involved in crew rotations.

Scope of Our Focus Groups

To gain broad perspectives, we conducted 19 separate focus group sessions with multiple groups of Navy ship officers and enlisted personnel involved in crew rotations on a broad range of ship types, from small focused mission ships such as patrol coastals to larger, more complex ships such as nuclear-powered and nuclear-armed strategic missile submarines. Table 3 identifies the composition of the focus groups on each of the vessels. Across focus groups, participants were selected to ensure a wide distribution of officers, enlisted personnel, seniority, and ship departments. GAO analysts traveled to three naval stations to conduct the focus groups.

Table 3: Number of Focus Groups by Personnel Group and Platform

Personnel groups	Strategic submarines	Guided missile submarines	Patrol coastal ships	HSV-2 *Swift*	Mine countermeasure ships	Total groups
Junior enlisted personnel	1	1	2	1	3	**8**
Chief petty officers/lead petty officers	1	2	1[a]	-	1	**5**
Senior enlisted personnel	-	-	1	1	1	**3**
Officers	2	1	1[a]	-	-	**3**
Total	**4**	**4**	**4**	**2**	**5**	**19**

Source: GAO.

[a]One Patrol Coastal focus group contained both chief petty officers and officers.

Methodology for Our Focus Groups

We conducted focus groups with all ship communities currently participating in rotational crewing. The number of focus groups we conducted varied by ship community depending upon ship crew sizes, the types of crew member responsibilities (e.g., command, engineering, and maintenance) and the experience level of the crew members. We developed a guide to assist the moderator in leading the discussions. The guide helped the moderator address several topics related to crew rotations: training, maintenance, infrastructure and operations, management and oversight, readiness, crew characteristics, quality of life, lessons learned, and overall satisfaction with the rotational crewing experience. We assured participants anonymity of their responses, in that names would not be directly linked to their responses.

Limitations of Focus Groups

Methodologically, focus groups are not designed to (1) demonstrate the extent of a problem or to generalize results to a larger population, (2) develop a consensus to arrive at an agreed-upon plan or make decisions about what actions to take, or (3) provide statistically representative samples or reliable quantitative estimates. Instead, they are intended to generate in-depth information about the focus group participants' reasons for the attitudes held toward specific topics and to offer insights into the range of concerns and support for an issue.

The projectability of the information produced by our focus groups is limited for several reasons. First, they represent the responses of Navy ship officers and enlisted personnel from the 19 selected groups. Second, while the composition of the groups was designed to assure a distribution of Navy officers, enlisted personnel, seniority, and ship departments, the

groups were not randomly sampled. Third, participants were asked questions about their specific experiences with crew rotations. The experiences of other Navy ship officers and personnel involved in crew rotations, who did not participate in our focus group, may have varied.

Because of these limitations, we did not rely entirely on focus groups, but rather used several different methodologies to corroborate and support our conclusions.

Appendix III: Comments from the Department of Defense

OFFICE OF THE UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND READINESS

MAY 12 2008

Janet A. St. Laurent
Managing Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Ms. St. Laurent:

This is the Department of Defense (DoD) response to the GAO draft report, GAO-08-418, "FORCE STRUCTURE: Ship Rotational Crewing Initiatives Would Benefit From Top Level Leadership, Navywide Guidance, Comprehensive Analysis and Improved Lessons Learned Sharing," dated April 8, 2008 (GAO Code 350966).

DoD appreciates the opportunity to comment on the draft report. Detailed comments on the GAO recommendations are enclosed.

Sincerely,

Joseph J. Angello
Acting
Deputy Under Secretary of Defense (Readiness)

Enclosure:
As Stated

GAO DRAFT REPORT – DATED APRIL 8, 2008
GAO CODE 350966/GAO-08-418

"FORCE STRUCTURE: Ship Rotational Crewing Initiatives Would Benefit From Top Level Leadership, Navywide Guidance, Comprehensive Analysis and Improved Lessons Learned Sharing"

DEPARTMENT OF DEFENSE COMMENTS TO THE RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy to assign clear leadership and accountability for managing rotational crewing efforts.

DOD RESPONSE: Non-concur. The Department of the Navy has clear leadership and accountability for the manning of ships and submarines. This management structure includes oversight and leadership within both operational and administrative chains of command. These organizational structures provide for manning, training and equipping all Navy ships and submarines regardless of crewing concept. Additional organizational structure dedicated to rotational crewing is unnecessary and potentially counterproductive.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy to establish an overarching implementation team to provide day-to-day management oversight of rotational crewing efforts, coordinate and integrate efforts, and apply their results to the Fleet.

DOD RESPONSE: Non-concur. The Navy already exercises day-to-day management to support ship and submarine manning and training. An implementation team dedicated to rotational crewing is unnecessary and potentially counterproductive.

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy to develop and promulgate overarching guidance to provide the high-level vision and guidance needed to consistently and effectively manage, implement, and evaluate all rotational crewing efforts.

DoD RESPONSE: Non-concur. The Navy has sufficient guidance in place to provide the high-level vision necessary to manage ship and submarine manning. Although rotational crewing includes some unique crew considerations and support requirements, the training and support of Sailors involved in rotational crewing are little different than those for Sailors in the standard crewing process.

RECOMMENDATION 4: The GAO recommends that the Commander, U.S. Fleet Forces direct the development and promulgation of concepts of operations by all ship communities, using or planning to use rotational crewing, that include a description of how rotational crewing may be employed and the details of by whom, where, and how it is to be accomplished, employed, and executed.

DoD RESPONSE: Partial concur. The Navy already uses appropriate concepts for Fleet operations. When or if additional rotational crewing is warranted, the Navy will issue specific guidance, instructions, and/or concepts of operations.

RECOMMENDATION 5: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, under the purview of the implementation team, to develop a standardized, systematic method for data collection and analysis, assessment and reporting on the results of rotational crewing efforts, including a comprehensive cost-effectiveness analysis that includes life cycle costs, for all rotational crewing efforts.

DoD RESPONSE: Partial concur. The Littoral Combat Ship is the only new ship class that currently plans on implementing rotational crewing. The Navy has no plans for broad general application of rotational crewing to all ship classes, and a standing implementation team and data collection is unnecessary. The Navy will conduct appropriate studies to determine if and when additional rotational crewing is appropriate based on cost effectiveness.

RECOMMENDATION 6: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, under the purview of the implementation team, to require as part of the mandatory analysis of alternatives in the concept refinement phase of the defense acquisition process, assessments of potential rotational crewing options for each class of surface ship in development, including full life cycle costs of each crewing option.

DoD RESPONSE: Partial concur. The Department of Defense agrees that all feasible crewing options should be considered during the concept refinement phase of the defense acquisition process. Ships determined to have a potential advantageous rotational crewing application will assess and include this option among the various crewing alternatives reported by the Analysis of Alternatives.

RECOMMENDATION 7: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy to develop overarching guidance to ensure the systematic collection and dissemination of lessons learned pertaining specifically to rotational crewing.

DoD RESPONSE: Non-concur. The Navy already uses “lessons learned” tools as part of the rotational crewing. Further guidance to use these tools is not needed.

RECOMMENDATION 8: The GAO recommends that the Secretary of Defense direct the Secretary of the Navy to incorporate components of the lessons learned approach outlined in the Atlantic Fleet [guided missile destroyer] DDG Sea Swap initiative concept of operations, including, among other things, establishing a lessons learned team, developing a data collection plan, and increasing use of the Navy Lessons Learned System.

DoD RESPONSE: Non-concur. The Department of the Navy already relies on data collection and analysis from ships. Requiring already implemented rotational crewing efforts to adopt experimental data collection procedures is unnecessary. Procedures are already in place for crews, rotational or standard, to provide data to the chain of command to identify improvements.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Janet St. Laurent, (202) 512-4402 or stlaurentj@gao.gov

Acknowledgments

In addition to the contact named above, Patricia Lentini, Assistant Director; James R. Bancroft; Renee S. Brown; Karen (Nicole) Harms; Jeffrey R. Hubbard; Roderick W. Rodgers; Rebecca Shea; Christopher T. Watson; and Johanna Wong made significant contributions to this report.

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