

REVISION 1

REPORT DOCUMENTATION PAGE			<i>Form Approved</i> OMB No. 074-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 18 March 2004	3. REPORT TYPE AND DATES COVERED Symposium Paper 17-18 March 2004		
4. TITLE AND SUBTITLE Reduced Manning in DDG 51 Class Warships: Challenges, Opportunities and the Way Ahead for Reduced Manning on all US Navv ships		5. FUNDING NUMBERS N/A		
6. AUTHOR(S) RADM James B. Hinkle, USN (Ret) CAPT Terry L. Glover, USN (Ret)				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Anteon Corp. 2231 Crystal Drive Arlington, VA 22202		8. PERFORMING ORGANIZATION REPORT NUMBER N/A		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		10. SPONSORING / MONITORING AGENCY REPORT NUMBER N/A		
11. SUPPLEMENTARY NOTES Prepared for the Engineering the Total Ship (ETS) 2004 Symposium held in Gaithersburg, Md. at the National Institute of Standards & Technology and sponsored by the Naval Sea Systems Command & the American Society of Naval Engineers				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE A	
13. ABSTRACT (Maximum 200 Words) This paper addresses the ongoing DDG 51 Reduced Manning Initiative undertaken by the Program Executive Office, Ships and specifically addresses the policy, processes, culture, tradition, and technology aspects of this ongoing initiative. The major lessons learned from this effort for future optimal manning programs will be outlined. In order to prepare the waterfront, the distribution system, and the training establishment for a new generation of ships built in the philosophy of significantly reduced manning, the Navy must embrace new ways of doing business...especially if we expect the introduction of DD(X), CG(X) and LCS, to be "revolutionary vice evolutionary".				
14. SUBJECT TERMS DDG 51, Reduced Manning			15. NUMBER OF PAGES 29	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18

20040419 126

**Reduced Manning in DDG 51 Class Warships:
Challenges, Opportunities and the Way Ahead for
Reduced Manning on *all* United States Navy Ships**

**Rear Admiral James Hinkle, USN (ret)
Captain Terry Glover, USN (ret)**

Abstract

The need to transform the United States military is, arguably, the number one imperative of the Department of Defense. President Bush emphasized this in his National Security Strategy when he noted: "The major institutions of American National Security were designed in a different era to meet different requirements. All of them must be transformed." Transformation is a challenging imperative, especially in a service as rich in tradition as the United States Navy. Two generations ago, President Franklin Delano Roosevelt, frustrated with how slowly the United States Navy was changing, famously said, "To change anything in the Navy is like punching a feather bed. You punch it with your right and you punch it with your left until you are finally exhausted, and then you find the damn bed just as it was before you started punching." Unlike the Navy of President Roosevelt's day, today's naval leadership is committed to transforming the Navy and ensuring that the Navy of tomorrow is a critical component of the Joint warfighting force and is a Navy that, in the CNO's words, "Gives the President options." Navy leaders have known intuitively that a smaller, better-trained, more stabilized crew could mean a more capable, more professional warfighting team. This paper addresses the ongoing DDG 51 Reduced Manning Initiative undertaken by the Program Executive Office, Ships and specifically addresses the policy, processes, culture, tradition, and technology aspects of this ongoing initiative. The major lessons learned from this effort for future optimal manning programs will be outlined. In order to prepare the waterfront, the distribution system, and the training establishment for a new generation of ships built in the philosophy of significantly reduced manning, the Navy must embrace new ways of doing business...especially if we expect the introduction of DD(X), CG(X) and LCS, to be "revolutionary vice evolutionary".

Reduced Manning in DDG 51 Class Warships:
Challenges, Opportunities and the Way Ahead for
Reduced Manning on *all* United States Navy Ships

Introduction

As the United States Military and the United States Navy transform, one of the most intriguing aspects of this transformation is identifying ways and means of reducing manning on platforms and systems in order to reduce life-cycle costs and enhance warfighting effectiveness. For the United States Navy, a significant focus of this effort has been on reducing the manning on the Navy's combatant ships – including ships currently in service and those not yet built. The various disciplines involved in engineering the total ship present a number of viable options to better engineer combatant ships in a way that enables warfighters to operate more effectively with fewer people.

The events of September 11, 2001 and the ensuing conflicts in Afghanistan and Iraq reemphasized this need to transform military forces and provided a glimpse of future warfighting as small, minimally manned units which achieved exceptional results against enemy forces. The aftermath of the war in Iraq has shown with equal clarity how small units can create havoc with larger forces. Concurrently, even as the United States Defense Budget rises beyond \$400B, the Department of Defense has looked to squeeze substantial savings from every possible account in order to fund the day-to-day costs of the ongoing conflicts in Afghanistan and Iraq while recapitalizing today's force and building the military of tomorrow – the transformed force.

For the Department of Defense in general and for the Navy in particular, there are significant institutional incentives to transform by reducing manpower wherever feasible. As the Navy's fleet slips below 300 ships for the first time since before World War II, and as the Navy finds itself with an expanded mission set, there is a strong drive to field ships with smaller, more capable crews. For the Navy, this initiative promises to accelerate naval transformation in two ways. First, more capable crews, often operating newer-technology systems, can make more effective decisions in a more-timely manner. Second, smaller crews can free up resources to recapitalize the fleet.

In an effort to move forward smartly with initiatives to reduce manning in U.S. Navy combatants, the Program Executive Office, Ships commissioned a study to examine and analyze alternatives to reduce manning for Arleigh Burke Class ships with the expectation that lessons learned from this effort would not only benefit current and future flights of DDG 51 Class ships but would also benefit future ship classes, particularly the DD(X) family of ships. The *DDG 51 Reduced Manning Study* (Figure 1) was conducted in two phases by a Navy-Industry Team, *Phase I Concept Study* (Hinkle and Glover 2003 – Concept) and *Phase II The Plan for Assured Manning* (Hinkle and Glover 2003 - Plan). This paper presents the significant results of the concept portion of this study.

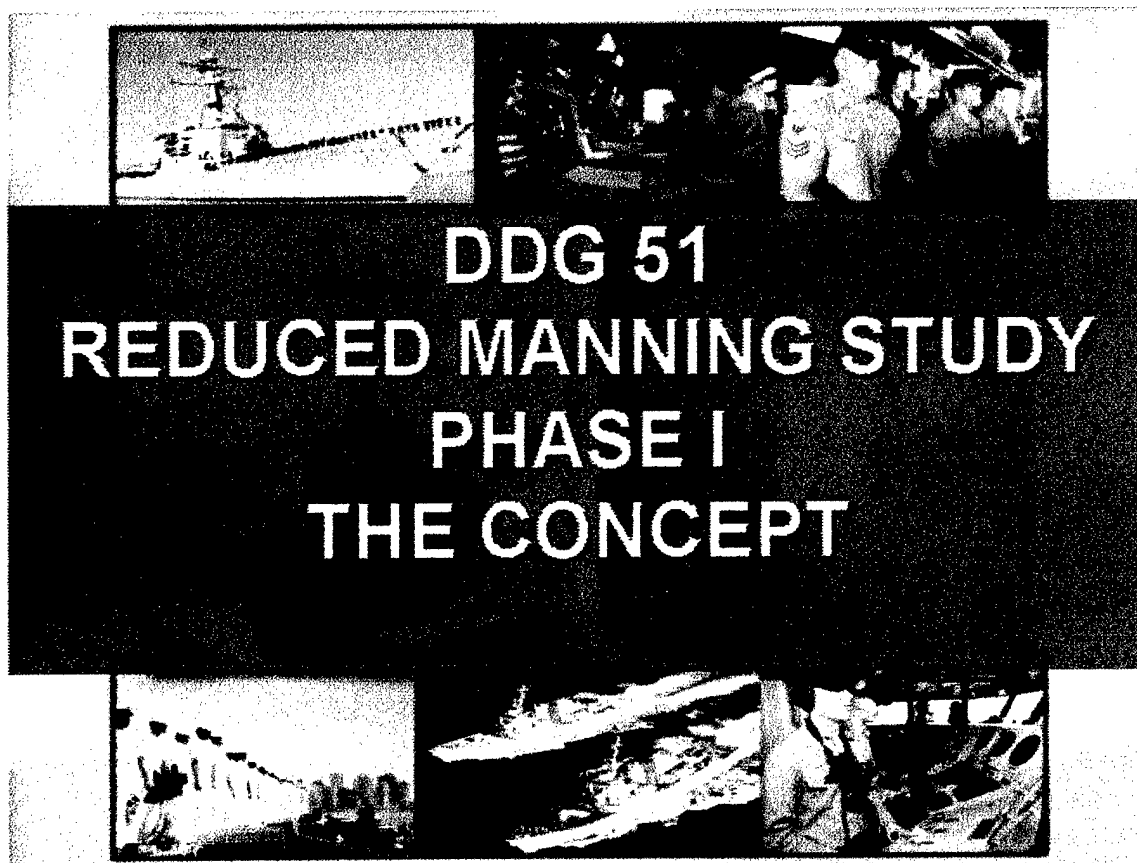


Figure 1

This study was coordinated with both past and ongoing manning reduction initiatives, particularly current reduced manning experiments being conducted by Commander, Naval Surface Forces. It came to important conclusions and recommendations regarding ways to reduce manning in DDG 51 Class ships and focused especially on changes to policy, processes, culture and tradition. The Study manning reduction initiatives covered three primary areas: 1.) Achieving economies of scale by moving many functions currently performed by ship's crew off the ship, 2.) Accepting increased levels of risk by eliminating or consolidating some watch stations and reducing some support and hotel services, and 3.) Investing in emerging technologies that would reduce the numbers of Sailors needed onboard Navy ships.

The importance of reducing manning on Navy combatant ships and on doing this in a total ship's engineering fashion was emphasized by the Commander of the Naval Sea Systems Command in January 2003 when he noted that: (Castelli 2003 – February 3)

“You don't build a ship and then put men on it. You build a ship around the human when you start it. The man/machine interface becomes critical. And at the same time on every program that we are developing within NAVSEA's arena of influence, we're going to use this as a gauge to say; is that program properly addressing the human system integration requirement? And so this organization will examine how we have captured the features for human systems integration in whatever we're doing.”

The Study represented a significant “first step” in achieving the Commander of the Naval Sea Systems Command's goals of reducing manning in Navy combatant ships in a thoughtful and methodical manner. Properly applied, the lessons learned from this study will enable the Navy to conduct a thorough analysis of alternatives for reduced manning on Navy combatant ships and to then make fiscally-informed decisions on risks and rewards of various reduced manning profiles. This will have a profound impact on how well and how rapidly the United States Navy transforms.

Transforming the United States Military

Transformation of the United States military was a strong imperative for President George W. Bush since well before his administration began its term in January 2001. Candidate Bush signaled the course for military transformation in a speech at the Citadel in September 1999 when he stated, “I know that transforming our military is a massive undertaking...The real goal is to move beyond marginal improvements – to replace existing programs with new technologies and strategies, to use this window of opportunity to skip a generation of weapons systems.” (George W. Bush 1999)

This theme of military transformation has remained consistent – and has been reinforced – in the years that the George W. Bush Administration has been in office. The *Secretary of Defense 2002 Annual Report to the President and the Congress* put a punctuation mark on the importance of military transformation by noting, “We owe it to our posterity to begin a sustained process of investment and military transformation to meet and dissuade future challenges. Transformation lies at the heart of our efforts to reduce risk posed by future challenges.” (Rumsfeld 2002)

Transforming the United States Navy

The Department of the Navy has invested substantial intellectual capital in coming to grips with how to transform the Navy and the Marine Corps in order to make them more effective contributors to a transformed United States military. Innovative concepts dealing with Navy and Marine Corps transformation have been generated in venues such as the Chief of Naval Operations Strategic Studies Group, the Navy Warfare Development Command, the Marine Corps Warfighting Laboratory, the Chief of Naval Operations Executive Panel and the Naval Operations Group (Deep Blue).

The Department of the Navy's plans for transformation were formally articulated in *The Naval Transformation Roadmap*, released in July 2002. (England 2002) Co-signed by the Secretary of the Navy, the Chief of Naval Operations, and the Commandant of the Marine Corps, this document set a clear course for transforming the Navy and the Marine Corps.

Smaller, More Capable Crews as an Agent for Transformation

Key tenets of *Sea Power 21* are designed to focus the efforts of designing systems that enable warfighters to make better and more timely decisions with fewer personnel. Strong anecdotal evidence suggests that the Navy is committed to efforts to reduce the number of Sailors on ships

There are compelling reasons to reduce manning on *all* Navy ships. An examination of Navy budget documents indicates that since 1985 the Navy's Total Operating Budget has declined by approximately 40% and the Navy's ship count by 45%; however, the Operations and Support (O&S) costs (consisting of personnel, maintenance, consumables and sustaining support) have remained constant during this time. This is because personnel costs comprise over 50% of O&S costs and these personnel costs have been growing more rapidly than other costs. (Hinkle and Glover 2003 - Concept)

The Navy's Sea Power 21 Strategy appears to offer the potential to give needed impetus to the goal of reducing manpower on United States Navy ships. The intersection of manpower and technology is evident in the supporting processes that facilitate the *Sea Power 21* warfighting imperatives embodied in *Sea Strike*, *Sea Shield* and *Sea Basing*. *Sea Trial: The Process of Innovation* supports rapid concept and technology development that can deliver enhanced technology capabilities to our Sailors as quickly as possible. *Sea Warrior: Investing in Sailors* moves to develop new combat capabilities and platforms that feature dramatic advancements in technology and optimization of crew size. *Sea Enterprise: Resourcing Tomorrow's Fleet* supports initiatives that will replace Cold War-era systems with significantly more capable sensors, networks, weapons, and platforms. Significantly, *Sea Enterprise* will substitute technology for manpower to achieve warfighting effectiveness in the most cost-effective manner. (Clark 2002 - October)

The lessons learned from Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) have resulted in dramatic changes to Navy deployment and readiness policies that further emphasize the need to reduce manning on United States Navy combatant ships. The Chief of Naval Operations has determined that the ability of the Navy to surge up to six Carrier Strike Groups for OEF and OIF is a capability that must be institutionalized throughout the Navy if the service is to remain relevant in future warfighting scenarios. The Fleet Response Plan (FRP), instituted in December 2003, places Carrier Strike Groups (CSGs) and Expeditionary Strike Groups (ESGs) in an enhanced readiness posture that will enable them to surge to respond to crises before they have completed the traditional inter-deployment training cycle (IDTC). The FRP mandates that ships and other units of CSGs and ESGs maintain manning at deployment-ready levels throughout the majority of the IDTC. This new, significantly increased manning requirement will likely put near-impossible strains on the Navy manning system unless or until steps are taken to reduce manning on Navy ships. (Natter 2003)

Therefore, the initiative undertaken by the Program Executive Office, Ships to commission the *DDG 51 Reduced Manning Study* came at an important nexus in the transformation of the United States Navy and represents a substantial step in creating best practices for reduced manning on United States Navy combatant ships. Presenting the results of this Study in venues such as the Engineering the Total Ship Symposium is an important step in socializing the findings of this comprehensive study.

DDG 51 Reduced Manning Study – Creating Best Practices for Reduced Manning

Scope of the Study

The *DDG 51 Reduced Manning Study* was one in a series of studies to reduce manning in Navy combatants and the first comprehensive Navy effort to examine the entire spectrum of drivers that determine manning requirements while developing choices to reduce the manning on an entire class of surface combatants. The organizational imperative for this study was straightforward. While the manpower authorization for the DDG 51 Class combatant has changed very little since the introduction of the lead ship (USS ARLEIGH BURKE) in the decade since DDG 51 was commissioned, there have been major improvements that suggest that a reduction in manpower for DDG 51 Class ships is achievable. Given the increasing manpower costs noted earlier in this paper, just the *possibility* that manpower on Navy ships might be reduced was sufficient reason to undertake this study.

This study was conducted in two phases by an integrated panel of principals from the Department of the Navy and industry. This panel was charged with examining technologies, both current and prospective – as well as policies and procedures – that have a potential of reducing the manning of the DDG 51 Class combatants. The final report delivered to Program Executive Office, Ships consisted of two distinct parts, the *Phase I Concept Study* that identified a range of possibilities for manpower reductions (Hinkle and Glover 2003 – Concept) and *Phase II The Plan for Assured Manning* which provided a number of options for introducing recommended initiatives (Hinkle and Glover 2003 - Plan). This paper focuses primarily on the results of the *Phase I Concept Study*.

Study Methodology

The *DDG 51 Reduced Manning Study* followed a disciplined methodology for developing a strategy and selecting a Navy-industry team to conduct, analyze, vet, review and produce the Study (Figure 2). Considerable emphasis was placed on both the exploratory phase of the Study where a wide array of divergent views were heard, and on the analysis phase of the Study where conclusions and recommendations were derived from the data obtained. Significantly, the Program Executive Office, Ships ensured that the Study's authors had unrestricted access to subject matter experts and policymakers alike in conducting this groundbreaking work.



CONCEPT

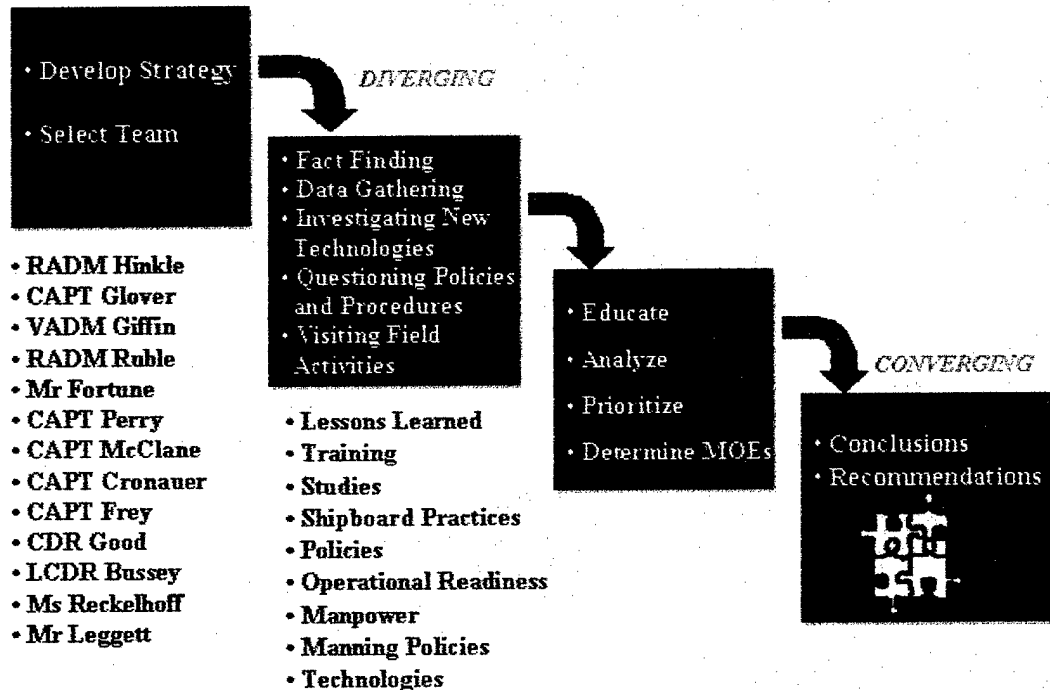


Figure 2

While the “why” behind conducting this Study has been addressed extensively earlier in this paper, it is worth emphasizing that the organizing impulse of the Study’s authors was to find ways and means to reduce crew size in the DDG 51 Class without impacting mission readiness, ship integrity, or quality of service. Further, the Study’s authors determined that in order for the transition to optimally manned crews to be evolutionary vice revolutionary, it is necessary to experiment with reduced manning profiles in the current legacy DDG 51 Class ships in order to fully understand the challenges inherent to a smaller crew anticipated in future ship classes.

The Study author’s experience – especially experience with the Navy’s Bureau of Naval Personnel – enabled them to understand the unique challenges and opportunities surrounding attempts to reduce manning profiles on the DDG 51 Class surface combatants. The authors noted that current manning postures, although never perfect given both Billet Authorization (BA) as a percentage of Ship’s Manning Document (SMD) and Navy Manning Plan (NMP) as a function of available inventory, do allow Commanding Officers some flexibility for leave, liberty, training, turnover, and other factors, but begs the question of the validity of stated manpower requirements. This Study also pointed out that while stabilized crew manning is challenging, even during a ship’s deployment, this stabilized manning *is the key to reduced manning* and should be a primary goal of any effort to reduce ship’s manning.

Addressing "Naysayers" Concerns

Importantly, the *DDG 51 Reduced Manning Study* began by acknowledging the significant challenges involved in any attempt to reduce manning in United States Navy ships. Among the "naysayers" concerns that militate against reducing manning in United States Navy combatant ships identified by the Study:

- There is no incentive for the Fleet to reduce the size of ship's crews. Ships will be asked to maintain the same level of mission readiness, ship integrity, self-protection, and cleanliness with fewer people. The ship takes all the risk while the savings are used to pay other bills and not necessarily improve shipboard conditions or support the minimally manned crew.
- Today's budget environment is particularly challenging. Money is tight and most reduced manning concepts include a restructuring of the shore support infrastructure and/or training base that will require some up front investment. Savings or return may not be apparent until multiple units are integrated into this ambitious plan.
- Despite the best intention of today's leadership, there is no guarantee that the necessary support funds derived from manpower savings will be protected in future budget drills, thereby threatening the shore support infrastructure required to support the minimally manned ships.
- There is no real reason, no driving imperative for the current players to take on the risk associated with significant manning reductions. Savings that will accrue in the out years may not be timely enough to convince the current team to buy in. Clearly, this opportunity has been looked at before and previous studies are consistent with what is being offered today, yet few if any of the initiatives in previous studies were pursued. Skeptics ask what is different today.
- Asking leadership to accept the perceived risk associated with reduced manning without sufficient incentive requires leadership to take a profound cultural leap. Many of today's Navy leaders point to USS COLE and opine that the ship could not have survived with a smaller crew. They feel that in the event of a catastrophic incident or accident, we are placing the entire crew at risk by under manning the ship.
- Today's leadership in the Wardroom and Chief's Mess have grown up with the luxury of a large crew and the flexibility that larger numbers offer. Even with BA (Billet Authorization) being less than the stated requirements of manning documents, there have been sufficient numbers to meet all demands on the ship.
- The normal shipboard pyramidal manpower base that exists in today's ships would be replaced by a more seasoned crew with fewer, more qualified people.

This raises the question of how to grow the required technical and managerial experience when there are very few junior training billets left on the ship.

- All previous studies and analysis have reached the same conclusion and support Sailor's contention that they are "not home when they are home." Force Protection requirements after 9/11 exacerbate this situation. The current crew size, based for the most part on the manning required to meet underway workload and fill Condition III watch stations, is insufficient to meet the import work load; therefore, there is no way to do it with an even more reduced crew.
- Any significant reduction in crew size would probably be at the expense of the junior, non-rated Sailor leaving behind a more experienced, more mature, more seasoned crew for whom mundane housekeeping chores may not be all that palatable.
- In today's Navy, it is almost impossible to complete all of the required maintenance. INSURV reports maintenance is not being accomplished or not being accomplished properly. Reducing the crew size will only exacerbate the problem and will lead to reduced mission readiness.
- Finally, the most important concern that captures much of what the naysayers believe is the most direct one; what's in it for the warfighter? Given legacy design, any efforts to substantially reduce the size of the crew in United States Navy ships in general and DDG 51 Class ships in particular means the Fleet will be asked to assume greater risk in its ability to meet mission requirements. Without the benefit of the most efficient match of man and machine, the ship will have less flexibility; learn to live with less self-sufficiency; set a new, lower standard for hygiene; and forego a normally expected level of hotel services.

The fact that the Study captured the concerns of naysayers up front makes this study all the more powerful. Significantly, it points out that the three primary areas of manning reduction initiatives (achieving economies of scale by moving many functions currently performed by ship's crew off the ship; accepting increased levels of risk by eliminating or consolidating some watch stations and reducing some support and hotel services; and investing in emerging technologies that would reduce the numbers of Sailors needed onboard Navy ships) are *all* important to achieving the most effective reduced manning profiles on U.S. Navy combatant ships.

Addressing Total Operating Costs

The *DDG 51 Reduced Manning Study* validated the long-term requirement to reduce manning on United States Navy ships by capturing the concerns of Navy leadership regarding the extent to which burgeoning manpower costs imperil the Navy's efforts not just to transform – but to remain relevant in future warfighting scenarios. This study noted that senior Navy leaders strongly believe that the reduction of O&S costs is crucial

to recapitalize and modernize the Navy since additional budget authority is not anticipated. These concerns were validated by the President's Fiscal Year 2004 Budget where, in a year where the total number of United States Navy ships dipped below 300 for the first time since before World War II and in spite of a strong drive to capitalize the fleet, the Navy's procurement budget increased by only two percent over Fiscal Year 2003. (Castelli 2003 – November 10)

As the Navy's leadership has sharpened the focus on understanding and managing the total ownership costs (TOC) throughout the life cycle of all weapons systems, the TOC of Sailors has been highlighted as the factor that has been growing most rapidly and as that part of TOC that consumes an enormous part of the budget. In noting that, from a TOC perspective, personnel costs comprise over 50% of total O&S costs, the Study highlighted the fact that there are compelling reasons to reduce manning on future Navy ships. (Hinkle and Glover 2003)

This imperative to reduce manning has gained traction within the Naval Sea Systems Command and was one reason behind the establishment of SEA 03. Speaking at a media forum in 2003, the Naval Sea Systems Commander, Vice Admiral Phil Balisle, explained the reasons for standing up SEA 03: "We created some new organizations in NAVSEA, things that literally did not exist before. One of them was SEA 03. We didn't have anything like it so we stood it up from scratch. It's an organization that is focused on human systems integration and training. We created an organization whose role is to one, be very focused on the commercial sector. What exists in the world of human systems integration? The truth is, it's changing quickly. The technology's rapidly changing. We want to be in tune with that. We want to stay at the state of the art." (Castelli 2003 – February 3)

SEA 03 will have a vital role in shaping the manning profile of future United States Navy ships. The Navy has mandated that future ship Classes (and in the case of the DDG 51, future flights of current classes) will be manned by significantly smaller crews. The Study noted that the projected DD(X) manning levels of 95-175 people will require a ship design process that begins with a zero-based manning concept and uses human systems integration as an integral part of the design process. By using this methodology, it is projected that the final ship design will achieve performance, risk and TOC objectives with an optimally manned crew. The Study correctly pointed out one of the unique challenges that must be overcome in designing ships with an optimal crew size is the stovepipe manner in which Procurement and O&S costs are provided. This sometimes makes it difficult to extrapolate the up front investment in technology and its impact in decreasing TOC over the lifecycle of the ship class. This Study highlighted the importance of using total savings to the Navy as the *only* discriminator in balancing technology insertion costs against the savings in personnel enabled by this technology insertion.

Key Assumptions

The *DDG 51 Reduced Manning Study* made a number of key assumptions in bounding the problem of dealing with such a multi-faceted issue. This was important in keeping the number of variables in the ship's manning equation down to a manageable number and gave the Study important focus. Additionally, these assumptions helped identify the various Navy entities that would be required to take some action if the Study's results and way ahead were to be accepted and adopted. Among the key assumptions made by the Study's authors:

- The top Navy leadership will fund and drive disparate owners to support and sustain reduced manning initiatives.
- Changes to the Required Operational Capability (ROC)/Projected Operational Environment (POE) are acceptable as long as core capabilities are maintained.
- The Study would focus on the current hull design and would not envision dramatic changes to the currently-configured DDG 51 Class.
- The Navy personnel distribution systems would reconfigure to support reduced manning initiatives.
- Up front investments would be made where the cost benefit demonstrates savings could be obtained.
- The solution to the DDG 51 manning challenge should reflect real savings and not just a functional transfer of workload.
- Manpower reductions will be measured against the Ship Manning Document (SMD) and savings will be measured against Billet Authorization (BA).
- Portions of the Navy training system will be reconfigured to support reduced manning initiatives.
- Total Ownership Cost is the key approach used to evaluate the viability of various reduced manning initiatives.
- Ashore total ship support will be in place before or concurrent with reduced manning.
- The NAVMAC manning model will be used to validate results of the Study.
- The DDG 51 Class will be in service for at least 40 years.
- Bandwidth will be available to facilitate distant support.

- Legacy support will be integrated to the maximum extent practicable.
- Prototyping of some technology and policy initiatives will be required as proof of concept prior to broad implementation.

Capturing these assumptions enhanced this Study's value because this effort identified the breadth of organizations that would be required take action if the goals of the Study were to be actualized. Clearly, the scope of this effort and the organizations involved made this a total Navy effort.

Key Reduced Manning Issues

The *DDG 51 Reduced Manning Study* identified key issues that would need to be dealt with in a synergistic way if the desired impact of the Study were to be achieved. Figure 3 represents the scope of the issues that would need to be addressed. Each of the issues is important in its own right and collectively they represent necessary conditions for coming to grips with the full scope of DDG 51 reduced manning possibilities.



ISSUES

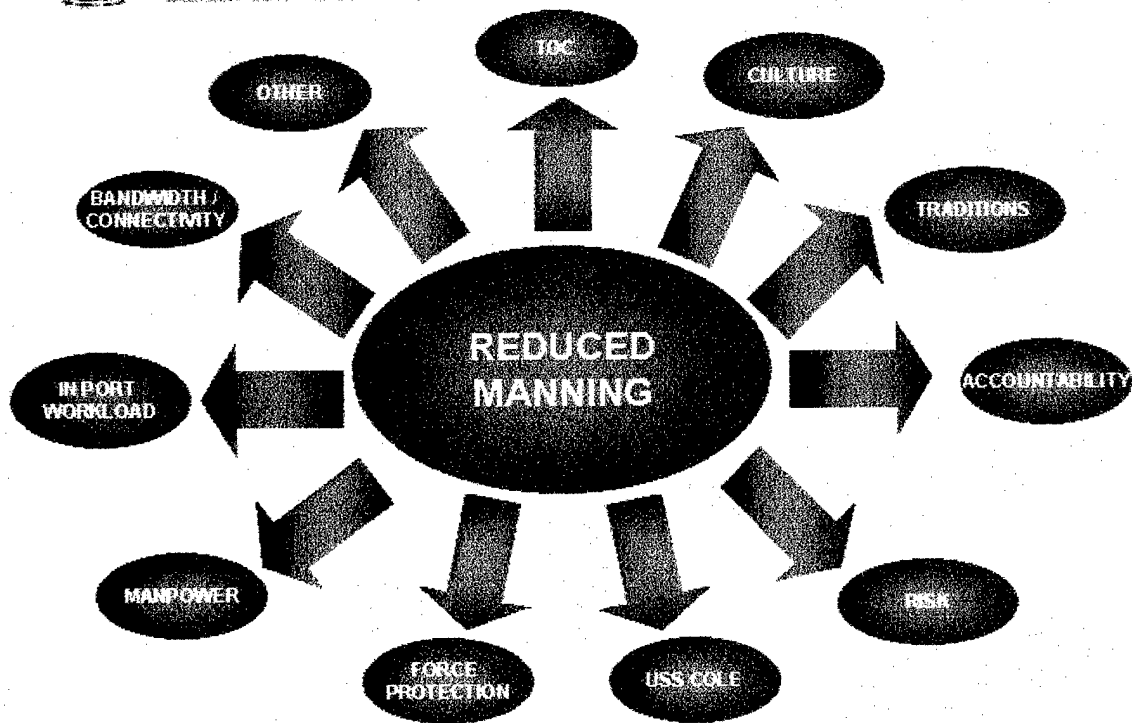


Figure 3

The impact of manpower on Total Ownership Costs (TOC) for the DDG 51 Class has been addressed earlier in this paper. The research conducted during this Study confirmed the fact that TOC is receiving increased emphasis from Navy policymakers and that the Navy leadership has an enhanced understanding of TOC – factors that are important if reduced manning initiatives on the DDG 51 Class are to move forward. That said, this Study also revealed that the process to evaluate Return on Investment (ROI) and the TOC impact for manning reduction initiatives is difficult. This Study determined that in evaluating reduced manning initiatives based on TOC, the “color” of money and traditional funding methods can not become an impediment to reducing manning.

The Study identified Navy culture as an important issue that must be recognized and dealt with in order to exercise any reduced manning initiatives. This Study asserted that fundamental shifts in how a ship does its day to day business both in port and underway – a culture that has not changed substantially since World War II - would be crucial to reducing manning. This would require that ships give up some of their traditional focus on self-sufficiency and perhaps change expectations regarding basic hygiene issues, shipboard maintenance, pyramidal rating structure, self-contained administrative support, lookout doctrine, manpower intensive damage control schemes and other factors. The challenge of dramatically changing these culture-embedded issues in an inherently-conservative military organization must be addressed forthrightly for reduced manning initiatives to succeed.

In much the same fashion as culture, Naval traditions – that which separates the Navy from civilian organizations – would need to be dealt with in order to effect significant manpower reductions. Especially important is the fact that the Commanding Officer's direct control of all aspects of inside the lifelines could be diminished by a move to more extensive off ship support. Closely tied to this is the issue of the Commanding Officer's accountability – perhaps the strongest tradition of all for a tradition-bound service. Some reduced manning initiatives will require the acceptance of increased risk. Apportioning the accountability for the increased risk will be an important task for the Navy's senior leadership if the Commanding Officer is not to be made to feel that he is being forced to accept substantial increased risk while being saddled with the full accountability he traditionally has been asked to bear.

The Study dealt with this issue of increased risk in an objective fashion in offering trade-offs to the Navy. The Study acknowledged the fact that a robustly-manned ship had inherent risk-mitigation in the sheer numbers of Sailors assigned to ships and that these Sailors could man damage control parties and firefighting parties with more bodies and mitigate the risk that a catastrophe could overtake the ship. The Study examined the attack on USS COLE in assessing this risk and recognized that many have opined that the crew of a minimally-manned USS COLE would not have been successful in keeping that ship afloat. Importantly, this Study found that in the case of USS COLE, it was *not* sheer numbers that saved the ship, but the actions of a handful of very experienced people who knew and did what was required to control damage and restore power, communications, and warfighting capability. This fact led to the assertion that the crew of DDG 51 Class ships could be reduced with acceptable risk if the Navy could replicate this highly trained reaction force supported by design features and technical innovation.

The issue of Force Protection loomed large in the Study. The need for enhanced Force Protection, especially in port, has become a waterfront rallying cry that has not only caused ships to increase their own self-defense requirements, but has also required these same ships to pay a "tax" to the Naval Stations where they are berthed in the form of water patrols, tower watches, additional gate guards and other requirements. This Study indicated that for the DDG 51 Class as many as 80 personnel would be required in each watch section in order to meet own ship's force protection requirements which would obviate the Navy's current efforts to reduce watch sections in port. The Study identified this Force Protection requirement as a factor that could derail reduced manning initiatives unless ship's force protection is augmented by off-ship assets.

This Study identified the way in which overall manpower requirements are determined as a key issue in reducing manning on DDG 51 Class ships. The reasons for this are straightforward. The current manpower requirements equation and the currently defined workweek determine the total manpower requirements for a ship while at Condition III steaming. This Study showed that, while traditionally the assumption has been that if a ship could meet its underway requirements, it would have sufficient manpower to meet import workload. Because of the Force Protection requirements discussed above as well as other factors, this is emphatically no longer the case. The Study determined that a

reduction in manning in DDG 51 Class ships will only be possible if the Navy changes the equation through a willingness to live with less self-sufficiency, through an increase in the use of flyaway teams, through the extensive use of long-distance technical support – a solution requiring sufficient bandwidth to implement, and a willingness to accomplish scheduled maintenance around the ship's cycles and before or after deployment.

While the Study identified a large number of issues that needed to be dealt with to reduce manning effectively, shifting the burden of much of the ship's maintenance ashore and significantly changing the way the Navy "grows" a senior shipboard petty officer were key issues that would need particular attention by the Navy's senior leadership before projected reduced manning initiatives could be implemented throughout the DDG 51 Class. Most manpower reduction strategies addressed in the *DDG 51 Reduced Manning Study* – as well as in a number of earlier studies – require some elements of policy, procedure, and cultural change to implement and the best case scenarios would envision a reduction of from 15-30%, depending on the extent of initiatives undertaken.

Models for Manning Reductions

The *DDG 51 Reduced Manning Study* paid particular attention to "best practices" of not only United States but also international navy units of varying types in order to ascertain opportunities for reducing manning on DDG 51 Class surface combatants. The scope of the types of units examined was broad, assuring that there was little likelihood of a "best practice" being missed or overlooked. Figure 4 represents the models that were examined. While a complete description of the ways and means that the units operated with optimal manning is beyond the scope of this Study, a few points bear mentioning:



MODELS

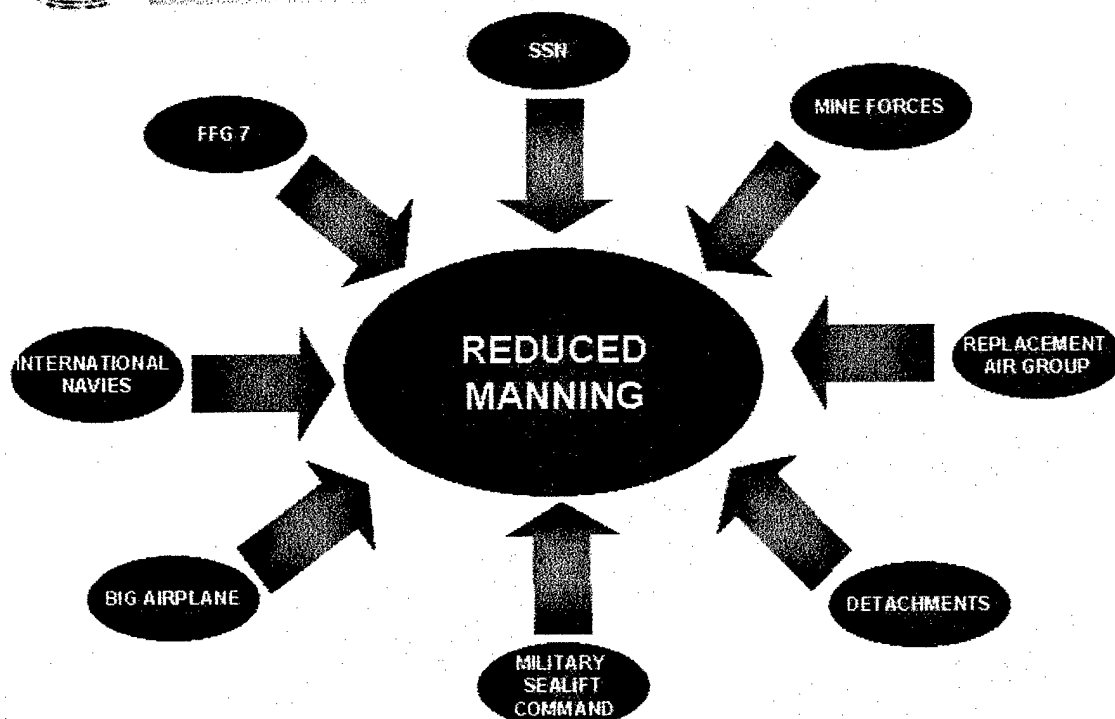


Figure 4

- The United States Submarine Service – and particularly the SSN Attack Submarine - provided perhaps the most striking example of a front-line unit operating with a small crew – specifically 120 personnel. The Study noted that an SSN crew has none of the support infrastructure (barbershop, ship's store, post office, etc.) that surface ships take for granted and that SSN crews enjoy extensive shore support for pay, admin, maintenance, and supply.
- Mine warfare force ships operate with small crews and have little intrinsic support capabilities, relying heavily on shore support and a "mother ship." Interviews with mine warfare force personnel revealed that the Rotational Crew concept did not work well due to a lack of shore support and training, which in turn led to no pride in ownership and no accountability.
- The Replacement Air Group, that naval aviation entity that prepares pilots and aircrews before reporting to their fleet squadrons was examined as another example of providing upfront training to a minimally manned crew prior to reporting.

- Mission manning for specific types of operations, similar to that envisioned for LCS, offered yet another possible manning reduction tool. LAMPS detachments, for example, routinely deploy on surface combatant ships only when required.
- The Military Sealift Command was examined as a notable example of an organization that sailed with an absolute minimal crew. This Study found that while USNS SUPPLY had an SMD of nearly 600 Sailors when it was an active Navy ship, as part of MSC the ship will deploy with a crew of about 120 people. USNS SUPPLY mans engineering spaces with as few as 2 or 3 people, culls bridge teams to the absolute minimum number of people, limits hotel services and minimizes crew turnover.
- The United States OLIVER HAZARD PERRY FFG 7 Class and international navies were examined for potential manpower reductions. In the case of the FFG 7 Class, mission creep, unanticipated service as a Battle Group asset, and non-delivery of a promised shore support infrastructure were identified as major factors in the Navy's inability to sustain the FFG 7 as a minimally-manned ship. In the case of international navies, most of those reduced manning initiatives were implemented in new ship Classes, not in legacy hulls and it was further noted that as these new ship Classes deployed for forward operations in the Arabian Gulf, significant crew augmentation was required.

Thus, this broad review of reduced manning initiatives revealed a wealth of good ideas. The submarine model and mission manning were two of the most productive options that would directly reduce manning on current DDG 51 Class surface combatants.

Initiatives to Support Manning Reductions

Building on the Study assumptions and issues - and with an eye towards a wide array of models for reduced manning - the *DDG 51 Reduced Manning Study* identified a number of initiatives that could support reduced manning on DDG 51 Class ships. The scope of these initiatives is depicted in Figure 5. A brief review of these initiatives provides some indication of "what it would take" to reduce manning on DDG 51 Class surface combatants from the current 361 people.



INITIATIVES

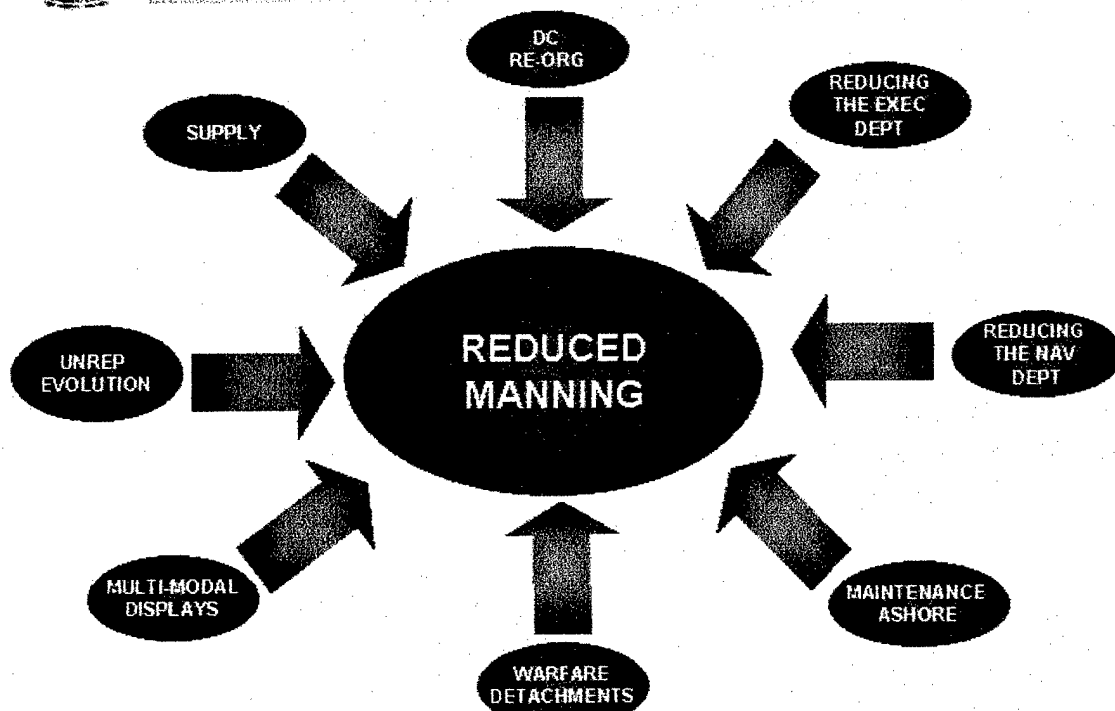


Figure 5

- Prior to the Study numerous studies have looked at ways that ships accept the responsibility for damage control. In particular, Dr. Fred Williams, at the Navy Research Laboratory has conducted extensive research toward providing technologies and reorganization of repair parties that show great promise for current and future classes of ships. It is estimated that several billets could be saved by changing the current three repair party organization to a combination of highly trained rapid response teams for less than GQ scenarios and an enhanced two repair party scheme for more intense damage control requirements. The initiatives provided a cascading methodology for reducing DC manning of DDG 51 Class ships from a high of 89 people to as few as 45 people (Figure 6).



DC EVOLUTION

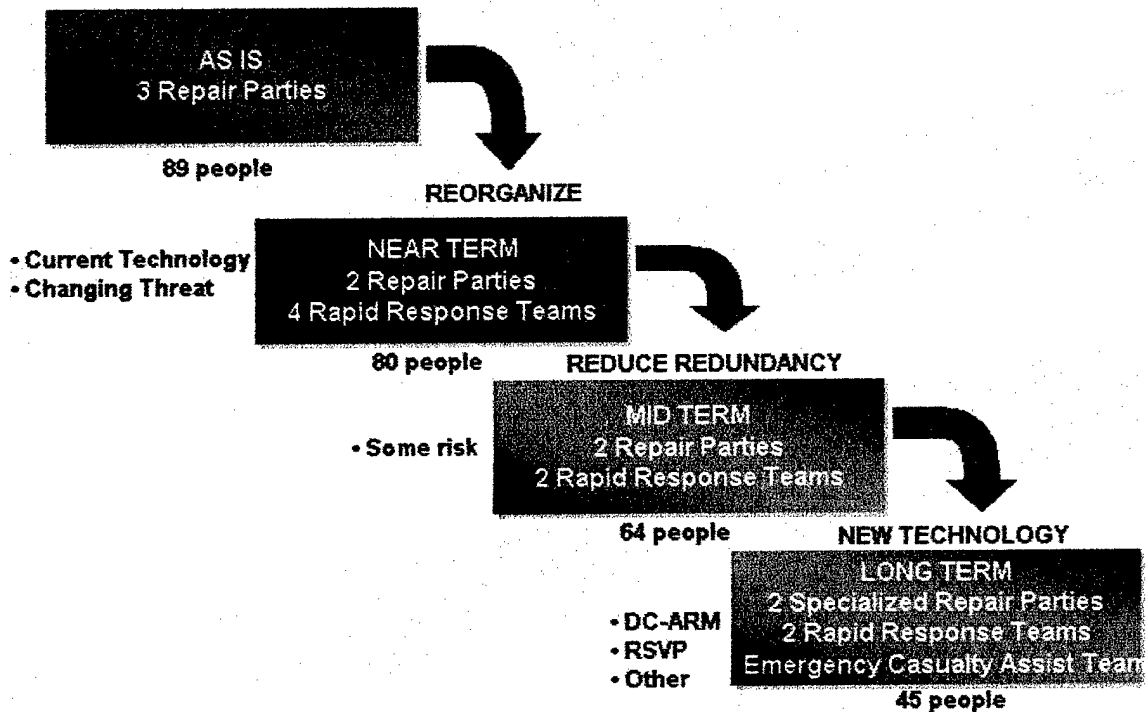


Figure 6

- This Study examined several low risk/near term initiatives in the area of admin that could generate billet savings. Most involve the transfer of at least some administrative functions to shore detachments with gains stemming from economies of scale. The Study estimates that these actions could save as much as 60% of administrative billets transferred ashore.
- This Study also examined initiatives to reduce the Navigation Department aboard DDG 51 Class ships. One initiative would remove all but one Signalmen from the ship, with ship's Quartermasters performing Signalmen duties. Electronic navigation could ease the workload of Quartermasters and allow a reduction in billets for this rate.
- The Study determined that performing only minimal maintenance aboard ship and performing the majority of this maintenance ashore could dramatically reduce shipboard manning. Through economies of scale of shore detachments this Study estimated that 60% of the maintenance manning billets removed from the ship could be eliminated. This initiative would have the added benefit of improving sea/shore billet ratios and increasing home basing opportunities.
- The use of warfare detachments – similar to the LAMPS helo detachment concept – is a mission manning initiative that could reduce crew size on DDG 51 Class

surface combatants. ASW is a prime area for the use of these warfare detachments, while Land-Attack, MIO and EW are additional areas where warfare detachments could be embarked only when needed. The study indicated at least a 25% savings of the number of people required in the mission area.

- The use of emerging technologies, such as the multi-modal watch station consoles, is an initiative that could reduce manning on DDG 51 surface combatants, but not without considerable upfront investment. These multi-modal displays allow a single watch stander to take on several roles from the one console. In testing, the improved situational awareness allowed the multi-modal teams to fare better than the control team. The Study determined that since this technology is cutting-edge, expensive and takes a long time to field in significant numbers, it is not a near-term initiative.
- One initiative under intense investigation as a way to save billets on DDG 51 Class ships is to reduce or eliminate the need for Food Service Attendants (FSAs). Having rated Sailors – and sometimes petty officers – serve often multiple tours as FSAs is almost universally viewed as a substantial negative in terms of morale and skills retention. The study looked at various options that would eliminate the need for FSAs by increasing Mess Specialist manning at a less than one for one replacement and other options such as assigning GENDET personnel to the Supply Department to perform FSA duties for an extended period. Neither of these options saves a significant number of billets and the Study found that perhaps the most effective way of reducing some billets is to combine all the ship's messes and to resort to more pre-prepared food in the ship's menus. A number of other Supply Department-focused initiatives, ranging from disbursing (a cashless ship), to smart storerooms, to modernized galleys were also examined in this Study.

These initiatives cover an incredibly broad scope, but, collectively, represent some of the best ways to reduce manning on DDG 51 Class surface combatants; however, in order to institute many of the initiatives of the Study, key enablers must also be in place and operating.

Manning Reduction Enablers

In addition to the shore support functions currently in place such as Port Engineers, waterfront support units (doctors, lawyers, chaplains) and paint teams, there are several key enablers identified by the *DDG 51 Reduced Manning Study* that will allow reduced manning in the DDG 51 Class, not the least of which is the commitment and strong support of the leadership from the CNO to the ship's CO.

Given the reduced manning in admin and maintenance, there is a concomitant impact on training and qualifications. This Study determined that making sure that processes and infrastructure are put in place to support the reduced manning levels is imperative. Some of the savings will have to be reinvested into the shore support structure and unless the reductions are made across the entire DDG 51 Class, there is probably insufficient savings to warrant implementation.

Many of these enablers are intuitive and are depicted in Figure 7. The Super Port Engineer Concept, an expansion of duties and responsibilities of the current Port Engineer concept, is one way of consolidating a huge amount of the Class maintenance and support activities while achieving significant economies of scale. Similarly, having a Type Commander pool of personnel – not an exact duplication of a DDG 51 crew but an amalgamation of vital, critical skills in sufficient numbers - managed by the Super Port Engineer, would ensure that needed maintenance was conducted and that replacements for unplanned losses were delivered to deployed ships immediately.

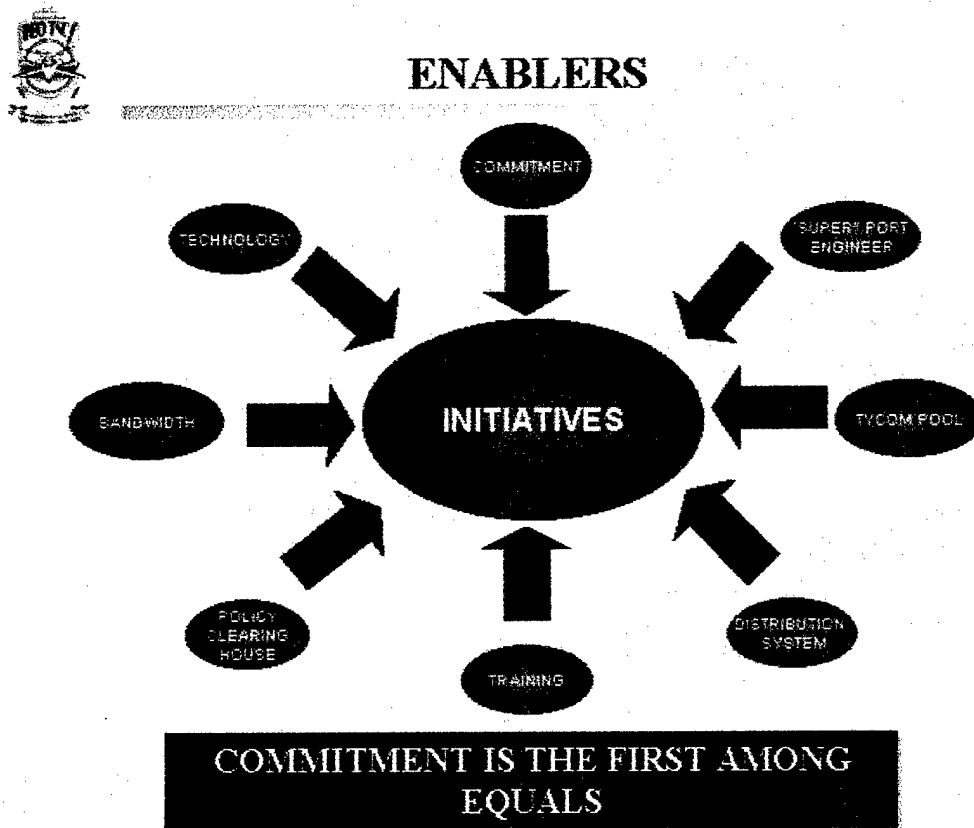


Figure 7

The Study determined that for a reduced manning initiative on the DDG 51 Class to work effectively, the minimally-manned ship must be manned to an "absolute" requirement of personnel and not a Sailor less. This will require significant changes to the Bureau of Naval Personnel distribution system and an interactive dialogue between and among the waterfront, EPMAC and the detailers. The TYCOM pool becomes a filter, a buffer, and

a dampener for the ships manning, thus assuring "absolute" manning at the right place, at all times.

In a similar manner, this Study noted that a warship manned to an "absolute" number of Sailors can not accommodate under-trained or non-qualified personnel. The Study determined that the importance of training as an enabler to making reduced manning work cannot be overstated. The difference between the old training paradigm (Figure 8) and a new training paradigm (Figure 9) is dramatic.

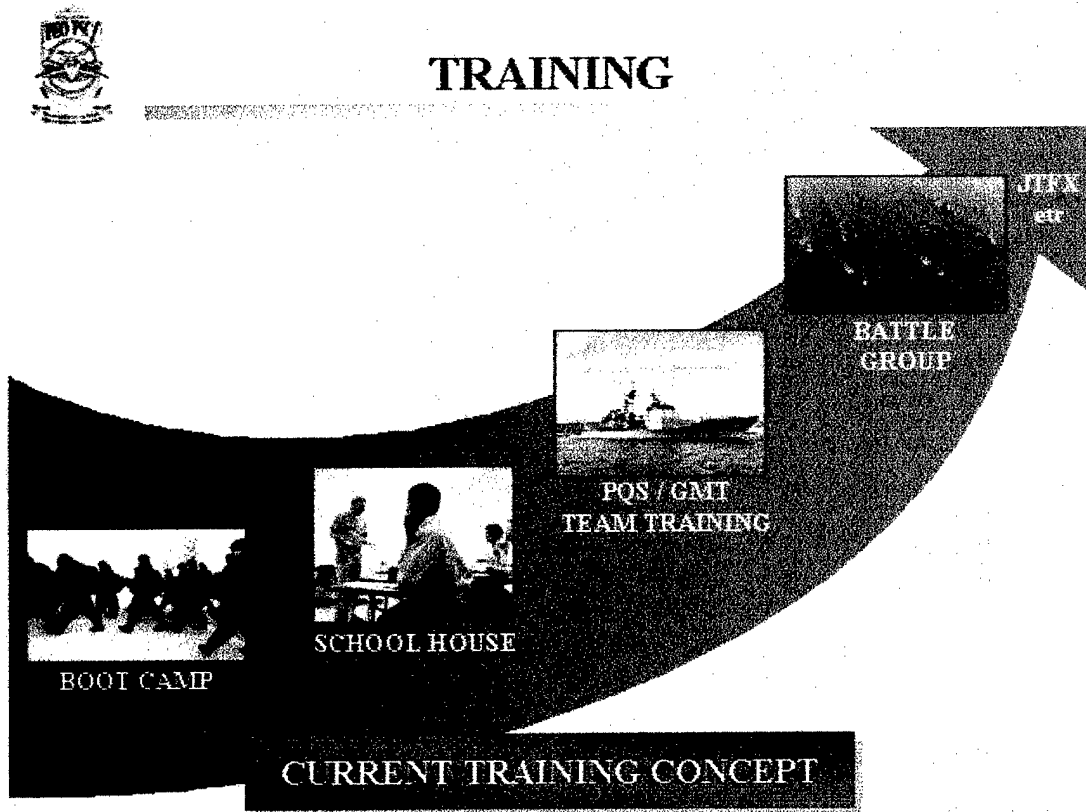


Figure 8



TRAINING

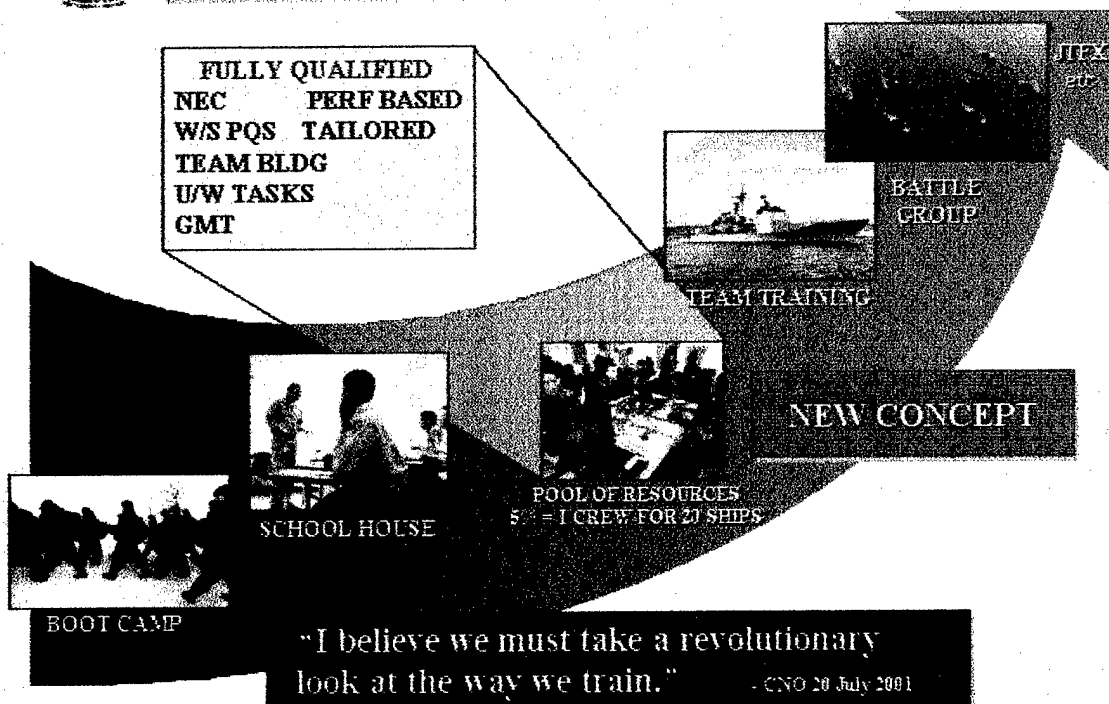


Figure 9

New technologies are a very important enabler. For example, the Integrated Bridge System, NAVSSI, and the Electronic Chart System allow for changes in policy and procedures, making it possible to support the reduction of bridge watch standers significantly.

While these enablers – and others – ranging from policy, to bandwidth, to technology are all important, the Study determined that a commitment by the Navy's top leadership and a concomitant commitment by the Commanding Officers of reduced manning DDG 51 Class ships are the *real* enablers in achieving the reduced manning results recommended by this Study.

Conclusions

The *DDG 51 Reduced Manning Study* represented a bold step for the United States Navy in its efforts to define the parameters for manning DDG 51 Class surface combatants with the right-sized crew while extrapolating these lessons learned to future ship classes. The ultimate goal of these efforts is not only to reduce manpower on U.S. Navy ships but also to enable these ship's crews to make better decisions in a more timely fashion. The implications for Navy leadership will have a profound impact on the Navy's ability to transform.

This study noted that new technology alone can not reduce manning significantly in current flights of DDG 51 Class ships – this new technology must be complemented by removing some functions from the ship and by accepting an increased level of risk; however, it also showed that the introduction of new technology can improve warfighting effectiveness on these flights of ships as well as future DDG 51 flights and newer classes of ships.

One of the important conclusions of this study was that new technologies, as well as changes in policy and procedures, that have the potential to reduce manning in Navy ships need to be prototyped *now* to ensure preparedness for the introduction of a new generation of warfighting ships that will be manned at unprecedented levels. This initiative will be facilitated by the Navy's new concept of Spiral Development where technology prototyping will be required as proof of concept prior to broad implementation. PEO Ships indicates that if these new technologies are prototyped in a new DDG 51 ship design by 2004, they will have excellent potential to reduce manning on the next flight of DDG 51 Class ships. (Hinkle and Glover 2003 - Concept)

Another key conclusion of the Study is that technology itself is an enabler. Whether it involves automation, better and more reliable sensors, electronics vice paper, better, faster computers or other inserted technologies, it is these technologies, combined with process change and cultural acceptance, that will enable the Navy to go beyond initial modifications to crew makeup and make even deeper cuts to ship's manning profiles. This study also concluded that risk can be mitigated if technology and reduced manning initiatives are piloted on a single platform or series of similar platforms that demonstrate equal or better capability than traditionally manned ships.

The Study provided compelling metrics for the importance of manpower saving on Navy ships. In its final evaluation of the three primary manning reduction initiatives, achieving economies of scale by moving many functions currently performed by ship's crew off the ship, accepting increased levels of risk by eliminating or consolidating some watch stations and reducing some support and hotel services; and investing in emerging technologies that would reduce the numbers of Sailors needed onboard Navy ships – this study reached the following conclusions:

The initiatives and enablers allow the 361 man crew of a Flight II DDG 51 to be reduced by 105 billets. Any savings from this reduction is measured against BA (90% of SMD); therefore, the 105 billets translate to 69 bodies actually being removed from the ship. 35 of these Sailors are reinvested in the shore infrastructure to provide admin and maintenance support (6 Sailors), create warfare detachments (16 Sailors), and build the TYCOM Pool (13 Sailors). Excellent economies of scale in the shore support area can be achieved by applying manpower reductions across the entire DDG 51 Class. The crew reduction of 34 people across 40 ships at an advertised rate of \$44K per Sailor per year equates to about \$60M in MPN (manpower account) savings per year. (The \$44K was based on FY 01 average cost per Sailor. The cost has increased substantially since then).

- By demonstrating a willingness to accept an increased level of risk, 22 additional billets could be eliminated by, for example, eliminating all lookouts, consolidating more watch stations, reducing hospital corpsmen and reducing hotel services (barber shop, laundry services, ship's store and other services). This savings equated to an additional \$38M in MPN savings per year.
- Technologies, such as the multi-modal work stations, could be introduced into a future DDG 51 prototype that offer even more opportunity for future manpower reductions if sufficient up front investment is made. A conservative estimate of 17 additional billets being removed from each ship equates to an additional \$30M in MPN savings per year.

The overall results of the Study can be seen most clearly by comparing the manning profile with the current DDG 51 Class manning authorization (Figure 10) with the potential lower manning profiles under three scenarios – near term low cost/low risk, mid term higher risk, and long term with future technology investment (Figure 11). Importantly, this study offers the Navy options that could be time phased to reduce manning on DDG 51 Class ships over the long haul from the current crew size of 361 to as few as 210 officers and Sailors.

In providing these compelling metrics, the *DDG 51 Reduced Manning Study* has helped the Navy take an important step in making fiscally-informed decisions regarding reducing manning on current and future flights of DDG 51 Class ships in a thoughtful way that will ultimately support ship's crews in making better decisions in a more timely manner with fewer people. Additionally, this Study provides a firm foundation for extrapolating these lessons to Navy ships still on the drawing boards. Now, the Navy must capitalize on this important step and use the results of this Study as an important lever in optimally manning *all* of our Navy platforms.



CURRENT MANPOWER AUTHORIZATION

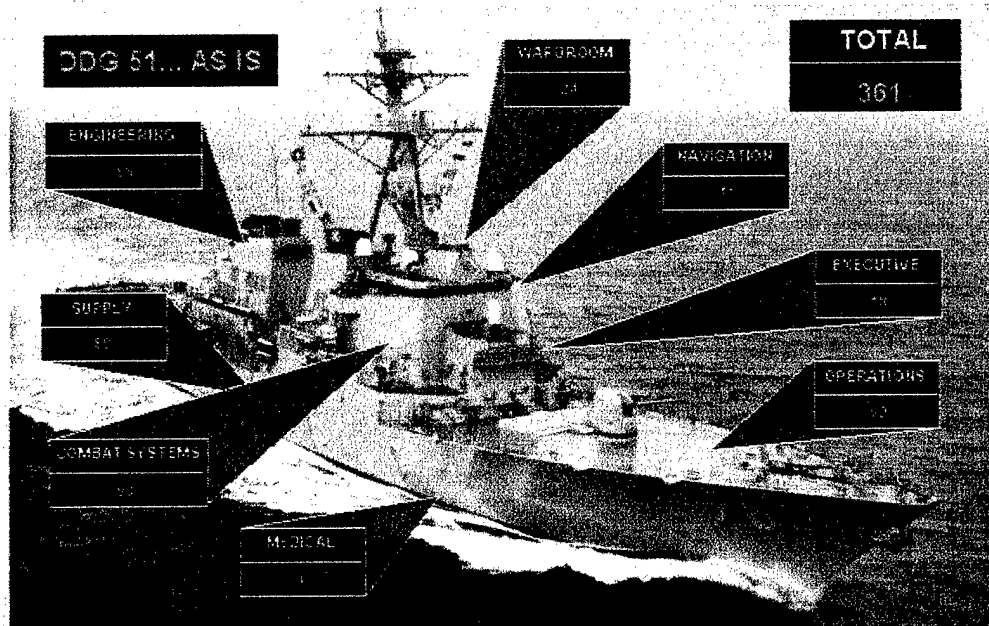


Figure 10



POSSIBLE MANNING REDUCTIONS

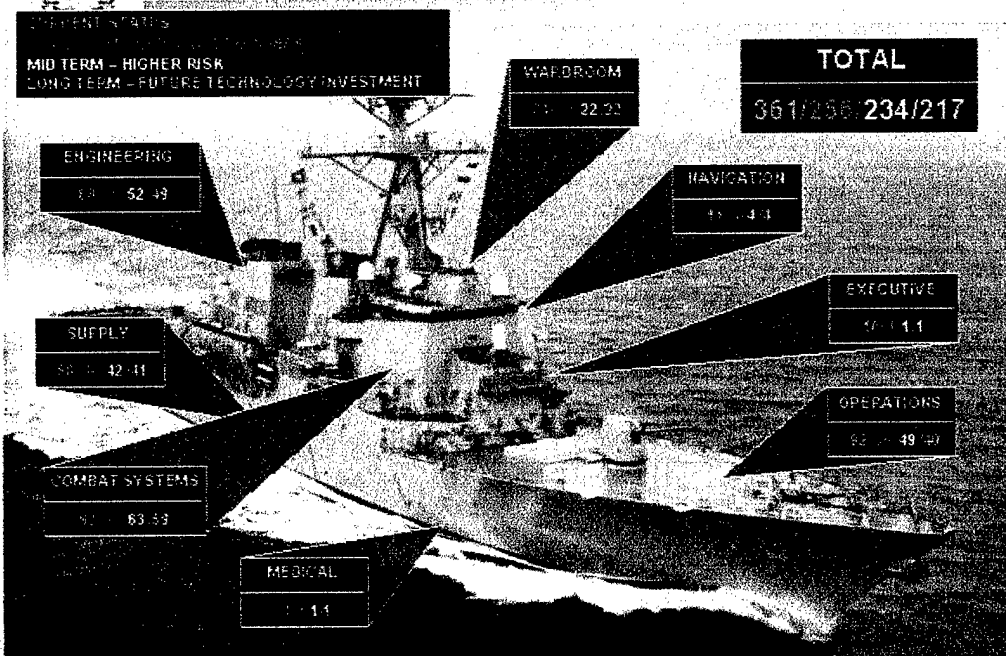


Figure 11

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