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MONTEREY, CALIFORNIA

THESIS

PLANNING CONCEPTS TO SUSTAIN, DEVELOP, AND TEST COMPLEX NAVAL COMBAT SYSTEMS AT THE SURFACE COMBAT SYSTEMS CENTER, WALLOPS ISLAND, VIRGINIA

by

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March 2005

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The Surface Combat Systems Center (SCSC), Wallops Island, Virginia is a combination of personnel, geography, airspace, and technology located on a barrier island off Virginia's Eastern Shore. First opened in 1985 as a US Navy, AEGIS Land-Based Test Site (LBTS), SCSC has grown to include the Ship Self Defense (SSD), and DD(X) combat system facilities to the site. SCSC is chartered to support computer program development, life cycle and in-service engineering, team training, and research, development, test, and evaluation services while adapting to evolution of US Naval combatants and emerging requirements.

The purpose of this document is to present an analysis of existing US Navy shipboard and land-based organization business practices and apply them to the existing SCSC command organization. The objective is to combine US Navy transformation concepts and SCSC planning concepts to provide the documentation needed to support the development of new strategic business plans for the command. The goal is to provide a long-term strategy to transform SCSC into the US Navy's East Coast Weapons Range Facility or otherwise named, the Wallops Island Test and Evaluation Range Facility (WITERF), while maintaining its synergy as a LBTS for research, development, testing and evaluation of naval combat systems.

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ABSTRACT

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For my wife Angie. Thank-you for standing by me. 143

For my children, Taulman, age 5, and Hope, age 2: It is my hope that when you read this work sometime in the future that it will inspire you to do great things. Thank-you for inspiring me every day.

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"Fortitudine Vincimus"

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I. INTRODUCTION

A. BACKGROUND

In 1980, the Naval Surface Warfare Center (NSWCDD) in Dahlgren, VA needed to establish a new surface ship weapons engineering facility to supplement its current facilities and signed a Host-Tenant Agreement with National Aeronautics and Space Administration (NASA) at the Goddard Space Flight Center, Wallops Flight Facility (WFF), Wallops Island, VA. This agreement led the way for the establishment of a permanent AEGIS facility, which was to become known as the AEGIS Combat Systems Center (ACSC), Wallops Island, VA.

In 1982, The AEGIS Program Office (PMS 400) became the official sponsor of the AEGIS Combat Systems Center (ACSC) and began construction in 1983. In 1985, the AEGIS Cruiser (CG) Facility, CG-47 Class, Building V-10, was completed as a fleet training and research, development, test and evaluation (RDT&E) center. The new facility provided Test and Evaluation (T&E) crew training personnel a site that was configured like a ship where realistic maintenance training and system operability could be demonstrated. This capability proved itself to be one of the most desirable features of the site; shipboard personnel would leave fully prepared and ready to operate their ship based on the transition training and testing obtained at SCSC.

In December 1987, as a result of congressional direction, ACSC officially opened its doors and in August 1989, was formally established as an Echelon III Navy Command and the site was officially commissioned the USS Accomack, CG-925. The addition of the AEGIS Destroyer Facility, DDG-51 Class, Building V-20, was completed in 1990 and marked the beginning of the ACSC being the only Land-Based Test Site (LBTS) able to fully support all of the AEGIS Ship Program system baselines. In 2004, SCSC added the AEGIS, SPY-1D(V) Facility, Building V-21, to the AEGIS complex to support additional programs such as Ballistic Missile Defense (BMD) and future AEGIS baselines.

In 1999, ACSC was renamed the Surface Combat Systems Center (SCSC) by direction of Commander Naval Sea Systems Command (NAVSEA). This direction

combined the AEGIS and Ship Self Defense (SSD) Facility, Building V-24, under one unified command. The SSD facility had been built in 1996 in order to support Aircraft Carrier (CVN) and Amphibious (Landing Platform Dock-LPD, Landing Helicopter Dock-LHD, Landing Ship Dock-LSD) combat systems and provided an environment that enabled Battle Force level integration and interoperability test support.

In 2002, SCSC completed the installation of the Multi Function Radar (MFR) (AN/SPY-3) Facility. The AN/SPY-3 MFR is an X-band active phased-array radar designed to meet horizon search and fire control requirements for the 21st-century Fleet. As a follow-on to this effort, planning and design of the DD(X) Engineering Test Center began in May 2002 with groundbreaking scheduled for December 2004 and the completion of the facility scheduled for July 2006. The addition of this facility will make SCSC the only US Navy LBTS with the capability to represent almost every US Navy surface combatant, including AEGIS, SSDS, and the new DD(X) Ship Classes, adjacent to a live fire maritime environment, where a combination of models, simulations and live systems can interact and used for proof of concept demonstrations.

While the Navy's organization and missions have shifted over time, the Navy's surface combat systems vision has remained focused and has been mirrored by the growth of combat system capabilities at SCSC in three ways:

1. The AEGIS Fleet is now at the apex of its growth and will shortly move into an in-service support phase. Any future developments, such as the Cruiser Conversion Program (CCP), upgraded baselines for new ships, the deletion of baselines of ships at the end of their service life, and the addition of future capabilities such as Theater Ballistic Missile Defense (TBMD) missions, must all be reflected at the SCSC, AEGIS facility in the same manner.

2. The SSD Facility enhanced the site capabilities to test Battle Force (BF) interoperability concepts and provides a means to test non-AEGIS combat systems and cross combat system elements such as Cooperative Engagement Capability (CEC). The addition of CEC makes it a hub for Battle Group Integration Testing (BGIT) that can replicate Radar and Link performance characteristics for naval battle groups.

3. The closure of the Atlantic Fleet Weapons Training Facility (AFWTF), Vieques Island, Puerto Rico in 2003 (Atlantic Fleet Weapons Training Facility (AFWTF), 2003) created the need for a training facility on the east coast. The addition of the MFR facility in 2002 and the DD(X) facility in 2006 at SCSC has the potential to fill this need and transform SCSC's role as a LBTS for research, development, test and evaluation of naval combat systems into the US Navy's East Coast Weapons Range Facility, or otherwise named, the Wallops Island Test and Evaluation Range Facility (WITERF).

B. PURPOSE

The purpose of this research is to provide products that can be utilized by the SCSC Senior Leadership Team for developing a new SCSC Command Business Plan and SCSC Strategic Plan. Since 2001, many efforts have been undertaken to achieve this goal. Nonetheless, the plans never fully matured due to a multitude of reasons. All the work that has been produced, however, now exists as a large assortment of documentation in the form of papers, presentations, and booklets that have been written, cataloged, and stored in various places by many different authors and groups over the past ten years. The intention is to analyze this information, combine it where appropriate, present it in one voice, and provide alternative suggestions based on up-to-date research.

C. METHODOLOGY

The methodology used in this research is based on business planning topics that SCSC can utilize to develop planning documentation for the command. This research included a review of relevant literature, a review of US Navy resources for analysis, and the preparation of a thesis roadmap based on a strategic planning model.

1. Review of Relevant Literature

A review of relevant literature included, but was not limited to, reference literature and other library information resources on organization performance, transformation theory, change processes, and performance management and measurement.

2. US Navy Resources

A review of existing US Navy resources included the following:

- An analysis of existing and planned US Navy Land-Based Test Sites and Range facilities.
- A review of Department of Defense (DoD) Transformation policies including US Navy Joint Vision 2020 and Sea Power 21.
- A comprehensive review of existing SCSC business, strategic, and future-planning documentation for organizational change. This included an analysis between government and private sector planning principles.
- A multi-case study of US Navy and private sector organizations that have applied strategic planning, business planning, and organization transformational processes in order to improve their long-range performance.
- Interviews with key members of the Acquisition Workforce, specifically, selected Land-Based Test Site personnel, Test and Evaluation professionals, and Program Executive Office personnel who are actively engaged in research, development, test, and evaluation efforts for existing and future naval surface combatants and their associated combat systems.

D. THESIS ROADMAP

Since the Navy closed AFWTF, fleet assets based on the east coast have been searching for alternatives to replace or replicate the same level of testing. SCSC can provide many of these testing resources and is making every effort to insure its business and strategic planning efforts are not in vain, however, additional work is needed. For

example, the current SCSC Strategic Planning Goal #1 that was first opened in 2001 with a 2004 completion date now states that,

> By 2006, develop a business plan, which identifies operations, processes, and support requirements to satisfy projected growth at least five years in the future. (SCSC/G1, 2003, 3)

SCSC needs to address strategic planning and business planning with renewed commitment that lends itself to completing the tasks at hand. This paper will provide new products aimed at reinforcing that commitment in the form of three standalone documents that can assist the strategic planners: 1) An analysis of US Navy Test and Evaluation Practices and Facilities, 2) An SCSC Internal Analysis and 3) An SCSC External Analysis. In order to facilitate this research and guide the reader, portions of John M. Bryson's book, Strategic Planning for Public and Non-Profit Organizations, (Bryson, 1995) were used as a model for these written products. These items included the internal and external elements and an approach to strategic planning, called the Strategy Change Cycle, as shown in Section II, Paragraph D: SCSC Planning Products and Model, page 18, Figure 1.

E. RESEARCH QUESTIONS

The questions at the heart of this research fall into seven categories, some that have been used at the SCSC Command since it's beginning and some that are new and innovative yet define the basic products that are needed, and will be needed, to sustain new and existing ships operating in the US Fleet.

1. Wallops Island Test & Evaluation Range Facility:
    a. What steps must SCSC take to transform itself from a Land-Based Test Site to the Wallops Island Test & Evaluation Range Facility (WITERF)?

2. SCSC Planning Process and Documentation:
    a. What steps must be taken to define the internal and external analysis of the SCSC command for strategic and business planning purposes?

3. Land-Based Test Sites:

   a. What are the US Navy and Commercial (contractor) Land-Based Test and Range Operations Sites that support US Naval Surface Combatants and how do they compare to the SCSC?

   b. How can SCSC improve and maintain its facilities to sustain long-term use?

4. AEGIS Shipbuilding:

   a. What impact will the completion of the AEGIS Shipbuilding Program have on SCSC as the program is phased out and moves into an in-service support status?

5. SSD Program:

   a. What effect will the future growth of the SSD program have on SCSC?

6. DD(X) Shipbuilding:

   a. What impact will the new DD(X) Shipbuilding Program have on SCSC?

7. Sea Power 21:

   a. How does SCSC currently embrace the Chief of Naval Operations (CNO's) Sea Power 21 transformation concepts?

II. SCSC STRATEGIC PLANNING

A. OVERVIEW

SCSC has undergone a series of Strategic Planning initiatives since it first opened for operations in 1987. The genesis of SCSC's road to producing a strategic plan was the result of two actions within the US Navy and US Government.

The first action was enacted in April 1992 when the AEGIS Program Manager, RADM George Huchting briefed the AEGIS Mission, Vision, and Guiding Principles to the AEGIS Community. In his plan, the Admiral outlined his directives for a Strategic Improvement Plan in which Strategic Goals for the next ten years and Tactical Objectives with Action Plans for the next zero to two years would be addressed. (Bengston, 1995, 3)

The second action was the Government Performance and Results Act (GRPA) of 1993 (U.S. Public Law 103-62, 1993) that was designed to hold government agencies accountable for program performance by requiring that they think strategically, set new goals, measure the goals, and provide a detailed report on these goals annually. In his paper to the Organization of Economic Cooperation and Development in November 1995, Walter Groszyk described the new law as follows,

> The main features of this law are: A requirement for Federal departments and agencies to prepare strategic plans, beginning with an initial plan to be submitted to the Office of Management and Budget (which is an agency within the Executive Office of the President) and to Congress by September 30, 1997. A requirement that Federal departments and agencies prepare annual performance plans, setting out specific performance goals for a fiscal year, starting with a performance plan for fiscal year 1999. (Groszyk, 1995, 1)

RADM Huchting's progressive thinking and the US Government's performance planning directives have since gone on to see drastic streamlining of government organizations and the long-term effects on the way business is currently being conducted within the US Navy, NAVSEA, and the command.

B. HISTORY

1. The First Strategic Planning Initiative

In May 1993, RADM Huchting's directives became the genesis for the newly formed SCSC command to begin development of their strategic improvement plan. The first SCSC Strategic Planning meeting was scheduled for July 1993.

The July 1993 off-site retreat for upper management personnel was held on base for fourteen senior officers and civilian department head staff, including the following: Navy - Commanding Officer, Executive Officer, Command Master Chief, Supply Department Head; Civilian - Executive Director, Combat System Department Head, Resource Management Department Head, Assistant Resource Management Department Head, Public Works Department Head, Command Support Department Head, Quality Staff Advisors (2), Facilitators (2). On-site worker level personnel, including project engineers, team leaders, and technical staff members were not invited. The two facilitators of the group were AEGIS Program Office personnel who were sent to assist with guiding the group through the planning process. The results of this meeting were very positive and resulted in solidification of the group as a whole and the formation of the SCSC Command Mission, Vision, and Guiding Principles which were then circulated throughout the command for comments. A follow-on session was held that August in order to review all comments and a group consensus was achieved. In September, the charter for the SCSC Executive Steering Committee was established and the SCSC Strategic Improvement Plan was developed. In October, the Strategic Improvement Plan was presented to the command for review and finally published in December 1993. The plan has been reviewed several times since then and received new birth in 2001 when the next measurable strategic initiative was implemented. Although a strategic plan and the associated documentation were produced, they were never fully implemented.

In his 1995 paper, Strategic Planning: A Comparison of Methodology, Alex Bengston, an engineer stationed at the SCSC Command, described the failure of SCSC's first Strategic Planning Initiative as follows:

> In the end, it seemed as if the commitment by management fell apart. The Mission, Vision, and Guiding Principles were not fully integrated into

> daily activities. It is as if Strategic Planning and its implementation was a "side task" which may be implemented one day, or maybe not at all in favor of the next "fad" management program the government adopts. The daily tasking of individual employees and their jobs seem to continue on as usual, with each department having their own twist on what they think TQM (Total Quality Management) is. Process improvements are being made not because it would satisfy a tactical objective, but because everyone is conscious of a need to improve processes in general. This lack of commitment throughout the entire process has been a major contributor to the weakness of the implementation phase of the SCSC Strategic Improvement Plan. The Mission, Vision, and Guiding Principles have undergone one revision already and no tactical objectives have been formally assigned, most assuredly due to lack of commitment by management throughout the implementation. The process requires a long-term commitment of time and resources and is a key to success in implementation of planning efforts and for the strategic plan to become a part of the way your organization does business. (Bengston, 1995, 15-16)

Mr. Bengston's comments echo the problems associated with many corporate strategic plans in that they do not THINK strategically, implement the changes they prescribe, and incorporate strategic planning in the daily lives of all the stakeholders. H. Mintzberg described this lack of implementation best in his book, The Rise and Fall of Strategic Planning, as follows,

> Every failure of implementation is, by definition, also a failure of formulation. (Mintzberg, 1994, 25)

It is not that SCSC did not want to implement the strategic planning process; the command and the plan did not successfully outline a strategy for implementation. SCSC is not alone. A 1997, a GAO survey based on the Government Performance Results Act (GPRA) of 1993 directed at results-oriented management practice to accomplish mission tasking, found that during a three-year period 68% of the personnel did not use program performance information, 70% did not link the performance of program to achieve agency strategic goals, and 78% did not implement the requirements of the GPRA. (GAO/GGD-97-109, 1997, 107)

Mr. Bengston's "think strategically" comment still holds true in some respects today because, in the opinion of many who work at SCSC, the command does not think strategically at the division level where the nuts and bolts work takes place. In many cases on-site, forward-thinking strategic planning is dominated by "crisis management

engineering" in the form of re-working engineering problems and projects due to improper requirement definition early in the engineering process. However, the SCSC command is aware of these inconsistencies and is committed to improving its in-house engineering practices and the way it does business by embracing and implementing change. These changes have come in the form of new senior leadership in 2002 that is committed to the development of strategic and business planning goals by adapting to the changing business environment outlined in the Department of Defense Transformation Goals and US Navy, SEA POWER 21 and Joint Vision 2020. In addition, these changes are being fueled by the need for an east coast Navy combat systems' testing facility and SCSC has been identified as the best possible choice to support that mission.

2. The Second Strategic Planning Initiative

In 1998, Strategic Planning at SCSC began a formal, systematic strategic planning process that allowed the command to periodically re-focus on what it was and where it saw itself going by adopting monthly planning groups, quarterly reviews, and annual off-site meetings that involved all command personnel including Navy, civilian, and contractor personnel.

SCSC took two steps forward with the strategic planning initiatives, which established a change in the way that management viewed strategic planning and in management's commitment to developing a clear working strategy. The first step was establishing the office of Director of Management Operations (DMO) in 2001, with the goal to organize the departments into a corporate-like structure and provide the command with a more forward-looking strategy. The second step was the re-evaluation of four strategic goals in 2002 that support the command mission and vision:

1. Evolve the Battle Group in the Sand to keep pace with Navy and Fleet Requirements. (SCSC/G4, 2002, 2)
2. By 2004, Improve SCSC capabilities to support AEGIS and SSDS current and future customers. Increase contacts with customers and sponsors to improve the quality and capacity of SCSC support. (SCSC/G4, 2002, 8)
3. By 2004, re-energize the operational partnerships with NASA WFF and NAWC AD Patuxent River to provide combat systems range services capable of supporting fleet exercises, operations, and at-sea testing. (SCSC/G4, 2002, 21)

4. By 2004, develop a business plan, which identifies operations, processes, and support requirements to satisfy projected growth at least five years in the future. (SCSC/G4, 2002, 26)

Based on the amount of involvement by all of the departments in 2003, the command strategic planning process was fully integrated into the command operations. Increased involvement included the required attendance of personnel at all meetings, the assignment of action items to develop products, and the re-evaluation of goals and objectives, which resulted in the decrease from four to two strategic goals. As part of an on-going SCSC strategic planning initiative, Strategic Goal #4 was renamed as Strategic Goal #1 in November 2003 with a revised timeframe for completion by 2006. These changes resulted in the current, 2004, strategic planning goals for the command, which are as follows:

1. By 2006, develop a business plan, which identifies operations, processes, and support requirements to satisfy projected growth at least five years in the future. (SCSC/G1, 2003, 3)
2. By 2008, establish SCSC as a premier Integrated Warfare Systems oceanfront proving ground. (SCSC/G2, 2003, 2)

3. Current SCSC Strategic Planning Efforts

Currently, SCSC is in the process of planning for its annual strategic planning off-site meeting in October 2004, which is aimed at producing the first command strategic planning document since 1993. This meeting is a clear example of management's commitment to the strategic planning process and its endeavor to adapt to the ever-changing business climate. Overall, SCSC has come very far since the development of its first strategic planning documentation, as evidenced by the following: 1) The evolution of goals and objectives has been manifested in the continued growth of strategic planning practices that have been refined over a eleven year period, 2) A business development office was established to address the command needs for future planning, and 3) The development of documentation, practices, and continued involvement in groups and meetings is part of the command planning and operations practices.

C. GOALS AND STRATEGIC ISSUES APPROACH TO PLANNING

SCSC's lack of success when implementing strategic planning concepts at the command is a common problem shared throughout many government agencies that model their strategic planning concepts on the GPRA of 1993.

For this research, two planning methods were examined: the Synoptic Approach, which best describes SCSC's current strategic planning agenda, and the Strategic Issues Approach, which may be the best alternative to SCSC's current strategic planning process.

1. Synoptic Approach

The Synoptic Approach, often called the Goals Approach, is a conscious effort launched by top management to integrate the decisions that compose the overall strategy and ensures that plans are consciously developed, integrated into a whole, and are mutually reinforcing (Fredrickson, 1983). SCSC's view of strategic planning is embodied in this approach because it follows all the hallmarks of the requirements called for by the GPRA of 1993 and utilizes a mission statement, goals and objectives for major functions and operations that can be successfully measured. This approach works very well for companies where there is a strong hierarchy, standardized work routine operating procedures, and clear divisions of labor without high levels of technological staffing.

SCSC is much different. It is continually operating in a climate of emerging naval technologies that are, never the less, subject to program cuts and the political climate. In addition, future planning is difficult due to its complex nature and its requirement for a high degree of expert technological staffing and labor. This approach, in comparison and contrast, is best described as follows:

> The goals approach, in other words, is more likely to work in public profit organizations that are hierarchically organized, pursue narrowly defined missions, and have few powerful stakeholders. In contrast, organizations with broad agendas and numerous powerful stakeholders are less likely to achieve the kind of consensus ("forced" or otherwise) necessary to use the goals approach effectively – although they may achieve it in specific areas as a result of political appointments, elections, referenda, or other externally imposed goals or mandates. (Bryson, 1995, 112)

SCSC's approach to strategic planning has been to take the private industry standard approach, which had been successful at building a strategic planning document that has been in use since 1993. This "one size fits all" mentality of the Synoptic/Goals Approach is best described as:

> A poor fit for many public bureaus, particularly those in highly politicized context, with diverse missions, conflicting stakeholders interests, and cross-cutting programs that require collaboration among multiple bureaus and levels of government. (Roberts, 1998, 3)

The Synoptic/Goals Approach that is used by SCSC is similar to the planning traditionally used in private industry and in many government agencies that have adopted the GPRA of 1993 mandates of strategic planning. However, SCSC is not a private industry that manufactures mechanical products that can be counted, measured, or driven by a board of directors that will be in place for the next ten years. SCSC is a US Navy, RDT&E, mission-funded activity, with numerous stakeholders and their own agendas. They utilize SCSC as their laboratory and do not see it as a business entity, but as an extension of their business. SCSC's goal #2 may be to establish SCSC as a premier Integrated Warfare Systems oceanfront proving ground by 2008, however it will only be a premier proving ground if the US Navy lets it be so.

2. Strategic Issues Approach

The Strategic Issue Approach may be the best alternative to SCSC's present strategic planning policy. Currently, the command has addressed a vision for the future and the forces at work outside of the command; however, it has failed to address the fundamental problems or "issues" at the engineering and business level.

SCSC needs to change this paradigm and define each of its strategic issues as part of its strategic planning policy. A strategic issue is best defined as,

> Fundamental policy question or critical challenge that affects an organization's mandates, mission, and values; product or service level mix; clients, users, or payers; or costs, financing, structure, or management. (Bryson, 1995, 104)

For SCSC, this may mean taking a hard look at the basic services that are supplied by its own personnel for the US Navy and then driving these issues up the chain to the sponsors. These issues could involve procuring additional building space, hiring additional personnel with specific skills, rebuilding the facilities infrastructure, and asking the sponsors how SCSC can operate outside of the constraints that currently binds it to several outside agencies. Strategic Issues Planning frames each of these issues into a critical question and places it into an individual category, identifies a strategy to address it, assigns a performance indicator to track each strategy, and prompts the planning team to agree on addressing the most pressing questions.

a. Types of Strategic Issues

To achieve this review, there are three kinds of strategic issues that can be applied to the critical questions/issues facing the command, they are:

1. Those for which no organizational action is required at present, but which must be continually monitored.
2. Those that are coming up on the horizon and are likely to require some action in the future and perhaps some action now. For the most part these issues can be handled as part of the organization's regular strategic planning cycle.
3. Those that require an immediate response and therefore cannot be handled in a more routine way. (Bryson, 1995, 32)

b. Issue Identification Categories

After each issue is identified it is assigned to one of four basic issue categories that define the approach the command will take to resolve the issue. These include the following:

1. Direct Approach: This approach goes straight from a discussion of mandates, mission, and SWOTs (strengths, weaknesses, opportunities, and threats) to the identification of strategic issues.
2. Indirect Approach: This approach begins with brainstorming about several different options before identifying issues.
3. Goals Approach: This approach starts with goals and then identifies issues that must be addressed before the goals can be achieved.
4. Vision of Success:This approach starts with at least a sketch of a vision of success in order to identify issues that must be dealt with before the vision can be realized. (Bryson, 1995, 128)

c. Changing the SCSC Strategic Planning Paradigm

SCSC has utilized the Synoptic/Goals Approach since it first started strategic planning and it has been argued that one strategic planning model will work for all of SCSC's strategic planning needs. However, past history at SCSC has shown that this approach does not work effectively and SCSC should look at implementing the Strategic Issues Planning Process, which argues that each strategic issue should be dealt with as a singular, specific situation.

By building on the Strategic Issues Planning paradigm, SCSC could envision strategic planning with other federal agencies by asking multiple questions using various strategies including the following:

1. How can SCSC exert the control to strategically plan in a shared power system? For example, SCSC is controlled administratively by NAVSEA and is a tenant to NASA.

2. How can SCSC be held accountable by a chain of command from elected representatives to organizational officers and executives and yet adapt to a changing environment which necessitates individual and agency flexibility? For example, SCSC's environment is controlled by the sitting President and its party affiliation and other government officials, outside political influences like the war in Iraq, the Navy programs which fund the command, and locally, by NASA which controls the use of the open ocean range area adjacent to Wallops Island.

3. How can SCSC be responsive to the unique needs of its customers? For example, SCSC could better serve the customer by addressing the internal needs of the command and by asking the customers what they think are the real issues that inhibit or enhance SCSC's performance.

These and many other similar questions illustrate that Strategic Issues Planning has advantages not found in a Synoptic/Goals Approach to strategic planning. Strategic Issues Planning can draw SCSC's numerous stakeholders together where

crosscutting programs and issues require collaboration across agencies and other levels of government. (Roberts, 1998, 21)

D. SCSC PLANNING PRODUCTS AND MODEL

In order to clarify the direction of this research it became necessary to employ the use of a model to guide the reader. In all, the desired effect was to provide a complete strategic plan for the command; however, this is not feasible due to the team environment and long-term commitment required for such an endeavor. The scope of this project is limited to the production of three elements that can be utilized to assist the command and the strategic planning team.

1. Analysis of US Navy Test and Evaluation Practices and Facilities: The items found in this section are used to provide the background information for readers who are not familiar with the Test and Evaluation practices and facilities currently used in the US Navy.

2. SCSC Internal Analysis: The items found in this section serve to examine the command's core organization and competencies and identify strengths and weaknesses.

3. SCSC External Analysis: The items found in this section serve to examine forces outside of the command and identify opportunities and weaknesses.

In order to facilitate this research, portions of the internal and external elements of John M. Bryson's approach to strategic planning, called the Strategy Change Cycle, as shown in Figure 1, were used as a model for these written products.

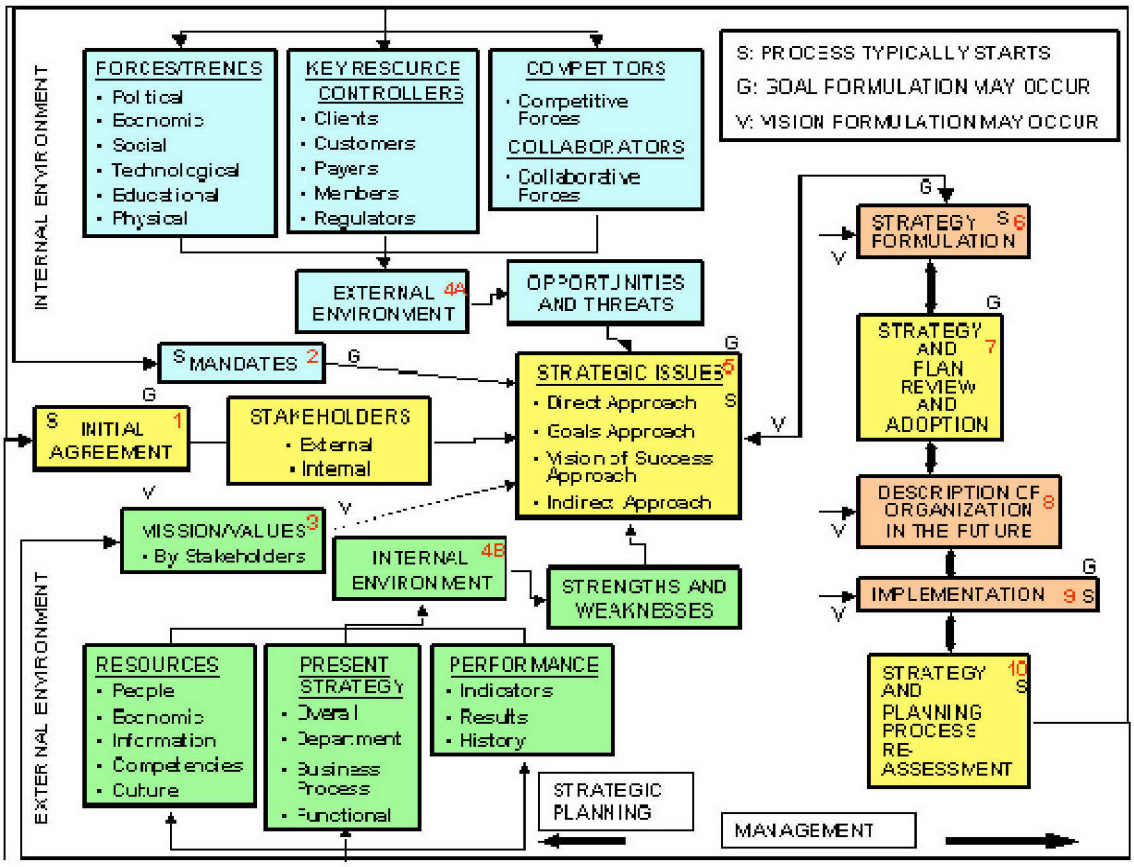


Figure 1. Bryson's Ten-Step Strategy Change Cycle (From Ref. 10, 24)

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III. ANALYSIS OF US NAVY TEST AND EVALUATION PRACTICES AND FACILITES

A. OVERVIEW

The analysis of US Navy Test and Evaluation practices and facilities is used to summarize standard naval T&E practices that will be examined in the internal and external environment sections ahead.

B. TYPES OF TEST & EVALUATION

Ships are a mix of interdependent single- and multi-purpose systems that are integrated to accomplish many tasks in peace and war. The emphasis on "try-before-buy" programs that are prominent in the high-tech systems that are installed on Navy ships, the T&E programs for the surface ship and submarines themselves can be characterized as a long-term building block effort to progressively demonstrate advancements toward full ship mission capability. In general, the technical risks in a ship acquisition program are in the shipboard systems that are to be installed. Ships have their own T&E programs, which are completed before the systems are produced in quantities and installed in new ships under construction. Since the high tech systems are proven before ship construction, it is not necessary to delay the decision to build follow-on ships of the class until after the lead ship has completed construction and all of its tests and trials (NAVSEA (SEA 62T): Ship and Combat Systems Test and Evaluation, 2004). The differences between shipbuilding and ship system T&E is that,

> Shipbuilding is more of a production effort than an R&D effort. The performance risks are in the combat systems and electronics, and not the hull itself. Ship design engineering for almost all ships is well within the state of the art and will produce predictable results with a high degree of confidence. Ship performance (i.e., speed, endurance, size, buoyancy, and stability) is predictable. Also, technological advances in hull and propulsion systems are very gradual in comparison to the combat systems, which must be constantly updated to meet changing threats. While Navy does not prototype most of its ships, it does nevertheless meet the spirit and intent of the "try-before-buy" policy. This is accomplished through Development and Operational Testing of the newer systems aboard surrogate ships and at land-based test sites to support the initial ship production decisions. Developmental systems that are planned for installation on the ship have their own acquisition programs, and are tested

in factories, land-based test sites, and on surrogate ships -- prior to being delivered to the shipyard for installation aboard the lead ship. (Rednor, 1992, 2)

A prime example of new ship acquisition processes and T&E is the next generation destroyer program, which is focused on developing Engineering Development Models (EDM's) to demonstrate system technologies for future ships, such as the DD(X) Future Stealth Destroyer shown in Figure 2. The EDM's include electric drive, integrated power management systems, multi-function and volume search radar suites, advanced gun system, new hull design, and stealth capabilities.

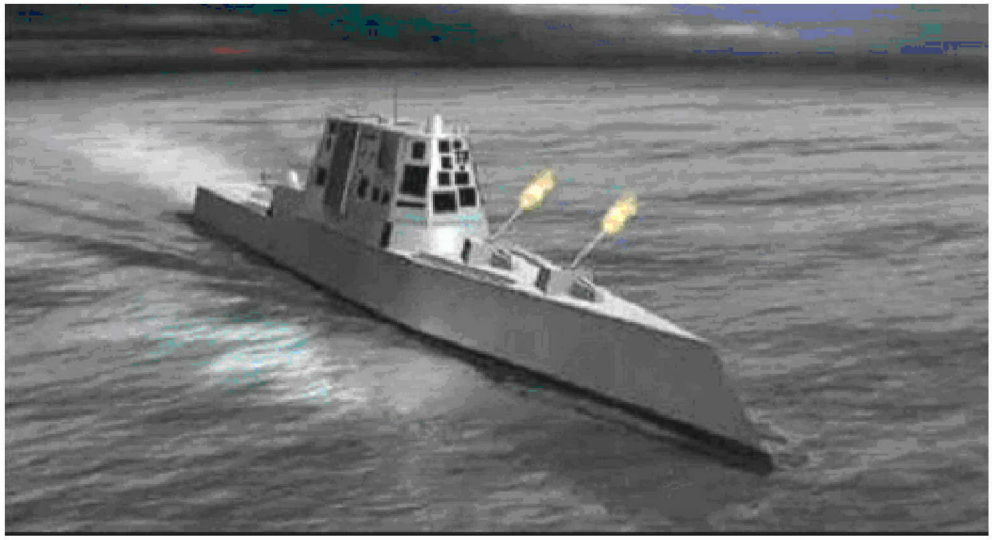


Figure 2. DD(X) Future Stealth Destroyer (From Ref. 23)

1. Factory T&E

Factory T&E is conducted by the manufacturer at the stage of final assembly or before delivery and can be either as simple as checking out a pump or as complex as a radio frequency assessment of an antenna in an anechoic chamber, shown in Figure 3. In either case, the manufacturer's testing is scoped so as to minimize risk for delivery to the next level of system integration. (NAVSEA (SEA 62T): Factory T&E, 2004)

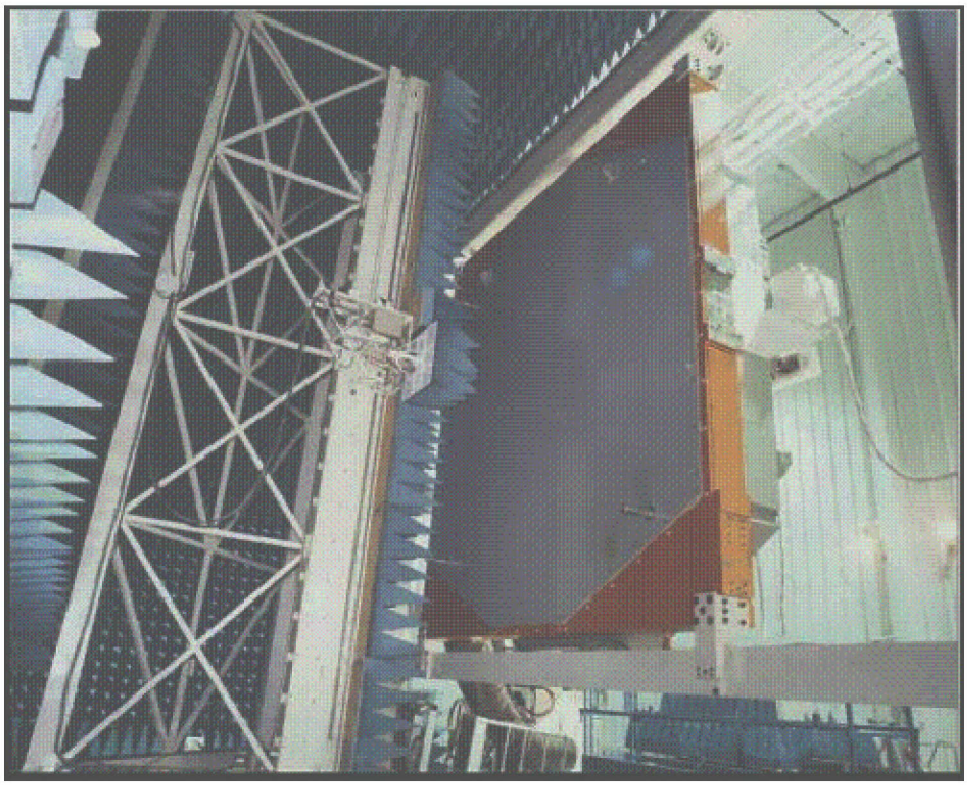


Figure 3. AEGIS Array Testing in Anechoic Chamber (From Ref. 3)

2. Weapon & Combat System T&E

Weapons and combat systems are generally developed and acquired as separate programs and involve tests to assess compliance with contract requirements and the system compatibility with other systems and operators. It is at this point that,

> The Technical Evaluation (TECHEVAL) of a shipboard system is usually conducted on a production representative system, actually installed in an in-service Navy ship. During TECHEVAL, the system is operated and maintained by the ship's crew under the direction of the systems Technical Development Agency (TDA), a Navy Warfare Center field activity. Full performance of the system is verified to confirm its readiness for Operational Evaluation (OPEVAL), which is full end-to-end, mission-oriented performance that is demonstrated in typical combat and peacetime scenarios. The Navy's independent Operational T&E agency, Operations Test Evaluation Force (OPTEVFOR), participates in planning the TECHEVAL and usually observes it. Once the system is certified ready for OPEVAL, the personnel from the TDA depart the ship and

> OPTEVFOR then directs the conduct of the OPEVAL, in which full end-to-end, mission oriented performance (can) be demonstrated in typical combat and peacetime scenarios. (NAVSEA (SEA 62T): Weapon & Combat System T&E, 2004)

For example, in the summer of 2000, SCSC provided direct support to demonstrate the system capabilities under realistic operational conditions for the Cooperative Engagement Capability (CEC) Techeval/Opeval for the CEC system, which is described as follows,

> CEC brings new capabilities to naval air and missile defense, not by adding new radars or weapon systems, but by distributing sensor and weapons data from existing systems in a new and significantly different manner. CEC fuses high quality tracking data from participating sensors and distributes it to all other participants in a filtered and combined state, using identical algorithms to create a single, common air defense tactical display ("air picture"). The result is a superior air picture based on all sensor data available that permits significantly earlier detection and more consistent tracking of air contacts. (Cooperative Engagement Capability, 2004, ⁀1)

The timeline for the exercises held at SCSC is provided, as an example only, in the following CEC TECHEVAL/OPEVAL schedule shown in Figure 4.

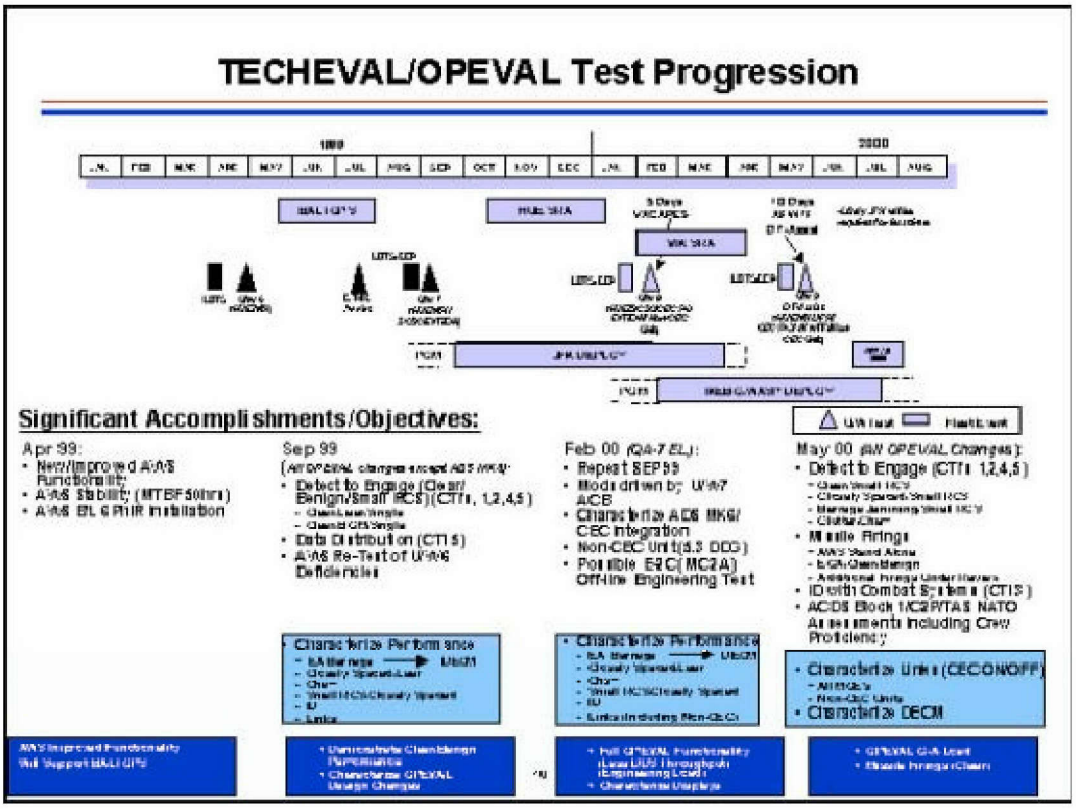


Figure 4. Cooperative Engagement Capability (CEC) OPEVAL Schedule (From Ref. 34, 7)

3. Land-Based System Integration Testing

A Land-Based Test Site (LBTS) is a facility that duplicates/simulates as many conditions as necessary of a system's planned operational installation and utilization. They are categorized into two groups:

> Development LBTS: A development LBTS is used for development and operational T&E of system hardware, software, and their integration. In addition, it is used to identify, design and test the unique interfaces that are required for the system to work in its intended shipboard environment. (NAVSEA (SEA 62T): Land-Based System Integration Testing, 2004)
>
> Production LBTS: A production LBTS is used for the interface testing and grooming of each suite of production hardware prior to shipboard installation. In addition, it allows you to test the system and prepare its interfaces as a module for a smooth installation at the shipyard. (NAVSEA (SEA 62T): Land-Based System Integration Testing, 2004)

The growth complexity and interdependence of systems has increased the scope and complexity of their testing. At first these test sites were established with the primary objective of reducing shipboard test time by emulating the functional and physical integration of a suite of equipment, as it would be installed on a ship. The sites provided the integration, testing, and certification of the equipment in later shipboard installation, checkout, and testing. This capability has grown to crew training and the validation of system documentation.

Figure 5 depicts how the LBTS's bring the combat systems elements together as systems for testing prior to ship integration. The AEGIS Ship Program was the first major ship class to propose building a LBTS at the Lockheed Martin Maritime Ship Sensors (LMMS2) complex in Moorestown, NJ as a part of the program's ship integration effort.

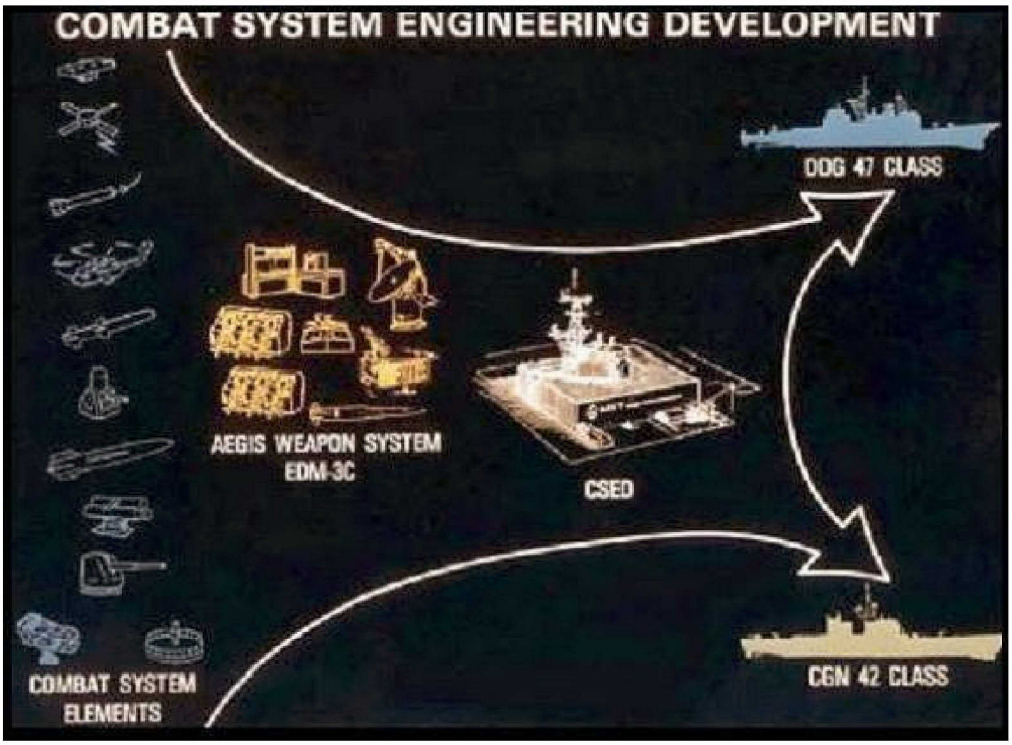


Figure 5. AEGIS Combat System Engineering Development Site (CSEDS), Moorestown, NJ (From Ref. 9, 28)

4. Ship Industrial Testing: Total Ship Test Program (TSTP)

Total ship testing for a given ship industrial availability is outlined in the Total Ship Test Program Manual, (TSTP/NAVSEA, 1995) which describes all standards and

practices and requires that a test program should be planned and conducted as a single, integrated program. The Integrated Test Package consists of the following:

1. Test Index: Lists the tests to be conducted and who is responsible to conduct the test.
2. Test Procedures: Step-by-step descriptions of the operations to be performed during conduct of the tests.
3. Test Packages: These are developed using a standard format and engineering process and structured into Seven Stages of Shipboard Testing.
4. Test Sequence Network (TSN): Defines the test program for the industrial availability.

The Seven Stages of testing described in Figure 6 outline the types of testing that take place during ship construction and systems integration. Normally this stage starts with the easiest tests and then proceeds to the harder ones as the program continues. (NAVSEA (SEA 62T): TSTP, 2004)

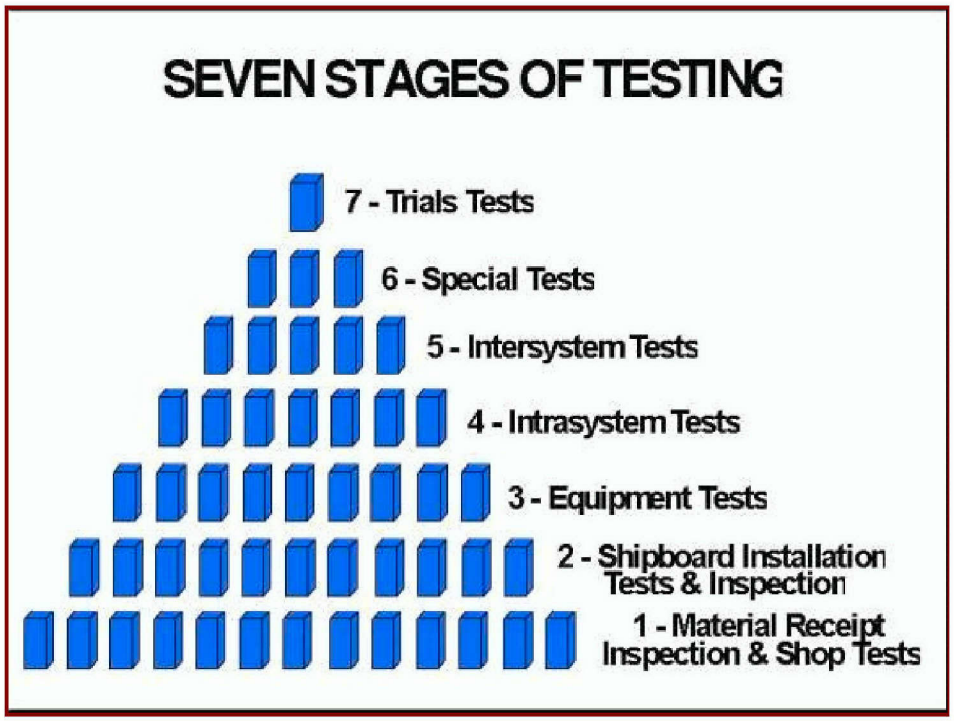


Figure 6. Seven Stages of Testing Pyramid (From Ref. 58, 1)

The Seven Stages of Testing underscores the philosophy of RADM Wayne E. Meyer, who said, "build a little, test a little, learn a lot", a philosophy that is still used today in the AEGIS Ship Program and is currently being used in the development of the DD(X) Ship Test Program.

5. AEGIS Land-Based Test Sites (LBTS's) Site and Planning Management

The AEGIS Program's objective is to deliver war-ready ships to the fleet, maintain the ships at optimum efficiency, and upgrade the ships to meet new threats. The AEGIS philosophy has led to fielding four LBTS's specifically designed and operated for development and life-cycle-maintenance. All elements including ship crews, computer programs, and weapons system components are tested at the LBTS's, outfitted on the ships in the shipyard, and tested at-sea before they are certified as war-ready. Accomplishing these objectives required the establishment of system development and lifetime support shore sites including the AEGIS LBTS's depicted in Figure 7. A detailed description of these sites is derived from the AEGIS Sites Activation, Maintenance and Modernization Program Guide (ASAMMP). (PEO/TSC, 2003, 2)

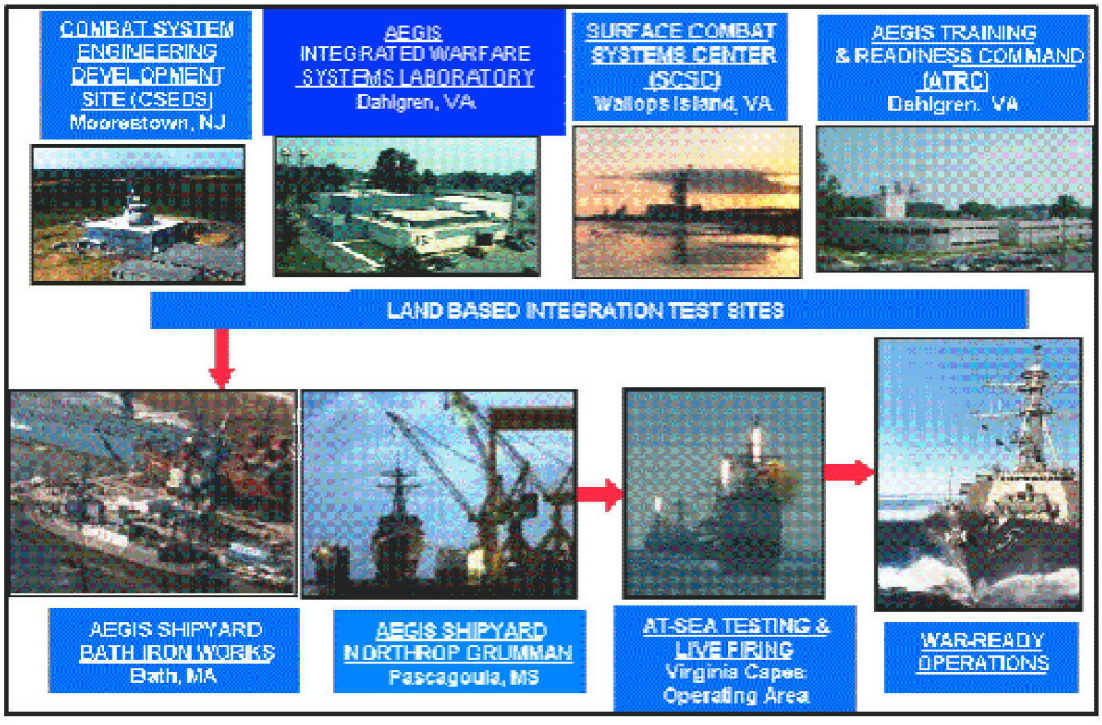


Figure 7. AEGIS Development and Testing Cycle (From Ref. 83, 24)

a. Combat System Engineering Development Site (CSEDS)

CSEDS provides a site where forward fit AEGIS Weapons System (AWS) computer programs are integrated with tactical equipment and other AEGIS Combat System (ACS) elements for Cruiser (CG-47) and Destroyer (DDG-51) class ships. The co-location of tactical equipment in an engineering development site in close proximity to the Lockheed Martin Maritime Ships and Sensors (LMMS2), AEGIS Radar Production facility has proven to be a valuable asset to the US Navy. (PEO/TSC, 2003, 2)

b. AEGIS Integrated Warfare System Laboratory (IWSL)

IWSL provides a site to perform life cycle engineering support of the AEGIS Weapons Systems (AWS) computer programs including the initial acceptance of the AWS computer programs and establishment of controlled libraries; it is the recipient of other ACS computer programs from all sources, and acts as a single point of computer program delivery to all AEGIS ships. IWSL is the primary Lifetime Support Engineering Agent (LSEA) site for computer programs. The LSEA also maintains all in-service baselines, monitors problem investigation and fleet feedback, and conducts all integration testing associated with problem correction and capability upgrades of the AWS. (PEO/TSC, 2003, 2)

c. AEGIS Training and Readiness Center (ATRC)

ATRC provides a facility in which AEGIS Combat System (ACS) training is conducted for officer and enlisted personnel assigned to AEGIS cruisers and destroyers. Training is conducted on tactical equipment with sufficient simulation and stimulation to replicate the shipboard tactical environment. Students include both pre-commissioning and replacement personnel and curriculum development incorporates fleet feedback as well as new capabilities and upgrades. (PEO/TSC, 2003, 3)

d. Surface Combat Systems Center (SCSC)

SCSC provides an AEGIS in-service engineering facility with tactical equipment and switching networks to replicate in-service CG-47 and DDG-51 AEGIS Combat System baselines. Its maritime location enables SCSC to replicate the at-sea environment necessary to radiate live SPY-1A, SPY-1B, and SPY-1D radars. In-service engineering tasking includes Ordinance Alterations (ORDALT)/Engineering Change

Proposals (ECP)/Field Change (FC) installation and checkout, LSEA computer program validation on tactical equipment, and system level In Service Engineering Agent (ISEA) testing for problem resolution. SCSC provides the capability to perform system-level operations and maintenance training, and pre-commissioning crew team training and certification for crews preparing for new construction ship trials. (PEO/TSC, 2003, 3)

6. Post-Industrial Ship Test and Certification Programs

When the Navy takes delivery of a ship from the shipbuilder, a period of tests and trials is conducted to confirm capabilities and limitations of the ship and is intended to bring the ship from a state of contractual completion to one of full material readiness. These Post Delivery Tests and Trials (PDT&T) identify discrepancies that qualify for correction under the guarantee provisions of the contract, establish the ship's baseline characteristics, develop proficiency of the ship's force in it's operation, demonstrate the ship's operational capabilities, and verify material readiness in an at-sea environment. The first AEGIS Destroyer, USS ARLEIGH BURKE, DDG-51, shown in Figure 8, demonstrated Post Industrial Ship and Combat System Testing and the role it plays in the acquisition of new ship programs. (NAVSEA (SEA 62T): Post-Industrial Ship Test and Certification Programs, 2004)



Figure 8. USS Arleigh Burke, DDG 51, Combat System Testing off the Virginia Capes (From Ref. 83, 10)

C. U.S. NAVY TEST AND EVALUATION FACILITIES AND RANGES

At this time, the US Navy operates and maintains Test Ranges, Training Ranges, and Operating Areas throughout the world. Maintaining and managing Navy training at these sites is difficult with increased encroachment, as well as environmental and political constraints. The Naval Sea Systems Command (NAVSEA) Navy Sea Test and Evaluation Command, Department SEA 62T (SEA 62T), is tasked with T&E Facility and Range oversight and the management of selected Test Facility sites such as the Shipboard Electronic Systems Evaluation Facilities (SESEF), the Fleet Operational Readiness and Check Sites (FORACS), and the Surface Ship Radiated Noise Measurement (SSRNM) ranges.

1. Test and Evaluation Facilities and Ranges

There are fifteen test and evaluation facilities that are currently associated with the Navy Sea Test and Evaluation Command (SEA 62T) and are shown in Table 1.

NAVSEA TEST and EVALUATION FACILITIES	
Facility Name	Facility Location
Aberdeen Test Center (ATC)	Aberdeen, MD
Atlantic Undersea Test and Evaluation Center (AUTEC)	Andros Island, Bahamas
National UUV Test & Evaluation Center (NUTEC)	Keyport, WA
Naval Air Warfare Center, Aircraft Division, (NAWCAD)	Patuxent River, MD/Lakehurst, NJ/Pensacola, FL
Naval Air Warfare Center, Weapons Division (NAWCWD)	China Lake, CA
Naval Air Warfare Center, Weapons Division, (NAWCWD)	Point Mugu, CA
Naval Surface Warfare Center, Carderock (NSWCCD)	Bethesda, MD
Naval Surface Warfare Center, Dahlgren (NSWCDD)	Dahlgren, VA
Naval Surface Warfare Center, Port Hueneme Division (NSWCPHD)	Port Hueneme, CA
Naval Undersea Warfare Center (NUWC)	Newport, RI
Pacific Missile Range Facility (PMRF)	Kauai, HI
Pacific Northwest Undersea Warfare Ranges (PNUWR)	Keyport, WA
Southern California Offshore Range (SCORE)	San Diego, CA
Surface Combat Systems Center (SCSC)	Wallops Island, VA
Wallops Flight Facility (WFF)	Wallops Island, VA

Table 1. NAVSEA Test and Evaluation Facilities (From Ref. 58, 17)

a. Aberdeen Test Center (ATC), Aberdeen, MD

Aberdeen Test Center (ATC) is located on the east coast in central Maryland and encompasses 56,000 acres of engineered and dedicated land and water with complex instrumented roadways and ranges. ATC has accredited analytical laboratories with specialized testing facilities and courses and full-scale, customized testing fixtures, which are versatile, interchangeable and readily reconfigurable with advanced instrumentation suites for customized test configurations. (Aberdeen Test Center, 2004)

b. Atlantic Undersea Test and Evaluation Center (AUTEC), Andros Island, Bahamas

AUTEC supports a full spectrum of Undersea Warfare by providing accurate three-dimensional tracking, performance measurement, and data collection resources to satisfy RDT&E requirements, and support fleet training, and tactical and material readiness. (Atlantic Undersea Test and Evaluation Center (AUTEC), 2004)

c. National UUV Test & Evaluation Center (NUTEC), Keyport, WA

The National UUV Test & Evaluation Center (NUTEC) serves unmanned undersea vehicle (UUV) developers, Navy UUV acquisition programs, and the fleet by providing extensive, yet cost-effective, capabilities for in-water and land-based T&E, training, and vehicle support, along with the broad range of expertise needed by the UUV community. (National UUV Test & Evaluation Center (NUTEC), 2004)

d. Naval Air Warfare Center, Aircraft Division, Patuxent River, MD & (Lakehurst, NJ/Pensacola, FL)

NAWCAD has facilities located in Maryland, New Jersey, and Florida that support research, development, test, evaluation, engineering and fleet support of Navy and Marine Corps air vehicle systems and trainers. The Patuxent River (known as "Pax River") Naval Air Station is one of SCSC's customers for Navy T&E programs. The complex stretches across 25 miles of shoreline at the mouth of the Patuxent River, overlooking the Chesapeake Bay, 65 miles southeast of Washington DC. NAWC Patuxent River serves as the Navy's principal research, development, T&E, and engineering and fleet support activity for naval aircraft, engines, avionics, aircraft support systems and ship/shore/air operations. In addition, the installation hosts the Navy Test Pilot School, Unmanned Aerial Vehicle (UAV) operations, foreign governments, academic institutions and private industry all of which regularly use the installation's airspace complex. There are two other branches of NAWC/AD located one in Lakehurst, NJ and the other in Pensacola, FL. (Patuxent River, 2004)

e. Naval Air Warfare Center, Weapons Division, China Lake, CA

Naval Air Weapons Station, China Lake is where the Navy and Marine Corps have developed or tested nearly every significant airborne weapon system in the past five decades and is located 150 miles northeast of Los Angeles on the western edge

of California's Mojave Desert. China Lake supports the primary research and development, test and evaluation work for air warfare and missile weapons systems and carries out the complete weapon-development process, from basic and applied research through prototype hardware fabrication, T&E, documentation, and Fleet and production support. (China Lake, 2004)

f. Naval Air Warfare Center, Weapons Division, Point Mugu, CA

Point Mugu Range provides development T&E and associated engineering, logistics and training for naval weapons, weapon systems and related equipment. The facility provides a major sea range for technical and base support for Navy RDT&E users, the fleet, other DoD and government agencies, and Allied nations. Capabilities include highly instrumented sea range for complex airborne, sea-borne and subsurface weapon systems; large variety of air and surface targets and support resources; weapon systems test complex; electronic and countermeasures environment testing in controlled air and sea spaces. (Point Mugu Air Station, 2004)

g. Naval Surface Warfare Center, Carderock Division (NSWCCD), Bethesda, MD

NSWCCD conducts research and development at several remote sites across the country. NSWCCD addresses the full spectrum of applied maritime science and technology, from the theoretical and conceptual beginnings, through design and acquisition, to implementation and follow-on engineering. Testing includes all technical aspects of improving the performance of ships, submarines, military watercraft, and unmanned vehicles, as well as research for military logistics systems. (Carderock, 2004)

h. Naval Surface Warfare Center, Dahlgren Division (NSWCDD), Dahlgren, VA

NSWCDD provides surface ship related research, development, test and evaluation, engineering and Fleet support. One of the major range features of NSWCDD is the Potomac River Test Range which provides T&E for large and small caliber gun weapon systems and long range munitions in a littoral-like environment. NSWCDD also provides RDT&E, engineering and Development Test (DT)/ Operational Test (OT)/Live Fire Test and Evaluation (LFT&E) support for surface warfare, surface ship combat

systems and software, ordnance development and engineering support, strategic systems, amphibious warfare systems, mine countermeasures and special warfare systems. (Dahlgren, 2004)

i. Naval Surface Warfare Center, Port Hueneme Division (NSWCPHD), Port Hueneme, CA

NSWCPHD provides T&E, in-service engineering, and integrated logistics support for weapon systems installed in Navy fleet ships, United States Coast Guard and foreign Navy fleets. T&E facilities and technical experts are located in five geographic locations including: Port Hueneme and San Diego, California; White Sands Missile Range (WSMR) White Sands, New Mexico (Desert Ship at WSMR); Louisville, Kentucky; and Virginia Beach, Virginia. An important function of PHD is completion and use of the Self Defense Test Ship (SDTS) program using the decommissioned USS Paul F. Foster, DD964, which will be ready to perform its T&E mission in fiscal year 05 as a remote-controlled destroyer to support self-defense engineering without the safety constraints associated with manned ships. (Port Hueneme, 2004)

j. Naval Undersea Warfare Center (NUWC), Newport, RI

NUWC is the Navy's full-spectrum research, development, T&E, engineering and fleet support center for Undersea Systems addressing submarines, autonomous underwater systems, and offensive and defensive weapons systems. (Naval Undersea Warfare Center-Newport, 2004)

k. Pacific Missile Range Facility (PMRF), Kauai, HI

PMRF is world's largest instrumented, multi-dimensional testing and training range where subsurface, surface, air and space vehicles can operate and be tracked simultaneously. This capability allows range users to plan and conduct realistic, multi-participant, multi-threat, free play operations to train crews, evaluate tactics, and test weapon systems. PMRF facilitates training, tactics development, and T&E for air, surface, and sub-surface weapons systems and advanced technology systems and is the lead range in the Pacific for AEGIS CSSQT that supports new AEGIS platforms as they go through testing & training prior to initial deployment. (Pacific Missile Range Facility (PMRF) NS Barking Sands, 2004)

l. Pacific Northwest Undersea Warfare Range (PNUWR), Keyport, WA

PNUWR supports Under Sea Warfare (USW) and Anti Submarine Warfare (ASW) weapon systems for RDT&E and fleet training in a unique cold-water environment. It can provide full support facilities for torpedo in-water development and acceptance testing. (Pacific Northwest Undersea Warfare Range (PNUWR), 2004)

m. Southern California Offshore Range (SCORE), San Diego, CA

SCORE is located at Fleet Area Control and Surveillance Facility, Naval Air Station, North Island California and provides tactical range training and testing services to ship units of the Pacific Fleet. The Range provides fully instrumented multi-warfare fleet training capabilities, and supports: Undersea Warfare (USW) in medium depth and shallow water, Missile Firing Exercises (MFE), Electronic Warfare (EW), threat simulation with radar and communications jamming, electronic false targets and outboard stimulators, Mine Warfare and Shore Bombardment (Naval Ship Fire Support (NSFS), Strike Special Operations) and Battlegroup Exercise Support (BGES). (SCORE, 2004)

n. Surface Combat Systems Center (SCSC), Wallops Island, VA

SCSC has live tactical capability in a maritime environment on the Atlantic Ocean and near the Chesapeake Bay whose tasking is focused on PEO IWS combat systems program development, life cycle engineering, fleet operator/Combat Information Center (CIC) team training, and in-service engineering.

o. Wallops Flight Facility (WFF), Wallops Island, VA

WFF is National Aeronautics and Space Administration (NASA) remote site that supports the Goddard Space Flight Center located in Greenbelt, MD. WFF operates scientific research as part of NASA`s Sub-Orbital, Special Orbital and Earth Sciences Directorates and supports orbital and sub-orbital payload rocket launches and scientific balloon programs. The launch and research airport has nearly unrestricted airspace and supports the Mid-Atlantic Test Range warning area (R-6604) and the US Navy Virginia Capes Operating Area (W-386). The facility offers a wide variety of customer support options including a range that integrates launcher, tracking, control,

airport, air-and-sea-space, and all other systems for launch support of DoD targets including Vandal Supersonic Rockets, Drones, aircraft, Unmanned Aerial Vehicles (UAV), and other launch vehicles. (Wallops Flight Facility, 2004)

2. Selected Test Facilities

In addition to the fifteen T&E ranges, there are four special test facilities managed by the Navy Sea T&E Command (SEA 62T). They are grouped into categories for specific T&E characteristics defined as US Naval Resources, as shown in Figure 9.

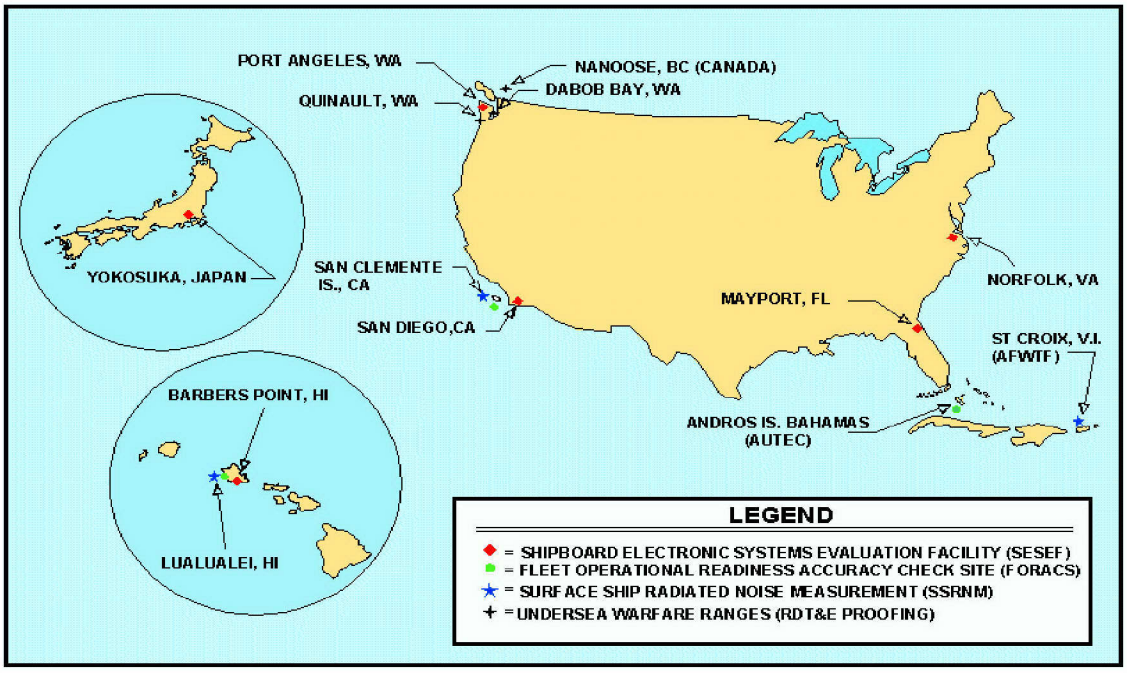


Figure 9. Navy Sea Test and Evaluation Command Specific Test and Evaluation Facilities (From Ref. 57, 12)

a. Joint Distributed Engineering Plant (DEP)

The Navy's Distributed Engineering Plant (JDEP) provides connectivity between hardware and software support activities and LBTS's. It provides a comprehensive test environment to assess the interoperability and equipment integration of the ships and aircraft of a battle group before the new or upgraded systems are introduced to fleet units before an overseas deployment. This allows more time for the warfighter to conduct operational training prior to addressing interoperability problems during at-sea operations. (Baker & Monteith, 2004, 6)

The JDEP serves as a DoD-wide distributed and collaborative system engineering test tool at the following sites:

- Surface Combat Systems Center, Wallops Island, VA
- Aegis Training and Readiness Center, Dahlgren, VA
- Integrated Warfare Systems Laboratory, Dahlgren, VA
- Naval Surface Warfare Center/Software Support Activity, Dam Neck, VA
- Naval Surface Warfare Center, Port Hueneme Division, San Diego, CA (Integrated Combat System Test Facility)
- SPAWAR Systems Center, San Diego, CCA
- Navy Tactical Communications Support Activity, San Diego, CA
- Naval Air Warfare Center Weapons Division, Point Mugu, CA

b. Fleet Operational Readiness Accuracy Check Site (FORACS)

U.S. and North Atlantic Treaty Organization (NATO) FORACS supports acquisition and Fleet Readiness T&E with the mission to measure the bearing, range, heading and positional errors of sensors on-board surface ships, submarines and helicopters. Sensors tested include: Active, Passive, Dipping and Towed Array Sonars; Mine Hunting Systems; Fire Control and Search; Radars; ESM and RDF equipment; Infrared, Laser and TV Sensors; Optical Sights and Peloruses; Periscopes; Inertial Navigation; Systems and Gyrocompasses; and Global Positioning Systems (GPS). The US FORACS sites are located at: AUTEC, San Andros Island, Bahamas, SCORE, and PMRF. NATO FORACS is a multi-national project with eight member nations: Canada, Denmark, Germany, Greece, Italy, Norway, the United Kingdom and the United States of America. There are three international test ranges including: NATO FORACS AUTEC (NFA) in the Bahamas; NATO FORACS Greece (NFG) near Souda Bay, Crete; NATO FORACS Norway (NFN) near Stavanger, Norway. (FORACS 2003)

c. Major Range and Test Facility Base (MRTFB)

The MRTFB is a group of test installations, facilities and ranges that are regarded as T&E "national assets" by DoD. These sites are selected because of their unique T&E assets that ensure the proper support and coordination between U.S. military weapon systems developers. The MRTFB management concept is to provide coordination among the major facilities, promote multi-service use, reduce unnecessary duplication of assets, and establish budgetary priorities at the department level. Navy MRTFB facilities include the following: Atlantic Undersea Test and Evaluation Center, Naval Air Warfare Center-China Lake, Naval Air Warfare Center-Patuxent River, Naval Air Warfare Center-Point Mugu, and Pacific Missile Range Facility. (Major Range and Test Facility Base, 2004)

d. Shipboard Electronic Systems Evaluation Facility (SESEF) Program

The NUWC Shipboard Electronic Systems Evaluation Facilities (SESEF's) are land-based test sites established to facilitate new acquisition and in-service T&E of ships' electromagnetic transmitting and receiving equipment. Six SESEF sites exist and are strategically located at major Fleet concentration areas including Ediz Hook, WA; Yokosuka, Japan; San Diego, CA; Barbers Point, HA; Norfolk, VA; and Mayport, FL. The sites provide T&E services to US Navy, US Coast Guard, and Military Sealift Command activities and allied foreign navies. (SESEF, 2004)

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IV. ANALYSIS OF SELECTED US NAVY LAND-BASED TEST SITES (LBTS)

A. OVERVIEW

The analysis of selected Navy LBTS's for this research was to form the basis for comparison and identify requirements for future T&E range capabilities. It should be noted that during the course of this research, well after I had defined the title and scope of this project, I became aware of NAVSEA's Report on East Coast Range Working Group Long Range Test and Evaluation Resource Strategy, or ECWRG. This report assessed the options, requirements, and investments needed to ensure a viable East Coast and Gulf of Mexico (GOM) range that could support the Fleet Forces Command (FFC) Training Resource Strategy (TRS) as shown in Figure 10.

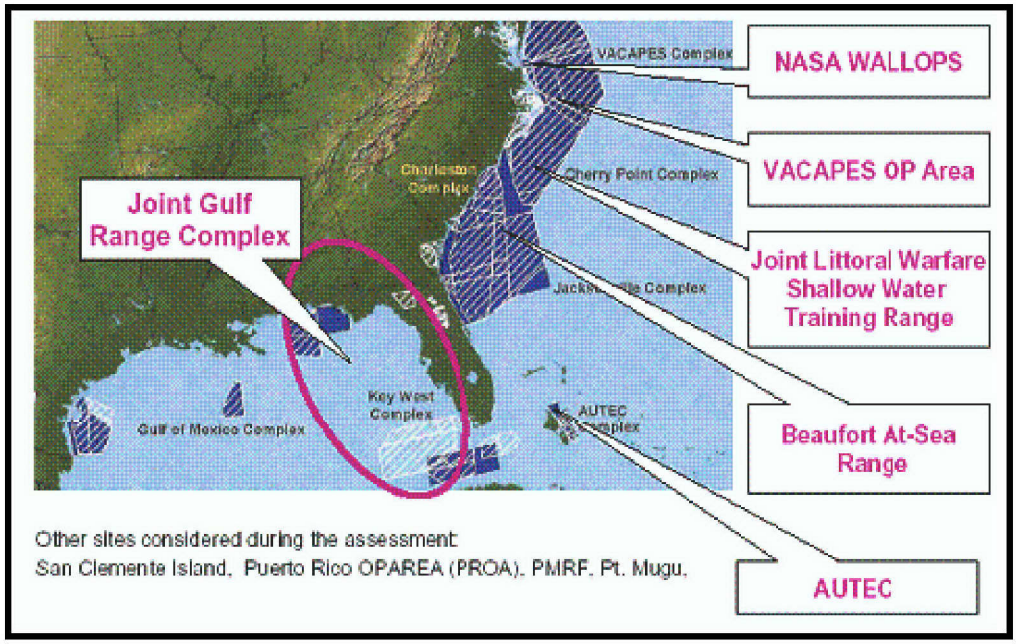


Figure 10. East Coast Ranges Assessed in ECRWG (From Ref. 6, 8)

Due to the large scope of work that defines the comparison and analysis of east and west coast test facilities and ranges, the reader should reference the Report on East Coast Range Working Group Long Range Test and Evaluation Resource Study &

Appendices. (DoN/NAVSEA 62T, 2003) Portions of the ECRWG study were utilized to illustrate comparison points with the SCSC.

B. TRAINING RESOURCE STRATEGY (TRS)

The US Navy developed a comprehensive Training Resource Strategy (TRS) to better coordinate use of existing east coast and Gulf of Mexico range facilities. The implementation of TRS will include distributing aircraft carrier battle group training among existing training ranges and facilities throughout the Atlantic Fleet region, including Virginia, Maryland, North Carolina, Georgia and Florida, and at ranges in the Atlantic Ocean and Gulf of Mexico, as shown in Table 2. The coordinated use of these areas will enable Fleet assets to emulate live-fire testing scenarios such as: Missile Exercises, (MISSILEX), CSSQT, Ship Sinking Exercises (SINKEX), Gunnery Exercises (GUNEX), and radar/telemetry/telecom capabilities that were primarily completed at the AFWTF until its closure in 2003. In addition, the TRS strategy will support the Fleet Readiness Program (FRP) that is designed to more rapidly develop and sustain readiness in ships and squadrons so that, in a national crisis or contingency operation, the Navy can quickly move significant assets to the scene. (Training Resource Strategy Targets Efficiency, 2003)

TRS T&E SITES and MISSION	
Facility Name	Mission
Patuxent River, MD	Air dropped mine execrcise
Wallops Island, VA	Surface-to-air and air-to-air missile shoots
Virginia Capes/Cherry Point, NC	Surface, air and subsurface training operations, including missile shoots and gunfire
Dare County, NC	Air-to-ground munitions training (inert ordinance)
Mid-Atlantic Electronic Warfare Range, NC	Electronic warfare and time sensitive targeting
Camp Lejeune, NC	Air-to-ground/close air support (inert ordinace), combined arms ship to shopre and ground manuever
Townsend, GA Range	Air-to-ground munitions training (inert ordinance)
Jacksonville, FL	Surface, air and subsurface training operations, including missile shoots and gunfire
Pinecastle, FL	Air-to-ground munitions training (inert & explosive ordinance)
Avon Park, FL Range	Air-to-ground munitions training (inert ordinace)
Key West, FL	Host oppostion force for all levels of traing, support surface, air, and subsurface trainign operations including missile shoots and gunfire
Eglin Air Force Base, FL Range	Air-to-ground (explosive and non-explosive ordnance), complex electronic warfare, potential to support combined arms ship to shore and ground maneuver Operations.
Atlantic Undersea Test and Evaluation Center, Bahamas	Supports air, surface and subsurface instrumented underwater range events.

Table 2. TRS T&E Sites and Mission (From Ref. 89, 3)

To support the TRS concept, the US Navy will increase the use of these existing sites and facilities and increase the use of modeling and simulation tools like Virtual At-Sea Trainer (VAST). VAST is a system that allows a ship's crew to see a realistic simulation such as a landmass, with the topography of a 'real world' target, which corresponds to an area actually located over Open Ocean. During training exercises, the operator fires at the simulation and ordnance lands within an array of buoys in the water where personnel monitor the target practice from computers located on board a ship or LBTS. One of the key advantages of VAST is its training versatility that enables live firing training anywhere where there is a clear body of water. Rather than firing on a static, predictable bombing range such as AFWTF, the presentation viewed by the war-

fighter on the virtual screen in a shipboard or LBTS command information center (CIC) can be manipulated to more closely resemble the type of terrain or target operators may face in battle. (VAST, 2004)

C. US NAVY DOMAINS AND LBTS T&E METRICS

Currently there are six warfare domains in the US Navy that are tested at existing Operational Areas (OPAREAS), and Fleet training and T&E facilities and ranges as shown in Table 3. The implementation of the TRS and VAST will enable SCSC to fully participate in many of these domains as the development of this strategy continues to evolve. A brief description and metrics evaluation of three of these domains, AAW/AD, SUW/GWS/NSFS/STK, and EW are provided for comparison. LMW and UW NCW were omitted because of the specialized needs and qualifications for operations at other sites. NCW was omitted because it is a new concept that is currently evolving.

US NAVY WARFARE DOMAINS	
DESCRIPTION PROVIDED	
ANTI-AIR WARFARE and AIR DEFENSE	AAW/AD
SURFACE WARFARE, GUN SYSTEM, NAVAL SURFACE FIRE SUPPORT, AND STRIKE WARFARE	SUW/GWS/NSFS/STK
ELECTRONIC WARFARE	EW
DESCRIPTION OMMITTED	
LITTORAL and MINE WARFARE	LMW
UNDERSEA WARFARE	UW
NETWORK CENTRIC WARFARE	NCW

Table 3. Six US Navy Warfare Domains (From Ref. 26, ii)

1. Anti-Air Warfare and Air Defense (AAW/AD)

AAW/AD is defined as follows:

> AAW/AD includes all measures designed to nullify or reduce the effectiveness of attack by hostile aircraft or guided missiles. Active AAW includes the use of aircraft, guns, missiles, and electronic countermeasures. Passive AAW measures are those taken to minimize the

effects of hostile air action and involve elements such as cover, concealment and dispersion.
(DoN/NAVSEA 62T, 2003, 4-3)

Currently SCSC is able to complete AAW/AD, which involves the detection, classification, and engagement of threats by sensors and weapons systems. However, it lacks full range capabilities based on two items: 1) the high concentration of water traffic, which adds to the range safety and surveillance obstacles in the operating areas, and 2) the lack of over-the-horizon capabilities associated with AFWTF, Point Mugu, and PMRF. A metrics comparison with other sites is shown in Figure 11.

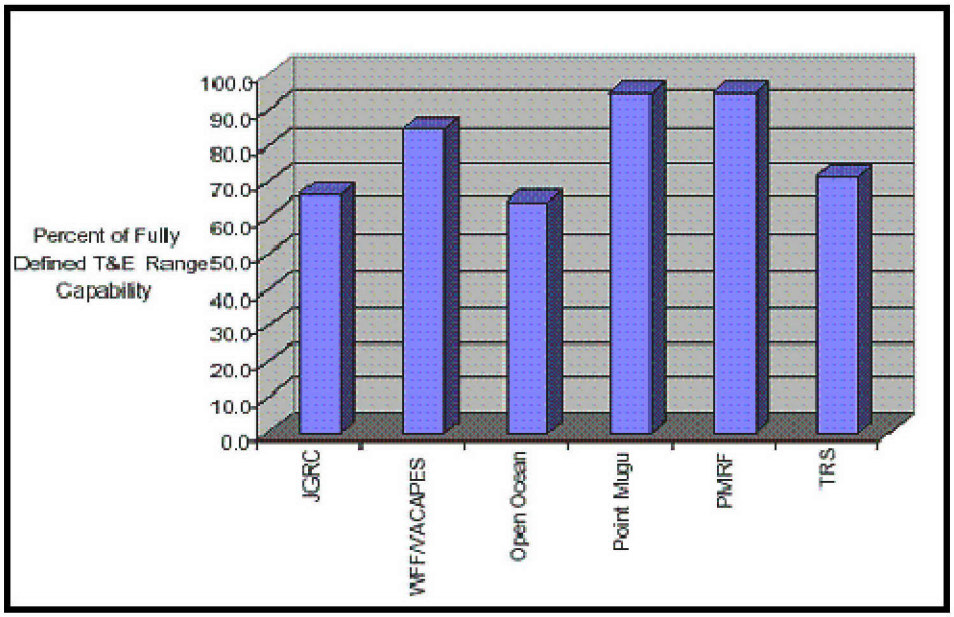


Figure 11. Metrics for AAW/AD T&E Capability (From Ref. 26, 4-16)

2. Surface Warfare, Gun System, Naval Surface Fire Support, and Strike Warfare (SUW/NSFS)

SUW is defined as,

The detection, control, and engagement of surface threats and can be employed by a variety of systems including radars and optical systems, Gun Weapons Systems, Missile Systems, and armed Helicopters. (DoN/NAVSEA 62T, 2003, 4-24)

NSFS is defined as,

Electronic warfare systems and fires provided by Navy surface gun and missile systems in support of a unit or units tasked with achieving the commander's objectives. (DoN/NAVSEA 62T, 2003, 4-24)

SCSC cannot fully support SUW live-firing exercises similar to AFWTF, SCORE, and the Shore Bombardment Area, San Clemente Island (SHOBA). However, it can support land-based firings out to sea in excess of 50 miles. NSFS on land cannot be completed at SCSC. A metrics comparison with other sites is shown in Figure 12.

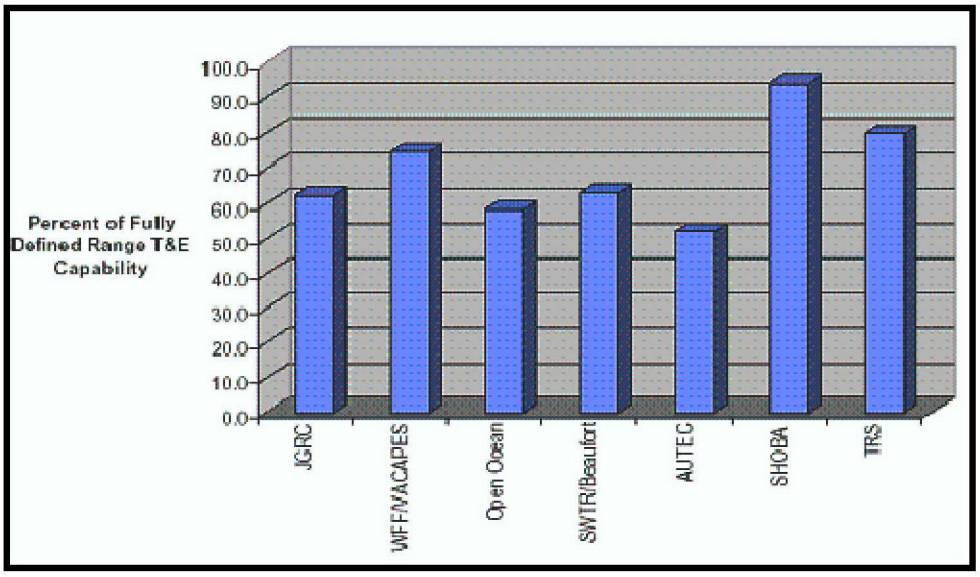


Figure 12. Metrics for SUW/GWS/NSFS/STK T&E Capability (From Ref. 26, 4-35)

3. Electronic Warfare (EW)

EW is defined as follows:

EW is the shipboard use of electromagnetic energy to control the electromagnetic spectrum or to attack the enemy. EW is comprised of electronic attack, electronic protection, and electronic warfare support. (DoN/NAVSEA 62T, 2003, 4-64)

SCSC currently supports EW, which involves using land-based, airborne, and surface-based stimulation and measurement systems, utilizing AEGIS and Ship Self Defense System (SSDS), and soon, DD(X) capabilities. A metrics comparison with other sites is shown in Figure 13.

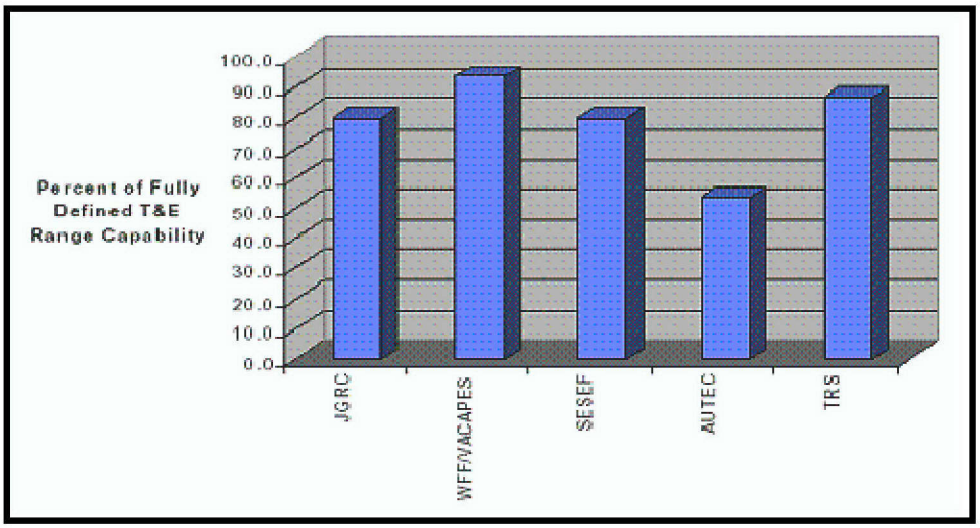


Figure 13. Metrics for EW T&E Capability (From Ref. 26, 4-66)

4. Summary of US Navy Warfare Domains and LBTS T&E Metrics

In three out of six warfare domain categories, including AAW/AD, SUW/GWS/NSFS/STK, and EW, SCSC has the capability to provide most of the Navy's needs for T&E. In NCW, SCSC is developing these capabilities by providing basic interoperability between the AEGIS, SSDS, and soon DD(X) facilities and at-sea ships using Cooperative Engagement Capability (CEC) and other Link networks.

SCSC can provide the end-to-end testing to support a realistic threat representation on the surface and above to simulate the execution of a mission, the threat representation to simulate naval operations in a realistic maritime environment with the capability to replicate multiple ship class configurations, and the ability to conduct OT&E operations that provide clear time and space position information with target and weapons system data collection and analysis at the conclusion of all test operations.

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V. SCSC INTERNAL ANALYSIS

A. OVERVIEW

The purpose of SCSC internal analysis is to assess the organizations internal environment in order to highlight its strengths and weaknesses based on three basic categories as proposed by Bryson (1995) including: 1) resources, 2) present strategy, and 3) performance. Much of this section is based on work that has been completed at SCSC over the past eleven years. The direction taken for this portion of the research is to provide the SCSC Senior Leadership Team with a product that can be utilized for the following items: 1) to provide a document containing all previous SCSC documents and present them in one voice, 2) to use as many elements of Bryson's Strategy Change Cycle in building an internal analysis document that could be used by the SCSC Strategic Planning and SCSC Business Planning teams, and 3) to provide an internal analysis document that addresses the elements needed to drive SCSC toward the goal of becoming the Wallops Island Test Evaluation Range Facility (WITERF).

B. SCSC, WALLOPS ISLAND, VIRGINIA LOCATION

SCSC, Wallops Island, as shown in Figure 14, is located on the Eastern Shore of Virginia and is within four hours drive of Washington, DC, Baltimore, MD, and Norfolk, VA.

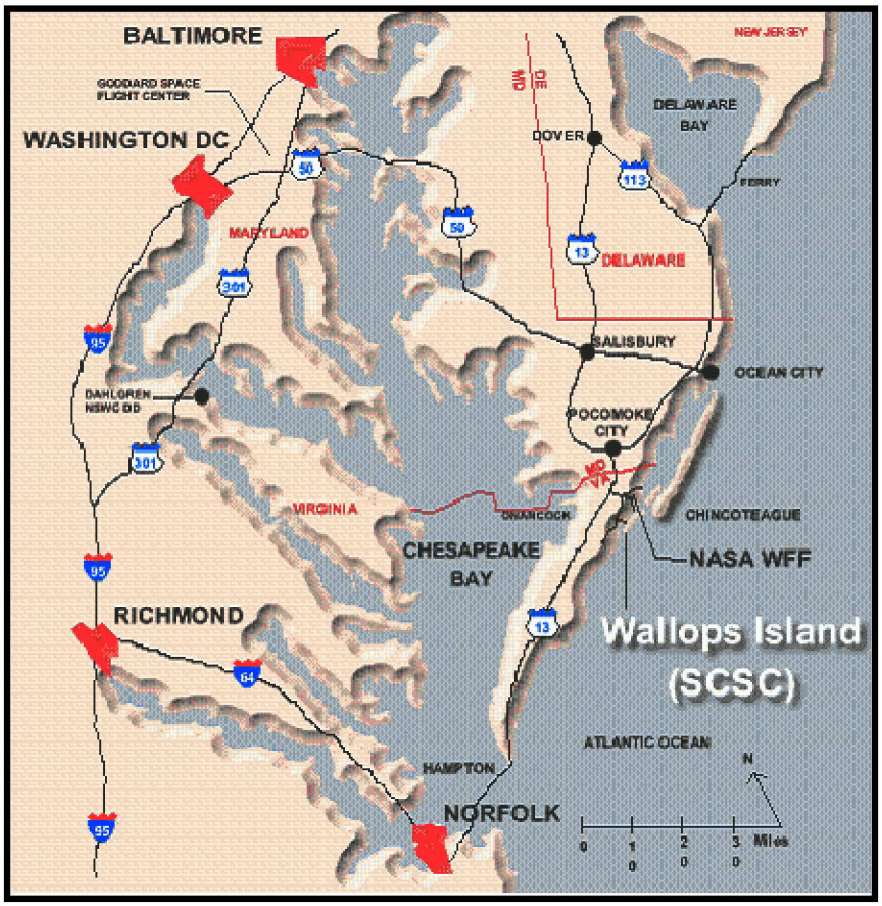


Figure 14. Surface Combat Systems Center, Wallops Island, Virginia Location Map (From Ref. 80)

C. THE EASTERN SHORE OF VIRGINIA

The Eastern Shore of Virginia, as shown in Figure 15, is a peninsula of land located on the east coast of the United States, north of the Chesapeake Bay cities of Norfolk and Virginia Beach, south of the city of Salisbury, Maryland, and bordered on the east by the Atlantic Ocean and on the west by the Chesapeake Bay. It is made up of the two counties of Accomack, population of 39,025, and Northampton, population of 13,285. (US Census Bureau Quick Facts, 2003)

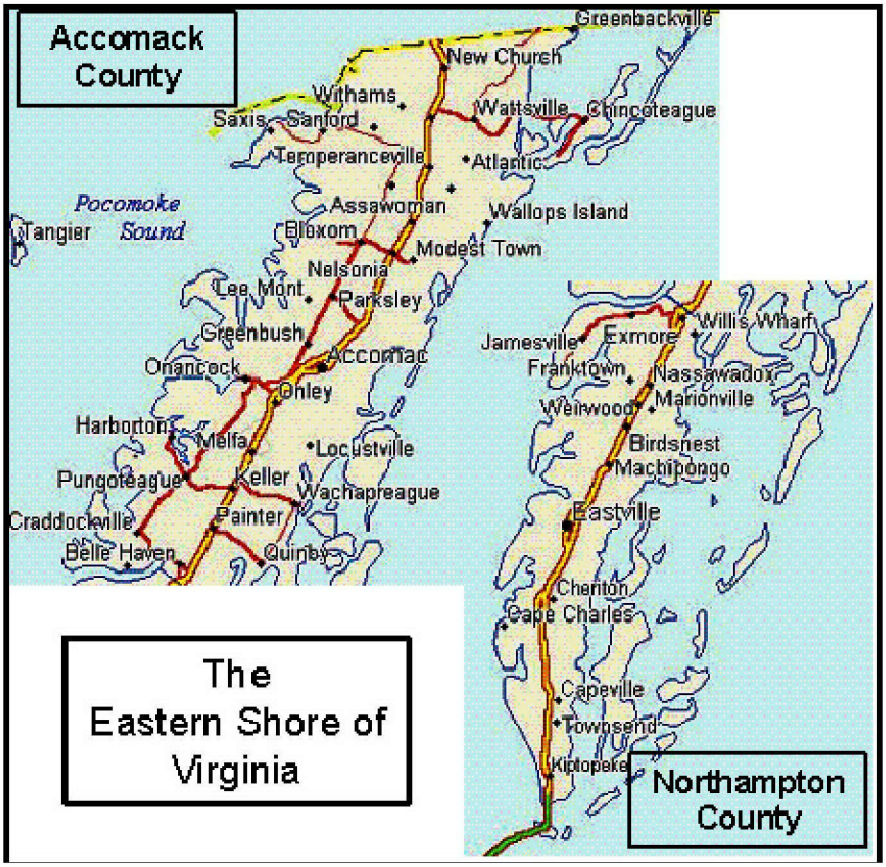


Figure 15. The Eastern Shore of Virginia Counties (From Ref. 27)

D. WALLOPS ISLAND HISTORY

Wallops Island is named after John Wallop, a 17th century surveyor and original owner of the island. The island, as shown in Figure 16, is separated from the mainland by two miles of marsh and water. Approximately six miles long and about one-half mile at its widest point, Wallops Island is connected to the mainland by a causeway and bridge, which was opened in 1960. The island had been used up until 1940 primarily for grazing livestock, as a hunting and fishing resort and preserve, and as a location for a Coast Guard Station. The last sixty years has seen Wallops Island grow from an obscure barrier island to a notable landmark for NASA and US Navy research, development and testing.



Figure 16. Wallops Island Main Base and Island Facilities (From Ref. 28, 4)

1. Naval Air Station to NASA, 1941 - Present

The Navy commissioned the Chincoteague Naval Air Station on the present site of the Wallops Main Base and established the Naval Aviation Ordinance Test Station on Wallops Island in 1941. The airfield, shown in Figure 17, consists of three concrete runways, of which, the primary runway is 8,749 feet long, one of the longest on the East Coast. In 1942 it was upgraded to a full Naval Air Station and was enlarged to house carrier fighter, torpedo & composite squadrons. Former President George Bush Sr. trained at the air station prior to his deployment overseas. In 1943 the Navy's Bureau of Ordnance set up a facility to secretly test aviation ordnance and the Civil Air Patrol flew antisubmarine missions. After the war, the Naval Air Station became a training center of carrier squadrons. In 1958, the National Advisory Committee for Aeronautics (NACA) was changed to the National Aeronautics and Space Administration (NASA) and the Navy ceased operations at the Chincoteague Naval Air Station and the Naval Aviation Ordinance Test Station. NASA acquired the naval facilities as part of their planned

expansion. Since then, NASA has launched numerous research vehicles in the quest for information of the flight characteristics of airplanes, launch vehicles, spacecraft, and upper atmosphere physics, which has contributed and is contributing significantly to the success of the U.S. space program. (DeVincent and Bennett, 2000)



Figure 17. NASA, Wallops Flight Facility, Main Base and Airfield (From Ref 83, 50)

E. COMMAND AUTHORITY STRUCTURE

The Surface Combat Systems Center is a fully operational, Echelon III, shore activity under a Commanding Officer reporting to the Commander, Naval Sea Systems Command, with activity management now provided by Program Executive Officer Integrated Warfare Systems (PEO IWS).

The Commanding Officer, Surface Combat Systems Center exercises responsibility for operations and maintenance of the facility through the Contracting Officer and the Contracting Officer's Representative (COR). All personnel adhere to Navy established security, safety procedures/policies, and SCSC operations policy and implementing procedures as referenced in all military specifications and instructions for a LBTS.

1. Command Organization

The SCSC team is a combination of US Navy military, civil service, and contractor personnel who operate and maintain the Headquarters Complex on the main base, and the Captain Eric L. Washam AEGIS Engineering and Training Complex, Ship Self Defense Facility, and Multi Function Radar Facility on Wallops Island. The workforce is fully integrated with military, civil service, and contractor personnel with the management of the organization held by the military and civil service staff reporting to the Commanding Officer, as depicted in Figure 18.

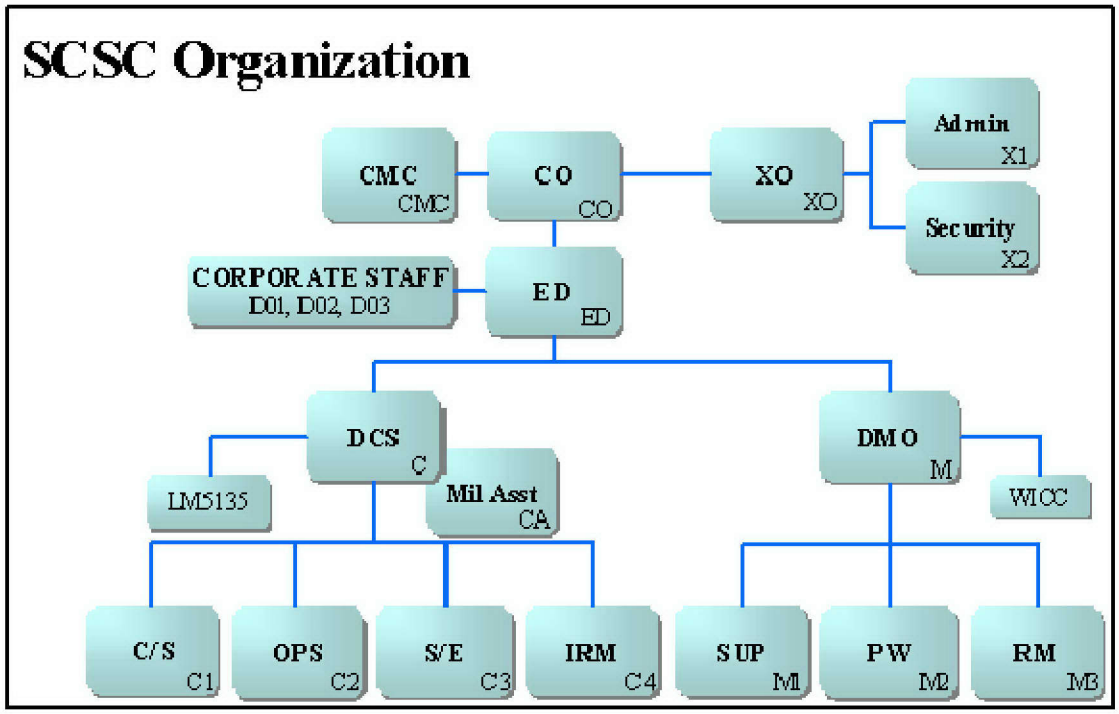


Figure 18. SCSC Organization (From Ref. 79, 7)

2. SCSC Command Duties

The Commanding Officer, SCSC, reports in an additional duty status as the Officer-in-Charge (OIC), of Wallops Island installation to the Commander Navy Region Mid-Atlantic (CNRMA), which is part of the Commander Navy Installations (CNI) command implemented on October 2003. Responsibilities as OIC include management of the Bachelors Quarters and Galley, Navy housing, public works support related to those activities, and the security force.

The command is supported principally by two contractor organizations: Lockheed Martin and Northrop Grumman. The combat systems activation, operations, maintenance, and engineering services contract provides support across the command, but principally provides support to the Director, Combat Systems (DCS) for the day-to-day operations and maintenance of the combat systems in the AEGIS, SSD, and MFR facilities. This is a NAVSEA contract with a planned ten-year period of performance that currently runs through 2010.

The Wallops Industrial Consolidated Contract (WICC) provides base support services such as grounds keeping, firefighting, facility maintenance, security, logistics, and some management and administrative services in support of the Director, Management Operations (DMO). This is a NASA contract with SCSC as a managing partner, which also has a planned ten-year period of performance.

F. COMMAND MISSION, VISION, GUIDING PRINCIPLES

In keeping with the spirit of this research, this document will provide an alternative SCSC Mission Statement, Vision, and Guiding Principles so they will be more reflective of the US Navy transformation principles and planning concepts. Again, the items in this section ARE NOT the current SCSC Mission Statement, Vision, and Guiding Principles used for public release by the command and are provided as an alternative for the command.

The SCSC Mission and Vision statements were updated and re-issued as a result of decisions made by the Executive Steering Committee (ESC) at a June 2003 Strategic Planning Off-Site meeting. These changes were made to reflect the reorganization of NAVSEA and the new Program Executive Officer (PEO) structure that became effective in October 2002, and to reflect the desire of the ESC for SCSC to support the broader requirements of the PEO Integrated Warfare Systems (IWS).

1. SCSC Mission Statement

Our mission is to provide integrated warfare systems and range services in a maritime environment for fleet operations, engineering, research, development, testing, and training. (SCSC Standard Presentation, 2004, 4)

2. SCSC Vision Statement

SCSC is an investment in the future of the US Navy. Our vision is to utilize our multiple-ship-class, Littoral warfare systems to operate together as a premier proving ground to support the fielding and sustaining of war fighting capabilities for surface combatants in a littoral environment. We shape our combat capabilities and improve our readiness through innovation and information superiority to obtain full spectrum dominance in the field. (SCSC Standard Presentation, 2004, 4)

3. SCSC Guiding Principles

In conducting our work, SCSC is guided at all times by three principles: People, Excellence, and Integrity. Our greatest strength is our *People*; not only those who wear the US Navy uniform, but also the civilians who support them. SCSC is committed to *Excellence* and continuously strives to improve its processes, products, and services to better serve the primary customer, the US Navy. And lastly, SCSC has the *Integrity* to be honest and ethical in all that we do by delivering on our commitments and being accountable for our performance. (SCSC Unit Self-Assessment, 2003, iii)

a. People

Our greatest strength is not only the people who wear the uniform of the US Navy, but also the civilians who support them. We achieve this through our diversity, balance, and training. (SCSC Unit Self-Assessment, 2003, iii)

- Diversity: We respect each person and their individuality, and believe they have the right to be treated in a fair and compassionate manner. Anything less is intolerable.

- Balance: We foster an environment where work life and personal life, including health, family, community involvement, and other interests, contribute to the vitality of the individual and SCSC.
- Training: We encourage growth and provide the necessary tools for our people to develop personally and professionally.

b. Excellence

We are committed to excellence and continuously strive to improve our processes, products, and services to better serve our customer, the US Navy. We do this by providing excellent fleet support, and having the versatility to adapt to changing requirements. (SCSC Unit Self-Assessment, 2003, iii)

- Fleet Support: We meet or exceed the fleet's needs by maintaining a clear focus on its objectives and providing combat systems that most closely replicate shipboard configurations.
- Versatility: We anticipate the future by embracing new technologies and promote our workforce to thrive in a dynamic environment.

c. Integrity

We have the integrity to be honest and ethical in all that we do by delivering on our commitments and being accountable for our performance. We do this by committing ourselves to customer driven quality and steadfast leadership. (SCSC Unit Self-Assessment, 2003, iii)

- Customer Driven Quality: We dedicate ourselves to technical excellence through effective and responsible engineering principles and practices, innovation, cost management, protection of the environment, and continuous improvement to enhance customers' ability to achieve readiness and other national defense objectives by providing quality products.

- Leadership: We hold ourselves accountable to the highest standards of honor, courage, and commitment by enabling our people to engage together in the process of developing, sharing, and moving into a vision, and then making it happen.

G. COMMAND RELATIONSHIPS

The SCSC Command is a fully integrated site with military, civil service, and contracting personnel who work closely with other US Navy commands and organizations and the NASA Wallops Flight Facility Partnership.

1. Sponsors

Sponsors are organizations that provide the funding and resources, including billets, to sustain the overall operation of SCSC. Prior to 1998, the AEGIS program office (PMS 400) was the sole sponsor of the AEGIS Combat Systems Center (ACSC), the precursor to SCSC. In 1998 SCSC was created by the addition of the Ships Self Defense (SSD) Facility, at which point the SSD Program Office (PMS 461) also became a sponsor. Recent reorganizations and the advent of CNRMA have created a more complicated picture. Beginning in fiscal year (FY) 2005, SCSC will have the following principal sponsors, as depicted in a DRAFT example of the PEO Integrated Warfare Organization in Figure 19.

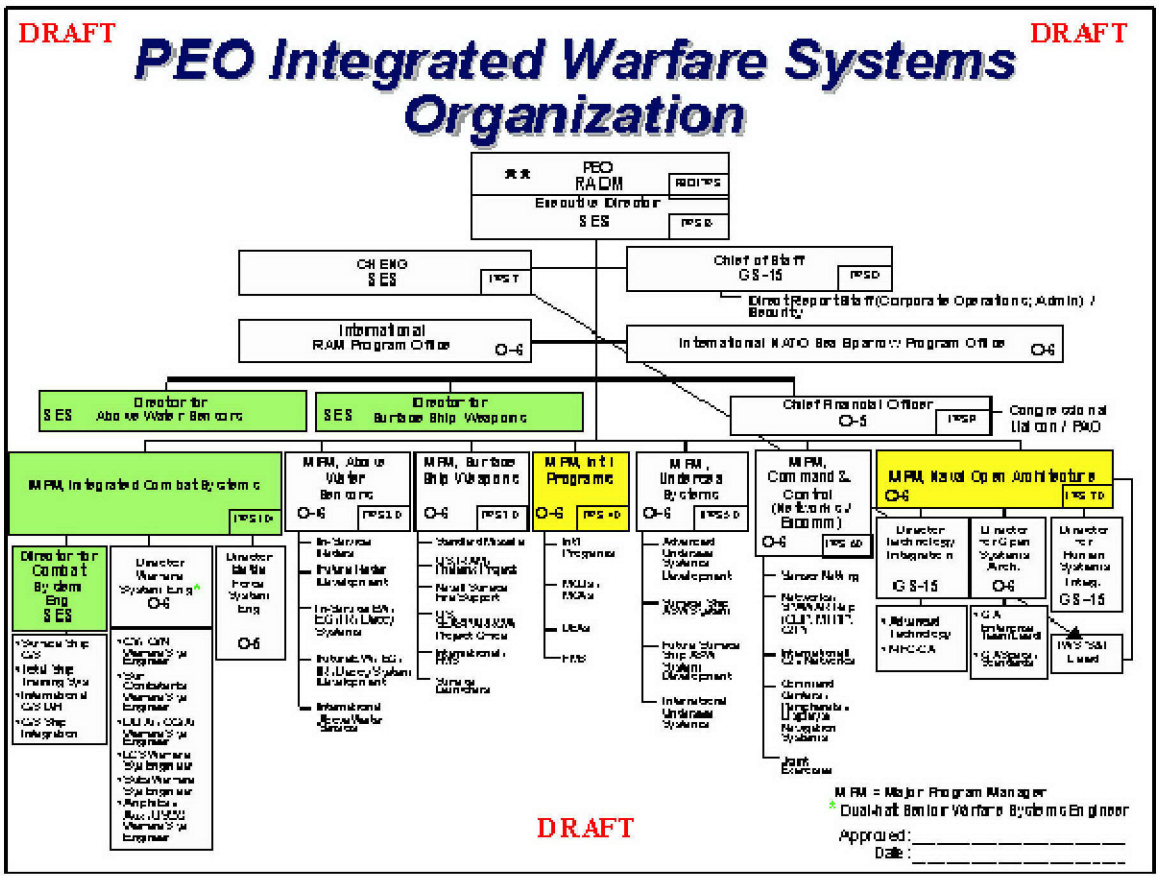


Figure 19. Program Executive Office Integrated Warfare Systems Organization (From Ref. 66, 4)

2. Customers

The customer base that SCSC supports is divided into two categories: Core and Non-Core Customers.

a. Core SCSC Customers

Core customers, as depicted in Table 1, maintain on-site representatives to coordinate their organization's requirements and activities with the SCSC staff and include NAVSEA Dahlgren Division (DD), NAVSEA Port Hueneme Division (PHD), and AEGIS Training and Readiness Center Detachment (ATRCD). Respectively, the Raytheon MFR Team includes contractor and government personnel needed to develop and test the MFR Radar, which is a pre-cursor to the Dual Band Radar that will be fielded

on the new DD(X) Ship Class. The Raytheon Team interfaces with SCSC through a special customer service coordinator and the SCSC DDX Program Manager. Customer requirements for the DD(X) program are expected to grow in the near term with the proposed construction of the DD(X) Engineering Test Center that is due to begin in December 2004.

Organization	Functional Responsibilities
NAVSEA Dahlgren Division (DD)	AEGIS Lifetime Support Engineering (LSE)
	AEGIS Combat System (ACS) certification
	AEGIS Weapon System (AWS) System Test and Evaluation (ST&E)
	AWS Element Testing
	NAVSEA DD engineering project test scheduling and coordination
NAVSEA Port Hueneme Division (PHD)	ACS In-Service Engineering (ISE)ORDALT/ECP installation coordination
	Investigate Fleet emergent issues or casualties
	ORDALT/ECP installation coordination
	AWS documentation (PMS, Tech Manuals, Test plans, etc.) verification and validation
	Coordination for other combat system ISE
	CEC scheduling point of contact
AEGIS Training and Readiness Center Detachment (ATRCD)	AEGIS Console Operator and CIC Team Training courses
NAVSEA PHD	SSDS MK 2 system development, System Integration Testing (SIT), and Demonstration Test (DT) / Operational Test (OT) coordination
NAVSEA DD	SSDS MK 1 LSE testing

Table 4. Core Customer Support List (From Ref. 85, 46)

b. Non Core Customers

Non-Core Customers do not maintain on-site representatives. However, they do coordinate their organizations requirements and activities with the SCSC staff. SCSC maintains a Project Office staffed to provide the necessary coordinating functions for organizations that desire to use the SCSC combat systems or facilities.

3. Partners

Partners are organizations with whom SCSC has either formal or informal relationships that contribute to the effective operation of the command. A prime example of one these relationships is between Naval Air Warfare Center-Aircraft Division (NAWC-AD) Patuxent River and NASA for the integrated control of range services provided by NASA for US Navy T&E events, where SCSC serves as the local agent for combat systems and liaison services with NASA. Other partnering relationships are described in the following sections.

a. NASA Wallops Flight Facility

The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center Wallops Flight Facility (WFF) is the principal SCSC partner. NAVSEA and SCSC established a host-tenant agreement with NASA in 1987 for use of the NASA land and services to support SCSC facilities and operations and as a follow-on effort to better address the interests of all the activities in the Wallops Island area, the Wallops Flight Facility Partnership was established in 1998.

b. NAVSEA DDX Program Office (PMS 500)

In 2001, SCSC signed a memorandum of agreement with what is now the DD(X) Program Office (PMS 500) to establish SCSC roles and responsibilities for supporting the development and testing of the SPY-3 Multi-Function Radar (MFR) at Wallops Island. This partnership will be extended when the SPY-3 system is de-activated and relocated to the DD(X) Engineering Test Center when it is completed in June 2006. A new MOA will then be established to address all new DD(X) operations.

c. Sites Planning Agent (SPA)

NAVSEA Dahlgren Division, Facilities Engineering Branch (Code N82), also known as the Sites Planning Agent (SPA), provides planning, engineering, and equipment procurement support for all the Virginia AEGIS Sites and the Ship Self-Defense Facility. The SPA representatives continue to support SCSC for systems acquisition, equipment installation, and systems modernization at both the AEGIS complex and the SSD Facility.

d. Patuxent River (Pax River)

Naval Air Warfare Center, Aircraft Division (NAWC-AD), serves as the Navy's principal research, development, T&E, engineering, and fleet support activity for naval aircraft, engines, avionics, aircraft support systems and ship/shore/air operations.

4. Contractors

The key feature of the concept of operation is the team formed by Lockheed Martin Services, Inc. (LMSI); Lockheed Martin Maritime Surveillance Systems (LMMS2) and Northrop Grumman Company. The teammates are collectively referred to as "Team SCSC" and are currently in the fourth year of a ten-year contract. Team SCSC is responsible for providing technology and management support for the research, activation, operations, and maintenance and engineering of equipment, systems and computer programs in support of SCSC.

H. SCSC FACILITIES

1. Mainland Complex

The SCSC Main Complex, as shown in Figure 20, is located outside the NASA main gate and includes the Headquarters, Building R-30, which houses the command suite, administrative office, security, resource management, and supply and warehouse facility. Located on the second floor of the Headquarters building are the administrative offices and classrooms for the Center for Surface Combat Systems Detachment, formerly known as the AEGIS Training and Readiness Center Detachment (ATRCD) where military personnel visiting Wallops Island come for training. Also located within the

compound are the Bachelor's Officers Quarters (BOQ)/Bachelors Enlisted Quarters (BEQ), Galley, 1st Lieutenant Shop, Fitness Center, and Navy Exchange.



Figure 20. SCSC Mainland Complex (From Ref. 79, 1)

2. Island Facilities

The US Navy currently operates facilities for the research, development, testing and evaluation of combat systems, as shown on Figure 21.



Figure 21. US Navy Facilities on Wallops Island Proper (From Ref. 28, 6)

a. Captain Eric L. Washam AEGIS Engineering and Training Complex and SPY-1D(V) Building

The Captain Eric L. Washam AEGIS Engineering and Training Complex, as shown in Figure 22, provides support to AEGIS Lifetime Support Engineering, AEGIS Training, AEGIS In-Service Engineering, Engineering Initiatives, Technical Research & Development, and Battle Group Interoperability Testing (BGIT) required to maintain and upgrade the AEGIS fleet in war-ready condition and fully capable of executing its mission. The AEGIS SPY-1D(V) Radar, as shown in Figure 23, is the air search radar for the AEGIS Combat System (ACS) that is used onboard all AEGIS forward-fit vessels, beginning with DDG-91, to the end of the build cycle and is a key element for the development and testing for Ballistic Missile Defense (BMD) capabilities. The SPY-1D(V) Radar building was completely renovated due to improper design faults that were found after the initial acceptance. (Abell, 2004, 4)



Figure 22. AEGIS Engineering and Training Complex (From Ref. 83)

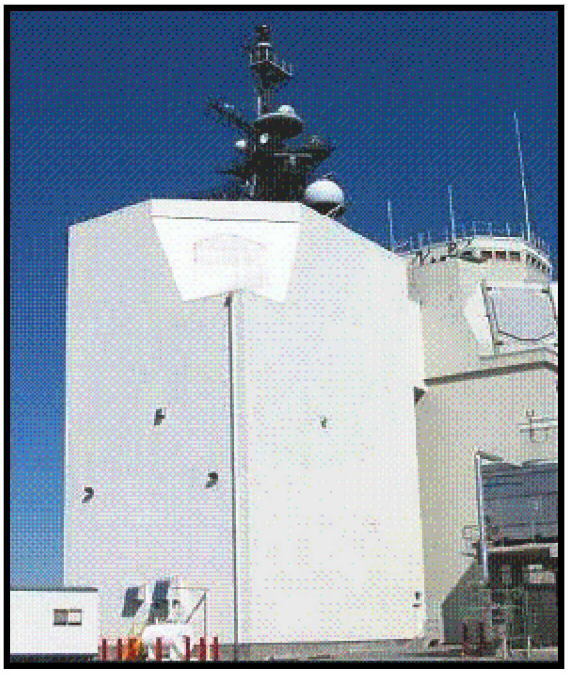


Figure 23. AEGIS B/L 7, SPY-1D(V) Building V-21 (From Ref. 87)

b. Ship Self Defense (SSD) Facility

The Ship Self Defense Facility, as shown in Figure 24, provides support to surface ship systems engineering, development, testing, training, and fleet operations as an integral part of the critical path to successful engineering development and integration

of combat system upgrades in the Navy's aircraft carrier and amphibious shipbuilding programs and ship modernization initiatives. These programs and initiatives include, but are not limited to CVN 21, LHD, LPD, and LSD-41 class ships.



Figure 24. Ship Self Defense (SSD) Facility (From Ref. 79, 37)

c. Multi Function Radar (MFR)

The AN/SPY-3 Multi-Function Radar (MFR), as shown in Figure 25, is an X-band active phased-array radar designed to meet all horizon search and fire control requirements for the 21st-century Fleet. MFR is designed to detect most anti-ship cruise missiles (ASCM) and is a key element of the Dual Band Radar (DBR) design requirement for CVN(X) and DD(X) ship class. The MFR Facility was brought on-line

in 2003, and is currently used for research, development and testing of the radar system that will eventually be housed in the new DD(X) Engineering Test Center.



Figure 25. Multi Function Radar (MFR) Facility (From Ref. 83, 56)

d. DD(X) Engineering Test Center

The DD(X) Engineering Test Center, as depicted in Figure 26, is envisioned as a state-of-the-art test facility. It will be used to integrate, test, and develop the new technologies for the US Navy DD(X) Program. This high-tech facility will house the latest in combat system radar array and communication arrays outfitted into a portion of the deckhouse structure utilizing the same composite materials that will be utilized on the new DD(X) class of ships. Groundbreaking for this facility is due to begin in December 2004 and facility construction completed by June of 2006. Northrop Grumman Ship Systems, the prime contractor, is on track to complete the DD(X) system design and associated Engineering Development Models (EDM's). The scope and complexity of the design work, which includes development and integration of new hull and ship systems as well as advanced combat systems, is unprecedented for a U.S. Navy surface combatant. Northrop Grumman is responsible for the total ship system design, as well as development and testing of the EDM's. Land-based testing at Wallops Island and selected at-sea testing of the EDM's will be performed with the results engineered into the total ship system design. (DD(X), 2004, 1)

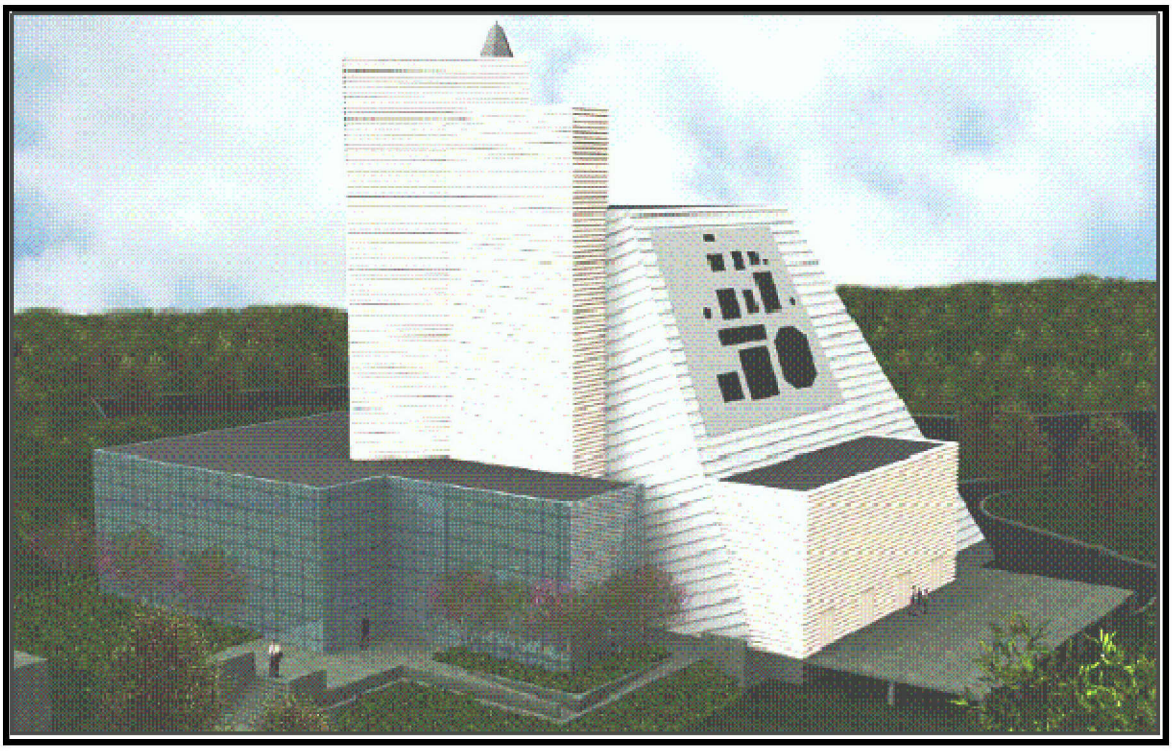


Figure 26. DD(X) Engineering Test Center (From Ref. 81, 25)

I. ENGINEERING PRODUCTS

The objective of SCSC is to provide surface combat systems facilities adequately equipped and staffed in which realistic engineering, development, system-level testing, training and fleet operations can be conducted in a maritime environment. SCSC is tasked with supporting the following types of engineering functions for the US Navy and other customers. (NAVSEA 5135, 2000, 19)

1. Engineering Development (ED): ED is used to incorporate new technology, improved technique, or other improvements into a design compatible with combat systems specifications.
2. Lifetime Support Engineering (LSE): LSE and technical support are used to resolve tactical computer program problems and verify computer program improvements at the Cruiser/Destroyer facility before the modifications are issued to commissioned ships. LSE performs element and system level testing.
3. Training: Combat system training provides officers and enlisted personnel who are proficient and competent in operating and maintaining the combat system equipment. All aspects of operating and maintaining the weapons systems are taught in the classrooms and laboratories at

SCSC. Through the extensive use of simulators, additional ships, aircraft, missiles and other threats can be included into the training.

4. In-Service Engineering (ISE): ISE engineering addresses emergent shipboard problems reported by the Fleet in order to maintain day-to-day operational readiness. ISE includes duplicating at-sea conditions for study in response to issues reported by fleet units, investigating fleet casualty reports, certifying computer programs, and proofing-in ORDALTS and Field Changes (FC), and assessing Engineering Change Proposals (ECPs).

5. Engineering Initiatives (EI): EI for specific projects and developments are for projects not necessarily restricted to the AEGIS Combat Systems (ACS) and are designed to enhance existing operational capabilities. Some of these EI's include Roving Sands Fleet Exercises, Fleet-wide Simulation Initiatives, and various Applied Physics Laboratory (APL) projects.

6. Projects: Projects consist of Engineering Initiatives (EI) and Engineering Development (ED) that are designed to incorporate new technology and improved techniques to enhance fleet operational capabilities. PEO IWS sponsors all project-related work at SCSC. SCSC has supported, and continues to support, such projects as Cooperative Engagement Capability (CEC), Radar Surveillance Technology Experimental Radar (RSTER), Shipboard Advanced Radar Target Identification System (SARTIS), Roving Sands Fleet Exercises, Fleet wide Simulation Initiatives, and various evolving technology system development.

7. Battle Group Interoperability Testing (BGIT): BGIT testing is completed as a part of the nation-wide Distributed Engineering Plant (DEP) under the auspices of NAVSEA 06. BGIT testing is designed to identify interoperability issues within a Battle Group prior to deployment, the documentation of capabilities and limitations and the development of acceptable work-arounds.

8. Program Management: Major special projects require extra planning and close Government management attention. Planning, budgeting, scheduling, engineering, complex technical support, progressing, reporting and senior management interface typically are involved in such programs.

9. Systems Interoperability: Interoperability is defined as the ability of two or more units to share tactically significant information and use that information to improve the effectiveness of combined units (battle force) over each unit operating separately. Interoperability measures of effectiveness should demonstrate improvement in battle force capability and readiness.

10. Network Centric Warfare (NCW): Warfare based on the timely acquisition and distribution of information is a central theme, which suggests that the military must achieve information superiority based on a common, compatible, timely decision information and systems

interoperability is the key. NCW is mandated as primary arm of the US Navy Transformation defined in Joint Vision 2020 and Sea Power 21.

11. Program Executive Officer (PEO): The Navy executive providing sponsorship, mission tasking and fiscal program support to Wallops Island Navy facilities and operations, specifically, PEO Integrated Warfare Systems (IWS).

(NAVSEA 5135, 2000, 19-20)

J. HUMAN RESOURCES

1. Overview

The Human Resource Service Center-Northwest Region (HRSC-NW) and the Director for Human Resources for the Naval Sea Systems Command (SEA 10) in Washington, DC provide human resource management services for civil service employees with limited services available locally. The following information is a detailed breakdown of the services that are provided at the local level. (SCSC Business Plan Draft, 2004, 23-28)

2. Staffing

As of March 2004, there are 515 full-time personnel, as shown in Table 5, with an estimated annual salary of approximately $21 million dollars. Of these 515 personnel, 41 are civil servants tasked with managing the US government facility.

	MARYLAND	VIRGINIA	DELAWARE	TOTAL
MILITARY	23	68	0	91
ATRCD	8	11	0	19
CIVILIANS	17	23	1	41
ATRCD	1	2	0	3
NSWC	6	2	0	8
NAF	3	5	0	8
APP	0	22	0	22
NORTHROP GRUMMAN	32	62	0	94
LOCKHEED MARTIN	42	71	1	114
EG&G	4	11	0	15
CUBE	19	69	1	89
CACI	0	5	0	5
PCI	3	0	0	3
OLD DOMINION	1	2	0	3
TOTAL	159	363	3	515

Table 5. SCSC Staffing Outline (From Ref. 83, 3)

SCSC Department Heads (DH's) are responsible for identifying manning requirements to their Directors and are given opportunities to discuss filling open positions. SCSC is located in a remote area, which frequently impedes aggressive recruitment efforts and impacts the rotation of military personnel. Positions opened to "Federal Agencies" afford transfer opportunities to all US government employees and "All Sources" permits the recruitment of non-government personnel. Incentives such as recruitment bonuses and student loan pay-offs are used to encourage more college graduates to apply and a Permanent Change of Station (PCS) is offered in association with our senior positions. (SCSC Business Plan Draft, 2004, 24)

3. Workforce Diversity

SCSC is comprised of military, civilian and contractor personnel with varying knowledge, skills and abilities. The health of the organization is based on a relationship that is cooperative, innovative and productive and one where managers and supervisors

can capitalize on the professional diversity and technical experience of its personnel. (SCSC Business Plan Draft, 2004, 23)

4. Work Systems

SCSC organizes and manages all work through an organizational structure that works in unison with the US Navy and civilian workforce professionals. This interdependent relationship is shared at all levels of the organization and is headed by the Executive Director (ED) and led by the Senior Leadership Team (SLT) consisting of the two Directors: the Director of Combat Systems (DCS) and Director of Management Operations (DMO). The DCS includes three major Department Heads (DH), including Combat Systems, Operations, and Systems Engineering. The newest directorate, the DMO, was established in May 2001 with the goal to organize the departments into a corporate-like structure and provide the Department Heads with a more forward-looking strategy, while continuing to meet the routine demands of external and internal customers. The DMO consists of the Supply, Resource Management, and Public Works departments.

The dissemination of information to the command is accomplished through weekly Department Head (DH) meetings, respective Directors' meetings, a weekly Senior Leadership Team (SLT) meeting, and e-mail, which enables multiple levels of the organization to be aware of time-sensitive information, receive or report on action items, and to maintain a channel of discussion on organizational business. Knowledge and skill sharing is assured through the development and implementation of project teams formed for major efforts. Internal Program Reviews (IPR) are conducted and debriefs are held to assess the effectiveness of the team in meeting their objectives. Personnel are empowered by their managers to propose innovative ways to improve these key processes and promote the overall well being of the command. (SCSC Business Plan Draft, 2004, 23)

5. Employee Growth and Development

SCSC managers conduct performance sessions with their direct reports and rely on the Internal Leadership Development Program (ILDP) to formally motivate civilian employees.

Informal succession planning is addressed at the SLT meetings and the Directors rotate DHs to act for them in order to gain experience for future positions and in the event of an absence, in the same manner that military officers act in the absence of their seniors. DHs have their personnel take the lead on various groups and projects in order to affect similar on-the-job training.

Unofficial mentoring relationships are often formed between the employees and supervisors and have the responsibility to develop people. However, the employee has to be receptive to taking on the additional training required for career advancement. Training is categorized as professional development, personal development or job essential, and the approval of training is based upon budget constraints, skills required, and future requirements. The command supports educational endeavors by funding tuition and travel costs and modifying employee work schedules when necessary. (SCSC Business Plan Draft, 2004, 23-25)

6. Compensation and Recognition

Personnel at SCSC are eligible for various recognition and awards that range from time off to monetary compensation. Their counterparts and peers throughout the command communicate award nominations to management where they are reviewed, the award is determined, and the distribution is normally reserved for command functions. (SCSC Business Plan Draft, 2004, 25)

7. Employee Well-being and Satisfaction and Work Environment

SCSC is a small, functional base providing services more often found in larger installations such as financial counseling, employee assistance program, health fairs, and a proactive health and ergonomics program. Key factors affecting employee well being, satisfaction, and motivation are measured by a number of vehicles, such as Annual

Command Climate Survey, SLT open-door policy, Commanding Officer's Suggestion box, and command-wide personnel meetings. Methods for employees to report concerns are informal/formal grievances and the Equal Opportunity (EO) complaint process.

SCSC's Ethnic Heritage Association strives to bring cultural and ethnic awareness to the command by listing noteworthy accomplishments in the Plan of the Day (POD). Other examples of promoting ethnic heritage are the displays mounted to commemorate and honor Asian Pacific Islanders, Native Americans, Hispanics, The Federal Women's Program (FWP), and other groups.

The Morale, Welfare and Recreation (MWR) Program offers a variety of activities and recreation for military members and their families, some of which are also available to civilian and contractor employees.

In addition to Navy-wide activities, SCSC personnel are able to utilize many of the NASA amenities such as the gym, cafeteria, and clubs. Social events including barbecues, bands, and informational speakers are also part of the sharing of activities between the NASA and SCSC.

SCSC's work environment is consistent with the smaller commands found throughout the US. Many of the civilian and military personnel who come to the command to support operations or are stationed here often retire and work for the contracting firms in the area. SCSC's small town feel is present in the workforce, however, the work that is accomplished at the various sites is equivalent to any of the larger NWSC organizations, and in some cases, surpasses their missions. As SCSC continues to grow its business base and combat system assets, the workforce and work environment will be forced to change. However, for now, SCSC is a small command with big-time aspirations. (SCSC Business Plan Draft, 2004, 23-28)

K. MANAGEMENT PHILOSOPHY

The management philosophy (derived from the Mission and Vision statements previously outlined in Paragraph F: Mission, Vision, and Guiding Principles) is meant to provide combat system facilities that are adequately equipped and staffed to complete realistic engineering, development, system-level testing, training and fleet operations that

can be conducted in a maritime environment. The existing AEGIS and SSD facilities have enabled SCSC to maintain this philosophy and achieve its mission objectives, and the addition of the DD(X) Engineering Test Center will ensure SCSC can do so in the future. Although under one command, each facility has distinct requirements and mission roles. The emphasis at the AEGIS facility is on life-cycle support of the Navy's AEGIS cruisers and destroyers, while the emphasis at the SSD site is on development and testing of new SSD capabilities for their delivery to the Navy's aircraft carriers and large amphibious ships. The DD(X) facility will be focused on the research, development and testing of the combat systems for the newest US Navy ship class. The facilities have different mission sponsors, each with different objectives and funding processes. however, the mission operations at SCSC endeavor to encompass all the facilities on site during all RDT&E operations. This overlap is the key to the SCS vision that is continually moving toward incorporating the principles of Navy Transformation.

L. MISSION OPERATIONS

SCSC provides Fleet training, Lifetime Support Engineering testing, In-Service Engineering tests and assessments, and approved engineering or project initiatives on behalf of a variety of customer agencies including NAVSEA/DD, NAVSEA/PHD, Center for Surface Combat Systems Detachment, combat systems laboratories, other AEGIS program Contractors, Ship Self Defense, and Multi Function Radar and DD(X). The facilities routinely conduct operations or provide related support on a two-shift, sixteen-hour-a-day, five-day-per-week basis. However, special requirements, including projects, requiring exclusive combat system usage and workload surges may require weekend and/or third shift assignments. Major products derived include certified computer tactical programs, trained crews, ordnance alteration proof-in, engineering change assessment, direct Fleet technical assessments and longer range tactical battle group evaluations.

1. Management

Management planning, assessment, and control must be exercised for SCSC mission activity to ensure effective operations while installing or de-installing systems,

equipment and/or associated computer programs. The customers require varied and often unique services that are often dynamic in nature. However, SCSC policies and procedures must be adhered to as reflected in command directives and approved plans. The command integrates all activities with that of the government agencies working on-site by recommending workable and effective use of both contractor and government resources including personnel, facilities, activation, research, engineering and operational schedules. Using multiple-shift operations and the high priority of all mission events dictate careful and detailed management planning and technical support by the contractor. The management plans for achieving the completion of work requirements while fully integrating all contractor activity with SCSC mission activity is critical to the achievement of PEO TSC program objectives and is outlined in detail in the following sections. (NAVSEA 5135, 2000, 21)

a. Management Technology

A management technology approach is taken for engineering services at SCSC and includes the following: strategic planning, program analysis, statistical reporting and other essential planning services for the technical support of major program management initiatives associated with long range mission planning and overall SCSC mission support effectiveness. (NAVSEA 5135, 2000, 21)

b. Information Technology

Information Technology (IT) for SCSC includes platform and network centric compatibility studies and command goals and objectives. These goals and objectives are derived from strategic planning and policy, independent assessments, and DoD mandates to optimize computer-based information accessibility and interoperability across all systems. (NAVSEA 5135, 2000, 22)

c. Technical Planning Processes

SCSC has established technical planning and mission execution support processes for the effective execution of assigned tasks that assist the team understanding of roles, responsibilities and effectiveness. Process assessments and measures are used to determine the overall effectiveness of the planning process and to help target areas for improvement. (NAVSEA 5135, 2000, 22)

2. Operations

The execution of the SCSC mission, training, combat systems personnel, equipment, and overall systems are operated at a level of tactical performance that enables SCSC to perform its mission with high fidelity in support of fleet combat systems. Extensive simulation systems are provided for all normally expected combat systems warfare elements. Customer agencies identify requirements both for both long range and immediate needs which must be fully supported with systems, personnel, and the required external services including aircraft and surface craft necessary to ensure a high probability of success. Fleet Area Control and Surveillance Facility (FACSFAC) and Virginia Capes (VACAPES) covers the air control and range operations in the Wallops Island area and provides the operations safety and coordination in the area activity. SCSC assigns an Operations Conductor to control the exercise, as necessary, and the contractor supports this process by providing operator personnel and varied technical or management support for all SCSC mission area operations. (NAVSEA 5135, 2000, 22)

3. Systems Availability

Combat system readiness of all systems and equipment, including essential switching and simulation systems, is a mandatory requirement for the support of the SCSC mission. Reliability, Maintainability, and Availability (RM&A) assessments are conducted periodically to determine progress toward achieving this goal. (NAVSEA 5135, 2000, 22)

4. Maintenance

SCSC combat systems configurations have grown significantly over the past ten years, and as these systems become operational the demand for SCSC customer support in test and training operations has increased. A corresponding increase in SCSC requirements for combat system maintenance and readiness assessment has also taken place. To meet this need, SCSC ensures that maintenance of all equipment and systems enables the government to provide a state of system readiness necessary to support the total SCSC mission. This includes all required maintenance of both tactical and support

equipment and systems including commercial equipment, cable repair and fabrication, equipment refurbishment and ensuring equipment calibration.

All system-level activity is fully planned and integrated into SCSC mission operations and maintenance schedules that incorporate systems-level Navy maintenance procedures. The SCSC maintenance teams are comprised of military, civilian, and contractor personnel operating much like a shipboard maintenance center. The Navy approves all maintenance requirements, schedules and military watch bills that will require military and contractor personnel working as an integrated maintenance team. SCSC Government and contractor personnel are expected to fully support the command maintenance concepts and provide all required planning and technical support to achieve the Navy's requirements in mission readiness. (NAVSEA 5135, 2000, 23)

5. Activation and Configuration Upgrade

SCSC-provided activation support includes all those tasks necessary to pre-plan, install, integrate, test and document the equipment as defined in the current Approved Baseline Equipment List (ABEL) and as modified through the Navy Configuration Control process. Specific tasking areas include management, planning, design, cabling, foundations, installation, checkout, alignment, acceptance testing, computer program definition, documentation, configuration management, quality assurance, and assessment of Electromagnetic Effects (EMX) as necessary to deliver to the Navy operational combat system configurations to meet the Navy milestones. (NAVSEA 5135, 2000, 23)

a. Existing SCSC Combat Systems Configurations

Specific requirements apply to the existing AEGIS Cruiser, Destroyer and SSD Carrier and Amphibious combat systems and support equipment, which is available for baseline upgrades and to incorporate into the new baselines as a fully integrated system. SCSC is required to maintain the equipment (as defined in the ABEL) and, as required by the customer, modify, upgrade and provide for special test configurations. The engineering and training configurations consist of the tactical and support equipment, simulators, emulators, tactical and support computer programs, interfaces to existing configurations, and all associated documentation. The current ABEL's define the

equipment unique to each of these combat system engineering and training configurations. (NAVSEA 5135, 2000, 23)

b. Milestones

System Operational acceptance milestones for the activation of new combat system configurations are known as Required Operational Dates (ROD's) are defined as the date when SCSC provides an installed, fully integrated, documented and operational combat system engineering or training configuration, including associated computer programs and documentation as a capability ready for use by Navy customers. Operational acceptance for activation includes the successful completion of all acceptance testing, a joint Navy/Government/Contractor site survey, an audit of all required documentation and material, and the completion of all outstanding associated activation deficiencies and correction of discrepancies.

Activation planning for major baseline milestones is conducted and executed to meet the ROD's, as shown in Table 6. These milestones are dictated by the PEO TSC and are subject to change over the life of the site. (NAVSEA 5135, 2000, 23-24)

Site Activation Required Occupancy Dates	
AEGIS: CRUISER/DESTROYER	
ACTIVATION	**ROD**
Baseline 6P3 (DDG 85)	Sep-01
Baseline 6P3 (backfit)	Sep-01
Baseline 7P1	Sep-02
Baseline 6P3 CG	Jun-03
Baseline 7P1 CG	Aug-04
SPY-1D(V) Facility	Aug-05
Baseline 7P1 Follow-on	Mar-06
SSD: CARRIER/AMPHIB	
ACTIVATION	**ROD**
SSDS MK 3	Jun-05
Common C&D	Jun-05
DD(X)	
ACTIVATION	**ROD**
Multi Function Radar Facility	Jun-03
Engineering Test Center	Jun-06

Table 6. Site Activation Required Operational Dates (From Ref. 56, 25)

6. Research and Development

Research and development technical activity is required to provide for the major Engineering Initiatives (EIs) performed at SCSC. EIs typically involve special support technical services and coordination to avoid any unplanned impacts to the on-going SCSC mission support capability including the following: system design, system interface engineering, facilities modifications and installations, configuration management, quality assurance, test support, data management and assessment, technical systems analysis, scheduling analysis, maintenance, and removal and restoration of

equipment to prior configurations. The scope of work is task orientated and may include items such as radar over-the-water testing, tests of new display systems, live missile Developmental Tests (DTs) and Operational Tests (OT's), command and control enhancements and other RDT&E efforts aimed at new ships or threats. SCSC provides the materials in support of these tasks to support installations, fabrications, cable repair/upgrades, emergency procurement to support critical operations, and specialized materials in support of EI tasking and participates in the planning and coordination of the available resources to ensure a high probability of successful testing. (NAVSEA 5135, 2000, 25)

7. Mission Process Engineering

Mission support processes form a strong foundation for the application of limited SCSC resources to the multiple tasks at hand. Major support processes are defined and assessed for optimum support effectiveness at SCSC. These processes are now carefully monitored for combat systems and technology support areas including (but, not limited to) technical systems activation, operations planning and scheduling for customers, tactical systems readiness, and general customer satisfaction feedback systems. (NAVSEA 5135, 2000, 25)

8. Network Centric Warfare (NCW) Initiatives

SCSC Wallops Island mission support strategy requires alignment of command mission task roles and capabilities in a Network Centric manner consistent with Joint Vision 2020 guidance and Navy Network Centric Warfare goals.

a. What is Network Centric Warfare?

> The term "network-centric warfare" broadly describes the combination of emerging tactics, techniques, and procedures that a fully or even partially networked force can employ to create a decisive warfighting advantage. NCW is an information superiority-enabled concept of operations that describes the way U.S. forces organize and fight in the information age. NCW generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, high tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. NCW translates information superiority into combat power by effectively linking friendly forces within the battle space, providing a much improved shared

awareness of the situation, and enabling more rapid, effective decision making. As a new source of power, NCW has a profound impact on the planning and conduct of war by allowing U.S. forces to get inside an adversary's decision cycle, changing the rules of warfare, and dictating the pace of military operations. NCW provides an edge at all three levels of military operations: 1) Strategy: Selects a competitive space and determines the scope, pace, and intensity of the competition. 2) Operations: Determines the key competitive attributes and applies/masters them. 3) Tactics: Executes in the battle space (as described above). (Director, Force Transformation, Office of the Secretary of Defense, 2003, 3)

b. What are the Benefits of Network Centric Warfare?

Forces that are networked outfight forces that are not, everything else being equal. Evidence of the power of NCW, collected from a wide range of U.S. military activities (combat operations, training events, tests, exercises, demonstrations), strengthens and reinforces the four major tenets of NCW. 1) A robustly networked force improves information sharing. 2) Information sharing enhances the quality of information and shared situational awareness. 3) Shared situational awareness enables collaboration and self-synchronization, and enhances sustainability and speed of command. 4) These, in turn, dramatically increase mission effectiveness. Recent operational experience has repeatedly shown that only forces that are truly joint, with comprehensively integrated capabilities and operating according to the principles of NCW, can fully exploit the highly path-dependent nature of information age warfare. They do so by altering initial conditions, developing and sustaining high rates of change, and repeatedly creating new operational realities that "lock out" an opponent's ability to cope effectively. Speed is critical to the successful execution of the "deter forward" concept – speed of deployment, speed of organization, speed of employment, and speed of sustainment. The ability to decide and act faster than our opponent allows us to define or alter the initial conditions on terms favorable to our interests. Networking is the key enabler of the battle space transparency necessary for speed. (Director, Force Transformation, Office of the Secretary of Defense, 2003, 3)

SCSC provides network and data communications connectivity analyses and command support for improved overall mission program support to the Distributed Engineering Plant (DEP) testing. Joint Military Services Interoperability requires multiple engineering and operations services to be provided, and future changes and engineering improvements to the Navy DEP are monitored and assessed and recommendations are provided.

Broad systems connectivity and interoperability is key to successful application of NCW principles at SCSC. To support this need, SCSC is growing its mission support capabilities (e.g., systems, sensors, and support roles) that will ultimately be completely integrated into an expanded Navy east coast battle force test and training capability. This goal will be achieved by strategically embracing the transformation processes outlined in Sea Power 21 and NCW program applications. (NAVSEA 5135, 2000, 26)

9. Logistics

When combat system equipment is installed and becomes operational, logistical support for it increases. To support this increase, SCSC maintains a COSBAL (Coordinated Shore Based Allowance List) within the current Maintenance, Material, and Management (3M) system database to support this equipment as well as the spare and repair parts. The maintenance of these spares and repair parts including Project Spares, Installation Check Out (INCO) Kits, Installation Kit (IKEE), and Interim Spares inventories are distributed by receiving, issuing, and inventorying them and then processing consumables and replenishing parts requisitions through the SCSC Supply Department as required. (NAVSEA 5135, 2000, 27)

10. Key Processes

Mission support processes form a strong foundation for the application of limited SCSC resources to the multiple tasks at hand. Major command-wide support processes are defined and assessed for optimum support effectiveness at SCSC. Such important processes are now carefully monitored for combat systems and technology support areas, including technical systems activation, operations planning and scheduling for customers, tactical systems readiness, and general customer satisfaction feedback systems. Combat system processes are integrated with other key processes such as Navy Supply System, Fiscal Planning, and Information Technology support (Local Area Network (LAN)/Internet/external connectivity processes).

In the execution of the SCSC Mission, combat systems personnel, equipment and overall systems must be operated at a level of tactical performance that enable SCSC to

perform its work with high fidelity to deployed fleet combat systems. Extensive simulation systems are provided for all normally expected combat systems warfare elements and these processes are continuously reviewed and changed to meet customer needs and to keep pace with changing technology. Communicating changes to these processes is critical and is achieved by utilizing a network of meetings that includes a combat systems meeting held daily in the morning, a Plan of the Day, operations scheduling, engineering and activation strategy planning sessions, SCSC Notices and Instructions, and training meetings. SCSC has identified key processes that apply to these meetings, as shown in Figure 27. (SCSC Unit Self Assessment, 2003, 6-2)

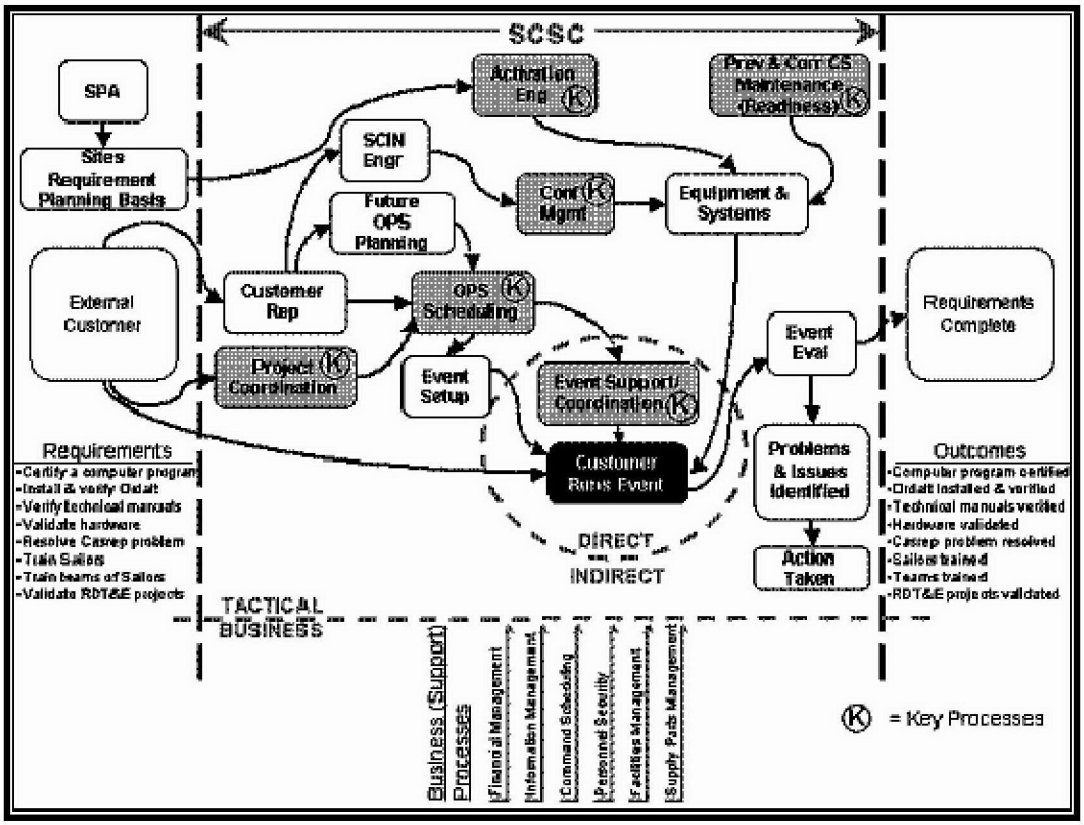


Figure 27. SCSC Key Processes (From Ref. 85, 6-2)

a. Event Coordination/Support

SCSC utilizes a scheduling system to produce daily, weekly, and monthly projected schedules and updates that identify potential scheduling conflicts with the government in the sharing of systems, equipment, ship tactical computer program baselines, and unique SCSC assets. It also helps to identify the incompatible uses of simulation systems and live tactical combat systems. The SCSC scheduling system exists in a PC-based computer program application entitled the Scheduling Activity Module (SAM), which is on the Combat Systems Department network. SCSC maintains the primary mission planning and scheduling database resident within SAM up-to-date with current information regarding schedules and planning. The SCSC Scheduling Officer is responsible for out-month and out-year forecast information to include an analysis of competing events and technical or resource conflicts that require coordinated planning and resolution prior to SCSC schedule commitment. Each event is tailored to the customer's needs based on their requirements, as stated in the test plan, the SCSC Run Sheet, and the operations schedule. Lessons learned are derived from customer feedback and observations of incorrect functionality, and efficiency is increased by sharing resources whenever possible. Acceptance tests are performed on systems prior to any customer usage and event errors are minimized by using prior-planning methods at scheduling meetings, detailed run sheets, baseline initialization checklists, and keeping track of baseline changes with Master Switching Notebook that documents all switching configurations. (NAVSEA 5135, 2000, 53-54)

b. Project Coordination

Key project coordination requirements are defined through SCSC and NAVSEA instructions. The processes are designed to meet key requirements by following instructions and checklists, and using the site personnel expertise. Coordination meetings and key performance measures and indicators are used for the control and improvement of project coordination measures to ensure objectives are met. (SCSC Business Plan Draft, 2004, 10)

c. Operations Scheduling

Key scheduling requirements that are determined by customer needs, SAM inputs, and scheduling projections, are designed to meet key requirements by

conducting coordination meetings, daily discussions with customers, and continually reviewing daily and weekly schedules. Performance measures and indicators are used for the control and improvement of the scheduling process and include customer feedback about the system, personnel performance, and SAM grades and comments. A continual upgrade to SAM and the event grading process that incorporates customer feedback on the scheduling process has proven to promote process improvements throughout the system. (SCSC Business Plan Draft, 2004, 10)

d. Activation Engineering

The Sites Planning Agent (SPA) in the Site Review and Planning Board (SRPB) and customers determine key activation engineering requirements at the sites by delivering, installing, testing, and interfacing new equipment and software. Activation engineering and process improvements are designed to meet key requirements by following local instructions and expertise; modifying test procedures written for ships and land-based test sites to minimize costs; analyzing system capabilities; and soliciting customer inputs from Activation Strategy Planning Sessions and other meetings. (SCSC Business Plan Draft, 2004, 10-11)

e. Combat System Maintenance (Readiness)

Key combat system maintenance requirements are determined by Planned Maintenance System (PMS) schedules, personnel availability, and command priorities and are needed to support customer events and to schedule maintenance time. These processes are designed to meet key requirements by working shifts and following US Navy Preventative Maintenance Schedules (PMS) schedules. (SCSC Business Plan Draft, 2004, 11)

f. Configuration Management

Configuration management (CM) requirements are determined by high-level instructions and customer inputs that provide "configuration control" so test configurations and testing procedures can be validated. The key performance measures and indicators used for the control and improvement of these processes includes the Site Change Implementation Notice (SCIN's), AEGIS Form Change Request (AFCR's), and other transactions. The CM department is manned by the contractor staff who provide and

maintain services that include scheduling audits of all site software and equipment, adapting to Commercial Off-the-Shelf (COTS) software and equipment, and consistently adapting to new process improvements designed to maximize the site CM. (SCSC Business Plan Draft, 2004, 11)

M. LOGISTICS OPERATIONS

The SCSC contractors support the Navy personnel in the packaging, handling, storage, transportation, and receipt and inspection of the equipment, furniture, computer programs, and other items to be installed at all command facilities. The Navy receives and ships all material and equipment coming into and leaving SCSC at the Logistics Storage Facility, Bldg R-30. All items are coordinated with Navy personnel to develop lists, identifying the technical documentation, repair, spare and support parts, special tools and test equipment requirements for all of the engineering and training configurations for the activation and operational phases that support of SCSC. Spares allowance planning documents for commercial equipment are developed as needed. Items that are required in addition to the current allowance are identified and a date required is established prior to installation, testing, and operations. Contractor personnel assist the Navy in procuring, storing, controlling and maintaining these resources. (NAVSEA 5135, 2000, 48)

1. Logistics Programming

SCSC supports the logistics planning required for equipment and computer programs to be installed in the engineering and training configurations. Command logistics planning is done with software compatible with the Operational Logistics Support Guide (OLSG) for both cruisers and destroyers, SCSC Logistics Plans, NAVSUP Manuals/Publications and the existing Navy 3M System. A Logistics Support Plan covers all equipment and computer program packages for all activation configurations at the command. (NAVSEA 5135, 2000, 49)

2. Parts Procurement

Parts are requisitioned utilizing the current Navy requisitioning programs in use at SCSC. A spare parts inventory program is maintained in accordance with the Coordinated Shore-based Allowance List (COSBOL) and other Navy directives. All spares inventory, including project, activation, interim and Installation Check Out (INCO) spares, are maintained on a separate database from current 3M databases in accordance with Navy directives. (NAVSEA 5135, 2000, 49)

N. INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS

The current environment at SCSC indicates that the emerging Information Technology (IT) interfaces will eventually be specified by outside organizations and the installation of these systems is planned as part of the Navy-Marine Corps Intranet (NMCI) contract. Currently, the SCSC IT Department Services will provide transitioning (NMCI) and non-transitioning services (non-NMCI) (SCSC Business Plan Draft, 2004, 19)

1. Data Availability

Data on information systems is protected as appropriate to their level of security classification, sensitivity, and importance by various means including firewalls, encryption devices, protected distribution systems, passwords, access restrictions, data backup, and physical security. System administrators, technicians, and security officers consistently monitor all data. Users are regularly briefed on security matters and are trained to use data entry sheets to ensure the integrity, accuracy, and performance of quality assurance and validation of data entries. Information systems that are flexible in their design are used in order for the command to adjust to changing needs and requirements. SCSC subject matter experts predict future data requirements and plan accordingly by meeting regularly with customers and technical representatives. (SCSC Business Plan Draft, 2004, 19)

2. Hardware and Software Quality

The Maintenance Request (MRQ) software application documents SCSC hardware and software problems and resolutions. The number of maintenance requests has decreased because of maturing information systems and upgraded network infrastructure. Problems that require software modification are documented and corrections are initiated on a Computer Program Change Request (CPCR) form, which provides the details of the requested software change. Computer users assist testing of new software and their feedback is solicited and incorporated in the final versions. When a computer user identifies new computer requirements, they are balanced against available resources by the Information Resource Management staff. (SCSC Business Plan Draft, 2004, 19)

3. Performance Measurement

Key requirements for the site are determined by the US Navy, NMCI, and customer and the performance processes are designed to meet key requirements by staying within available personnel and financial resources that cover items such as sharing data files, providing connectivity and applications to meet customer needs, and shifting priorities. Day-to-day operations are covered by the IT personnel and include providing computers and interconnectivity in the form of e-mail, Local Area Network (LAN), and Internet access, as well as providing Secret Internet Protocol Router Network (SIPRNET) access throughout the command.

LAN administrators receive key performance measure indicators including Maintenance Requests (MRQ), Computer Program Change Requests (CPCR), customer feedback and the Information Resource Management (IRM) to track the progress of changes made on the system and to determine the effectiveness of the system. (SCSC Business Plan Draft, 2004, 19)

O. PUBLIC WORKS AND FACILITIES OPERATIONS

The Public Works (PW) organization, as shown in Figure 28, budgets for and provides all required services including facilities maintenance, construction, repair,

facility engineering, drafting, planning, grounds maintenance, custodial, refuse collection/disposal, environmental, transportation and real property management in support of all combat systems operations.

The majority of PW services are provided through the WICC contract, which is used to consolidate NASA and Navy requirements and achieve cost-effective institutional services by implementing a working partnership for all operations. The basis for this contract was to obtain additional control and influence on services being provided via participation of functional area Integrated Product Teams (IPT's) throughout the command. These efforts have provide a consolidated institutional capability where cross-utilization of the resources yield cost, administrative, and management efficiencies. Additional resources for services are available from such sources as Naval Facilities Mid-Atlantic (NAVFACMIDLANT), Government Services Administration (GSA), NASA, and CNRMA.

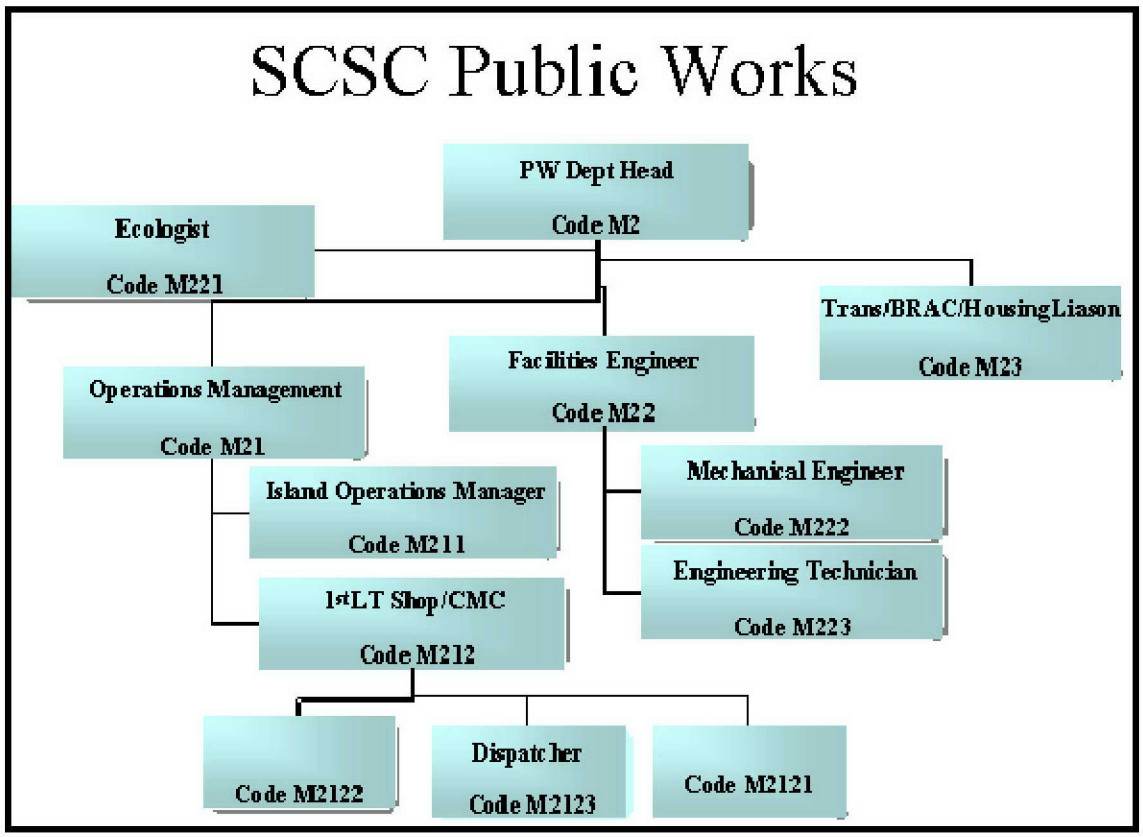


Figure 28. SCSC Public Works Organization Chart (From Ref. 82, 11)

1. Wallops Institutional Consolidated Contract (WICC)

The Wallops Institutional Consolidated Contract (WICC) is managed via a team of NASA and Navy government representatives and contractors (CUBE Corp). All work is divided into a Statement of Work (SOW) and has its own government and contractor representative or IPT. The WICC contract is an award term fee, cost plus incentive performance contract with a baseline requirement and an Indefinite Delivery/Indefinite Quantity (IDIQ) option that can be performed as required. All IPTs, Contracting Officer Representatives (COR), and Resource Managers are required to work together to ensure fiscal integrity of the contract.

All work is completed using a task-order execution and monitoring process for all baseline and IDIQ work to achieve financial management and oversight on the WICC contract. No work can begin unless a task order has been submitted and approved by the Contracting Officer who insures that all designs have met the requirements of the government project lead, contractor assessment, SCSC Resource Manager and the SCSC COR.

P. SCSC AND EASTERN SHORE ECONOMIC ANALYSIS

The growth of SCSC is mirrored by the growth of the Eastern Shore itself. When the SCSC was first opened in 1985, the Eastern Shore was classified as a remote site and the Lockheed Martin engineering staff, charged with the initial activation, was awarded per diem bonuses for the hardship. Today, SCSC, is now a destination on the map of the East Coast for US Navy RDT&E efforts and the Eastern Shore is a destination for retiring baby boomers who want to live in a rural setting yet still want to be close to the major metropolises of Washington, DC, Baltimore, MD, and Norfolk, VA.

1. Navy Land-Based Test Site

A major goal of the US Navy mission at Wallops Island is to ensure that no regression of performance occurs throughout each ship's operational life. This is one of the principal reasons for investments in shore sites, similar to SCSC, dedicated to technical, test, and training support of the naval fleet assets. These sites include the

AEGIS Combat Systems Production Test Center, Moorestown, New Jersey and the AEGIS Integrated Warfare Systems Laboratory (IWSL) and Center for Surface Combat Systems Detachment.

2. Development Concerns on the Eastern Shore

Development has been an issue on the Eastern Shore (also called the Delmarva Peninsula) since the Chesapeake Bay Bridge was built in 1952. From 1990 to 2000, census figures show that in one Eastern Shore County, Talbot, the number of people older than 60 increased by 28 percent. That was the highest growth rate in any Maryland county, with second place taken by Worcester County, home to Ocean City 40 miles from Wallops Island. In the past two years, development across the Eastern Shore has risen greatly and developers say they anticipate attracting retiring boomers from along the East Coast. (Fahrenthold, 2004)

The most distinguishing character of the Eastern shore is its rural setting and natural resources. These assets have not been lost by the locals, who are determined to keep the shore the beautiful place that is.

> The Eastern Shore has long prospered from its natural resources. The Shore boasts a world-class coastal ecosystem, the last undeveloped coastal wilderness on the Eastern Seaboard, extraordinarily productive waters and farmland, and a tightly knit community distinguished by its unique towns and villages. These assets, lost to so many other coastal places, are still intact because Shore residents are determined to protect their natural, cultural and historic resources as they seek to strengthen their rural economy. In a decade of collaboration among citizens from all walks of life, Shore residents have pursued a pioneering approach to economic development. In the early 1990's, residents and elected officials faced high poverty rates, high unemployment, low median incomes and widespread substandard housing, all brought on by the collapse of the farm and seafood industries. But residents rejected two economic development proposals deemed inappropriate: a maximum-security state prison and a remediation plant for contaminated soil from northern states. They also voiced strong opposition to sprawling residential development as an economic option. Shore leaders conducted a series of forums in the 1990's to determine what kind of economic development would be acceptable to the community. The result was an emphasis on economic activity that is compatible with the region's rural character and healthy environment. Real progress is evident. Unemployment in 2000 dropped as low as 1.9 percent and now ranges from two to four percent. Median

> income still lags far behind the state, but is slowly rising. Local leaders estimate that the region's emphasis on compatible development has generated $30 million in new public and private funds invested in the Eastern Shore in the past eight years. (Gallagher, 2001)

3. LBTS Growth Comparisons w/ SCSC

Growth around the surrounding areas where a LBTS is located has historically seen the area grow. This is due to a variety of factors including professional employment opportunities in the high tech area and the prime real estate associated with Navy testing in a waterfront environment. Real estate encroachment of all US Navy facilities is a prime concern and future planning for all sites is underway. The three LBTS's researched in this study have all experienced the effects of population growth: Point Mugu and Port Hueneme in California have experienced the most dramatic increases in real estate prices and encroachment; CSEDS in New Jersey has had its operations impeded by the effects of nearby encroachment. PMRF in Hawaii is the Navy test site that has taken the most steps to impede the growth around their facility. SCSC is in the early stages of feeling the effects of major real estate growth and encroachment. The following factors must be considered for future planning:

1. SCSC is poised to be a leader in multi-ship class configurations with the addition of the DD(X) Engineering Test Center in 2006. The addition of this site, co-located with the AEGIS and SSD test facilities will make it unique in the LBTS community. In addition, SCSC has been identified by NAVSEA as one of the best alternative sites to AFWTF to support future T&E activities in the future.

2. The Eastern Shore of Virginia has become a prime location for urban dwellers looking for inexpensive real estate in a rural setting. In 1998 the average price of a home in Northampton County was $76,002.00 with an average household income of $28,276.00. Today, the average cost of a home is $143,223.00. (Miller, 2004)

Q. SCSC STRENGTHS AND WEAKNESSES

The SCSC strengths and weaknesses outlined in Table 7 are for a command SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. The purpose is to

> Assess the organization's internal environment in order to identify its strengths and weaknesses (that is, those aspects of the organization that help or hinder the accomplishment of its mission and fulfillment of its mandates). It (this step) may also lead to clarification of the organization's core competencies. (Bryson, 1995, 90)

All of the items listed represent the strengths and weaknesses that have been outlined in the Section V: SCSC Internal Analysis. Although many more can be derived or deleted from this list, these may represent the issues that could be the focal point for discussion during strategic planning or business planning meetings.

STRENGTHS	WEAKNESSES
Combat Systems capabilities	Financial flexibility
Demonstrated experience with navy test and evaluation projects	Location is remote and not conducive to hiring well qualified candidates
Data systems connectivity	Turnover in key management positions
NAVSEA recognition	Lack of recognition at NAVSEA working
Fleet Perspectives	Do not locally control SSDF schedule
New systems provide capability for sailor	Do not control engineering/activation of
Ability to multiplex tasking and people to achieve greater efficiencies	Military billets less than fully manned
SCSC does have talented individuals who can multi-task but worker overload can be a weakness	Sailors doing security rather than working within their rates
	Lack of space for future expansion
	Staffing below adequate levels
	Do not have active process improvement program to measure and define processes
	Organizational structure not matured
	Facilities at capacity for people
	NASA Costs
	Lack of customer visibility or relationships

Table 7. SCSC Strengths & Weaknesses

VI. SCSC EXTERNAL ANALYSIS

A. OVERVIEW

The purpose of SCSC external analysis is to assess the organization's external environment in order to highlight its opportunities and threats based on three basic categories (Bryson, 1995) including: 1) forces and trends, 2) key resource controllers, and 3) actual or potential competitors. The direction taken for this portion of the research was to use as many elements of Bryson's Strategy Change Cycle in building an external analysis that addresses the elements needed to drive SCSC toward its goal of becoming the Wallops Island Test Evaluation Range Facility (WITERF). In addition, this section is an attempt to identify the planning directives of the Navy programs and organizations and to associate them with SCSC activities and capabilities to provide perspective. Wherever possible, trends were identified and associated with current events internal and external to the command.

SCSC is a mission-funded activity subject to decisions from the Department of Defense and the Department of the Navy that are influenced by political changes in the US and around the world. Faced with these changes and decisions that mark a fluid business environment for all Navy Land-Based Test Sites and Range Facilities, the SCSC organization operates in an external environment that is not unlike commercial entities, such as Lockheed Martin or Northrop Grumman. However, SCSC, as a government entity, is subject to a higher authority than a corporate board of directors or stockholders, namely, the US public and government. Because of this fact, corporate planning for government entities is more difficult for several reasons: the change of a Republican or Democratic administration or Congressional leadership could mean the difference between funding shortfalls or funding growth, the competition between LBTS and range facilities depends on previous decisions to fund new projects and sustain existing ones, and finally, the planning often depends on the caliber of personnel at each site and how they interact with the external activities that influence the work they do.

B. ENVIRONMENT AND TRENDS

1. Global

The United States is still engaged on the battlefield on two fronts in the Middle East; Operations Enduring Freedom (OEF) in Afghanistan and Iraqi Freedom (OIF) in Iraq. The Iraqi dictator Saddam Hussein was captured in December 2003 and is currently awaiting trial. Meanwhile, US troops are helping to maintain the peace by repelling terrorist and insurgent strikes against the Iraqi people and government as it works toward rebuilding the country and its infrastructure.

The War on Terrorism continues.

2. Domestic

The Department of Homeland Security (DHS) was established in November 2002. This was done in the wake of the September 11, 2001 terrorist strikes in New York City and Washington, DC that killed more than 2,700 people. The establishment of the DHS is one of the most significant reorganizations of the federal government attempted since the beginning of the Cold War when the Central Intelligence Agency (CIA) was established in 1947. Currently, the DHS has a budget in excess of $35 billion dollars and employs more than 160,000 personnel. (Department of Homeland Security, 2004)

The U.S. economy had a steady, though not spectacular, growth path over the past four years that was generally attributed to the emergence of larger global markets, the globalization of labor and capital, and the widespread application of information technology within business enterprises. An economic slow down occurred after 9-11, which prompted the Federal Reserve to lower the discount interest rate even further in 2002. The economy has shown signs of cooling off over the past year and U.S. job growth nearly stalled in July 2004, reinforcing other signs that the economic recovery lost steam this summer, just months before the 2004 presidential election.

3. Department of Defense

In January 2001, the Secretary of Defense, Donald Rumsfeld, laid out new objectives that called for the armed services to develop roadmaps for transforming their operations and directed that all associated agencies were to become aligned within five "new" DoD objectives including the following:

> 1. Fashion and sustain deterrence appropriate to the new national security environment.
> 2. Assure the readiness and sustainability of deployed forces.
> 3. Modernize US command, control, communications, intelligence and space capabilities.
> 4. Transform the US Defense establishment to address our new circumstances to include the introduction of new weapons systems and to take full advantage of commercially created information technology.
> 5. Reform DoD structures, processes, and organization.
>
> (Rumsfeld, 2001, 1-7)

To achieve these goals, the DoD budget requests and appropriations for defense spending have dramatically risen since the Clinton Administration. For example, the FY 2003 budget saw the $355 Billion Defense Appropriations and Military Construction Appropriations law reflect a $37 Billion increase over fiscal 2002 spending, providing a 4.1% pay raise for services members, increasing operations and maintenance funds by more than $5 Billion, and adding $11 Billion over the prior year's budget for weapons procurement. Congress increased the $53.9 Billion request for research and development to $58 Billion, reflecting the priority of Mr. Rumsfeld's Defense Transformation Policy. (Rhem, 2002) Since 2001, the Department of Defense has completed the following:

- Fought the War on Terror on the offensive.
- Removed threats to our security in Afghanistan and Iraq, liberating nearly 50 million people in these countries.
- Provided pay raises to our servicemen and women of more than 21 percent and expanded the use of targeted pays and bonuses.
- Began to transform our Nation's defenses and increased spending by 26 percent, the largest increase in the Defense budget since the Reagan Administration.
- Launched a transformational and joint training program, improving readiness rates.
- Increased research and development funding by 56 percent.

- Improved the quality of housing for military personnel and their families through privatization and new construction.
- Doubled investments in missile defense systems, deploying the first ever land- and sea-based system.

The President's Budget provides for the following:

- Advances our ongoing efforts in the Global War on Terror.
- Provides $401.7 billion for the Department's base budget, an annual increase of seven percent, for a total increase in defense spending of 35 percent since 2001.
- Makes measurable strides in transforming the Department to meet new threats. Continues improvements in the quality of life for our military personnel and their families.

(Office of Management and Budget, 2004)

4. Department of the Navy

In keeping with DoD policy to embrace transformational change, the Chief of Naval Operations (CNO), Admiral Vern Clark outlined his "Top Five" priorities, as depicted in Table 8, that are intended to help the Naval establishment focus, as an organization, on the issues most critical to its success.

MANPOWER:	Manpower is, and will remain, our Navy's biggest challenge. We are at war for people and we are fighting this war on three fronts — recruiting the right people, raising retention and attacking attrition. To win, we need the involvement of every leader at every level, from admirals to third class petty officers and seamen — everyone who has Sailors working for them. All of you directly affect our success on this issue, through your own personal actions and through your chain of command.
CURRENT READINESS:	The best quality of work that I know of is when you're on the other side of the world taking on the enemy, you know you're going to come home victorious. That's why current readiness is where it is. It is about mission first. I'm convinced the Continental Congress did not create the Navy way back then so we could cut a fine silhouette on the horizon. It was so we could represent this country and its vital interests.
FUTURE READINESS:	The power to compete in the future has everything to do with being credible today. The world is dangerous and unpredictable. Our Navy routinely operates in tough places, and that's as it should be. We work and operate in an atmosphere of risk and we should not shy away from it. We should be credible and we should be ready. We must constantly challenge the assumptions that we face on a daily basis and adapt to an ever-changing world.
QUALITY OF SERVICE:	Quality of service is a balanced combination of quality of life and quality of work. Although we are seeing great improvements in quality of life, this has not been the case for quality of work. Quality of work includes everything that makes your workplace a great place to be — from getting the spare parts you need in a timely manner to working spaces that are up to current standards. Quality of service includes having a work environment that contributes to personal and professional growth.
ALIGNMENT:	This involves a couple of things. First, we must ensure that our organizations, systems, and processes are aligned to deliver exactly what they are designed to produce — a combat-capable Navy, ready to sail into harm's way. Second, alignment involves clear communication, from the recruiter, to the LPO to the CO to the CNO. It's about communicating realistic expectations and then helping Sailors accomplish realistic goals — in a word, credibility.

Table 8. CNO Top Five Priorities, July 2001 (From Ref. 13 2004, 1)

In October 2002, the Navy released the Navy Transformation Roadmap, known as SEA POWER 21 (which is addressed in detail in paragraph C), which outlined the organizational changes driven by the new DoD guidance. One principal area of change is the renewed focus on readiness and the fleet and the way operational funding is managed. The Navy's performance in Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF) in 2003 demonstrated and underscored the value of readiness and highlighted the

Navy's ability to exploit the open maneuver space provided by the sea. In 2005, the Navy will expedite SEA POWER 21 capabilities.

In 2003, DoD changes directly affected sponsorship requirements and the command operations at SCSC as the command became the responsibility of the new PEO for Integrated Warfare Systems (IWS) while PEO Ships retained funding for the AEGIS facility. In addition, the consolidation of all SCSC facilities and shore installation management functions has been moved under the Commander Navy Region Mid-Atlantic (CNRMA). Funding was transferred from NAVSEA to Commander, Navy Installations (CNI) operations as part of this functional transfer.

In April 2003, the Atlantic Fleet Weapons Training Facility (AFWTF) at Puerto Rico was closed, which virtually eliminated the US Navy's ability to conduct Test & Evaluation (T&E) exercises for foreign and domestic surface combatants on the East Coast. In December 2003, NAVSEA published a report called the East Coast Range Working Group (ECRWG) Long Range T&E Resource Study that outlined the Commander Fleet Forces Command (CFFC) Training Resource Strategy (TRS) to conduct Atlantic Fleet (LANTFLT) training events on the East Coast. This report identified SCSC and the Virginia Capes Operating Areas as the prime alternative site to AFWTF to conduct T&E training on the East Coast.

Emergent needs throughout the US Navy, spurred on by changing policies, have led to the development of new requirements at SCSC.

5. SCSC

SCSC facilities continue to expand with the addition of new technology relating to the development of new ship class combat systems and additional capabilities for existing ship classes. In 2002, SCSC completed the installation of the first Multi Function Radar (MFR) (AN/SPY-3) Facility. In 2004, SCSC added the AEGIS, SPY-1D(V) Facility, Building V-21, to the AEGIS complex to support additional programs such as Ballistic Missile Defense (BMD) and future AEGIS equipment and software baselines. Currently, this facility is being prepared for active service at the end of FY 2005. As a follow-on to this effort, the planning and development for the DD(X)

Engineering Test Center is scheduled for groundbreaking in December 2004, with the completion of the facility scheduled for July 2006. The addition of these facilities will make SCSC the only US Navy LBTS with the capability to represent almost every US Navy surface combatant, including AEGIS, SSDS, and the new DD(X) Ship Class for Battle Group exercises, adjacent to a live-fire maritime environment.

Changes at the NASA Wallops Flight Facility in 2002 included the arrival of new management who desired to increase their commitment to the NASA/Navy partnership for continued growth and prosperity at Wallops Island. NASA WFF proactively seeks out business opportunities to develop and promote the launch capabilities available at Wallops Island. NASA has placed new emphasis on Range and Mission Management and has pursued several new initiatives, including the increased use of sounding rockets for sub-orbital projects, the qualification by NASA WFF for heavier payload vehicles, and the addition of unmanned aerial vehicles (UAV) operations. Lastly, since 9-11, NASA and the Navy have increased the security posture both for information assurance and physical security. Since NASA is governed by different security rules and regulations, additional attention and cooperation for addressing security concerns have been implemented across both commands.

A Base Re-alignment and Closure (BRAC) effort is planned for 2005 with the goal of reducing the overall defense department infrastructure, improving the overall quality of DoD facilities, and transforming the infrastructure that reflects the changing mission and force structure needs of the 21st Century. Currently, the SCSC Senior Leadership Team is working with all command departments to prepare the documentation required by this directive.

C. DEPARTMENT OF THE NAVY DIRECTION AND TRENDS

The Department of the Navy (DoN) Transformational Road Map and the CNO's SEA POWER 21 concepts, as shown in Figure 30, support the critical operational goals needed to provide new technologies and capabilities to the war fighter, drive organizational changes, and direct future funding. The following information outlines the

main external influences on SCSC and will provide the direction the command will need to the keep pace with the DoN Transformational Roadmap.

1. SEA POWER 21

NOTE: All items in this section were taken directly from SEA POWER 21, Operational Concepts for a New Era.

The DoN unveiled its Transformation Roadmap in June 2002. The Roadmap describes the key naval concepts, capabilities, initiatives, processes and programs that will guide the transformation efforts of the Navy-Marine Corps Team in support of the critical operational goals. Military Transformation is a process that depends on a culture where innovation is encouraged, nurtured and rewarded. True transformation is about seizing opportunities to create transformation capabilities by radically changing organizational relationships, implementing different concepts of war fighting, and inserting new technology to carry out operations in ways that profoundly improve current capabilities and develop desired future capabilities. The SEAPOWER 21 concept, as shown in Figure 29, identifies four major capabilities for the 21st century that form the Navy's Roadmap for Transformation.

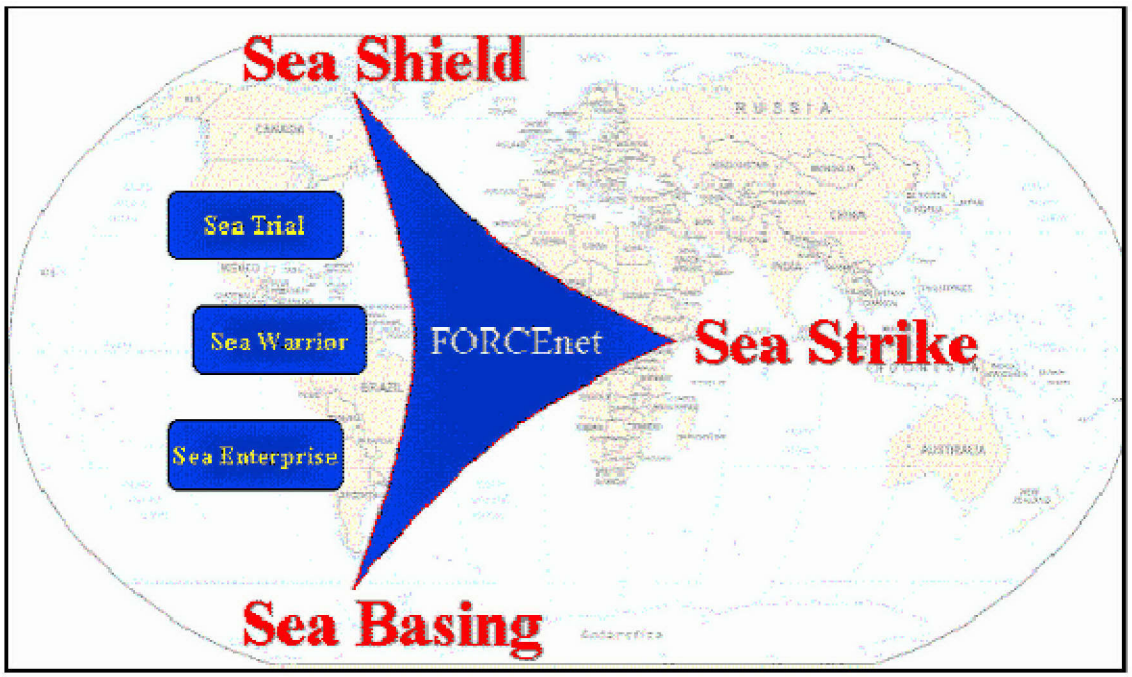


Figure 29. SEA POWER 21 (From Ref. 14, 31)

1. SEA STRIKE: Projecting Precise and Persistent Offensive Power.
2. SEA SHIELD: Projecting Global Defensive Assurance.
3. SEA BASING: Projecting Joint Operational Independence.
4. FORCEnet: FORCEnet is the "glue" that binds together Sea Strike, Sea Shield, and Sea Basing.

Sea Strike, Sea Shield, and Sea Basing will be enabled by FORCEnet, an overarching effort to integrate warriors, sensors, networks, command and control, platforms, and weapons into a fully netted combat force. We have been talking about network-centric warfare for a decade, and FORCEnet will be the Navy's plan to make it an operational reality. Supported by FORCEnet, Sea Strike, Sea Shield, and Sea Basing capabilities will be deployed by way of a Global Concept of Operations that widely distributes the firepower of the fleet, strengthens deterrence, improves crisis response, and positions us to win decisively in war. (Clark, V. ADM: SeaPower 21, 2002, 3)

a. Sea Strike: Projecting Precise and Persistent Offensive Power

Projecting decisive combat power has been critical to every commander who ever went into battle, and this will remain true in decades ahead. Sea Strike operations are how the 21st-century Navy will exert direct, decisive, and sustained influence in joint campaigns. They will involve the dynamic application of persistent intelligence, surveillance, and reconnaissance; time-sensitive strike; ship-to-objective maneuver; information operations; and covert strike to deliver devastating power and accuracy in future campaigns. (Clark, V. ADM: Sea Power 21, 2002, 3)

b. Sea Shield: Projecting Global Defensive Assurance

Traditionally, naval defense has protected the unit, the fleet, and the sea lines of communication. Tomorrow's Navy will do much more. Sea Shield takes us beyond unit and task-force defense to provide the nation with sea-based theater and strategic defense. Sea Shield will protect our national interests with layered global defensive power based on control of the seas, forward presence, and networked intelligence. It will use these strengths to enhance homeland defense, assure access to contested littorals, and project defensive power deep inland. As with Sea Strike, the foundation of these integrated operations will be information superiority, total force networking, and an agile and flexible sea-based force. (Clark, V. ADM: Sea Power 21, 2002, 5)

c. Sea Basing: Projecting Joint Operational Independence

Operational maneuver is now, and always has been, fundamental to military success. As we look to the future, the extended reach of networked weapons and sensors will tremendously increase the impact of naval forces in joint campaigns. We will do this by exploiting the largest maneuver area on the face of the earth: the sea. Sea Basing serves as the

foundation from which offensive and defensive fires are projected—making Sea Strike and Sea Shield realities. As enemy access to weapons of mass destruction grows, and the availability of overseas bases declines, it is compelling both militarily and politically to reduce the vulnerability of U.S. forces through expanded use of secure, mobile, networked sea bases. Sea Basing capabilities will include providing Joint Force Commanders with global command and control and extending integrated logistical support to other services. Afloat positioning of these capabilities strengthens force protection and frees airlift-sealift to support missions ashore. (Clark, V. ADM: Sea Power 21, 2002, 7)

d. FORCEnet

FORCEnet is the operational construct and architectural framework for Naval Warfare in the Information Age, as shown in Figure 30, which integrates Warriors, sensors, networks, command and control, platforms and weapons into a networked, distributed combat system, scalable across the spectrum of conflict from seabed to space and sea to land.

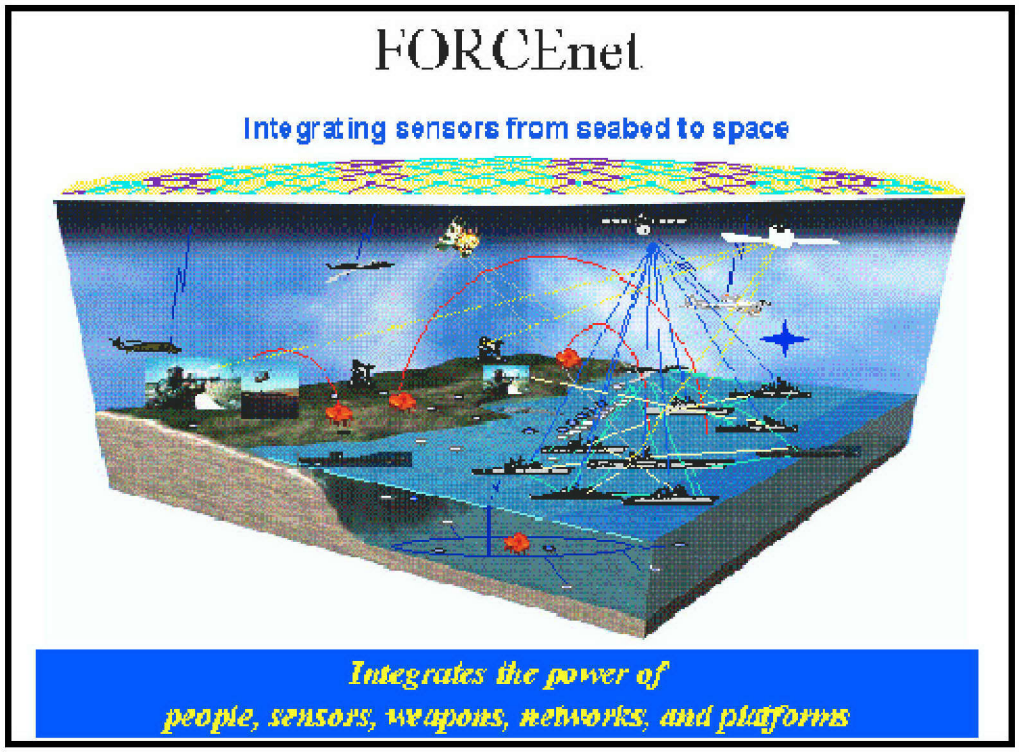


Figure 30. FORCEnet Diagram (From Ref. 14, 19)

FORCEnet is not necessarily a "thing" as much as it is a framework with an emphasis on a system-of-systems end state. It is the glue that ties together SEA STRIKE, SEA SHIELD, and SEA BASING. US Navy organizations across the US are all involved with various aspects of defining, programming, leading, engineering, and executing this process. The intent is to use a spiral development process to incrementally increase combat capabilities (i.e. situational awareness, effects of mass without massed forces, speed of decisions) over time. Several experiments are being planned over the next two years to test various components of FORCEnet. (Clark, V. ADM: Sea Power 21, 2002, 9)

Future FORCEnet components that could enhance NCW capabilities include the Navy Fires Network (NFN) to support Land Attack and Strike Warfare and the Joint Task Force (JTF) WARnet to support advanced Command, Control and Communications technologies. NFN is describe as follows:

> A network-centric warfare system that provides real-time intelligence correlation, sensor control, target generation, mission planning and battle damage assessment capabilities, while also enabling real-time engagement of time-critical targets. This capability will allow ships in a battle group to share real-time targeting and intelligence data with each other, as well as with other war fighting assets in a joint or coalition task force. (Nagle, 2002)

The ability exists today to take data from a sensor on an unmanned aerial vehicle (UAV), transmit that input into the network and deliver a fire control solution to hit the target. Wallops Island combat systems and the future UAV test support infrastructure can provide the required test environment for this technology.

SCSC has kept pace with the Navy's current NCW evolution. The tactical networks include Link 11/16/4A, Lamps MK III Hawklink, Global Command and Control System-Maritime (GCCS-M), and Cooperative Engagement Capability (CEC). These networks and systems provide a strong foundation for supporting Navy and Joint NCW development, interoperability and integration efforts. The CEC system networks sensors on ships and aircraft and provides a composite track picture and more robust engagement capability. It will be a component of FORCEnet and a stepping-stone to the future of NCW operations. In addition, CEC will support the joint warfare requirement for a Single Integrated Air Picture (SIAP). SCSC's C4I capabilities and specifically the

AEGIS, SSDS, and CEC systems and their ability to simultaneously network with ships at sea and other land-based test sites puts SCSC in a strong position to support future FORCEnet development and test initiatives. The addition of a Super High Frequency (SHF) and Extremely High Frequency (EHF) radio system would reinforce this position and provide a means to support data transfer from ships at sea.

e. Sea Trial, Sea Warrior, and Sea Enterprise

> SEA STRIKE, SEA SHIELD, and SEA BASING concepts will be developed through a supporting triad of organizational processes: SEA TRIAL, SEA WARRIOR, and SEA ENTERPRISE. SEA TRIAL will provide a fleet-led, enduring process of innovation and accelerated concept and technology development (spiral development, rapid prototyping, fleet experimentation). SEA WARRIOR will provide enhanced assessment, assignment, training and education of the Navy's most valuable asset- its people. SEA ENTERPRISE will allow the Navy to sustain its core capabilities, optimize investments and apply selected business reform to organizations and processes. SEAPOWER 21 and the concepts of SEA STRIKE, SEA SHIELD, SEA BASING and FORCEnet will transform the way we fight and should drive future ship design, weapon programs, funding and reorganization within the Navy. (Clark, V. ADMR: Sea Power 21, 2002, 8)

2. Evolutionary Acquisition and Spiral Development

DoD Directive 5000.1: The Defense Acquisition System and DoD Instruction 5000.2: Operation of the Defense Acquisition System establishes a preference for the use of evolutionary acquisition strategies that rely on a spiral development process. These approaches are designed to develop and field demonstrated technologies for both hardware and software in manageable pieces. Evolutionary acquisition and spiral development also will allow insertion of new technologies and capabilities over time, reduce cycle time, and speed the delivery of advance capability to our war fighters. This is similar to pre-planned product improvement, but is focused on providing the war fighter with an initial capability that may be less than the full requirement as a trade-off for early delivery, agility, affordability, and risk reduction. (DoD 5000 Series Resource Center, 2004)

3. Open Architecture

Open Architecture (OA) is an information technology term that refers to components conforming to formal interface specifications, fully defined by industry, and available to the public and manufacturers. The US Navy Transformation Roadmap describes OA as

> The development effort is a cornerstone in the foundation of FORCEnet enabling capabilities. The C4ISR and Combat Systems communities' convergence on functional module development and allocations, design guidance that decouples software development from hardware development and a standardized computing environment that will satisfy a range of quality of service demands up to and including essentially real-time deterministic operations, provide the kernel of technical capability to implement global distributed combat system's services. The national military strategy calls for the services to operate as a fully interoperable and integrated joint force. The Navy and Marine Corps will leverage theater, national and organic assets to ensure there are sufficient resources available to execute missions assigned by the Regional Combatant Commander. FORCEnet is more than just better communications, higher capacity networks and better applications for interfacing with these joint and agency assets. FORCEnet is the transformational enabling infrastructure to conduct global distributed combat operations. (Navy Transformation Roadmap, 2003, Section 3D)

Developing systems based on such a model is intended to allow compatible third-party functional replacements and upgrades to be fitted at comparatively low costs. The first AEGIS Combat System baseline to have OA infrastructure for SCSC will be Baseline 7 Phase 1 CR2.

While providing enormous potential for increased capability and cost reductions, this transition also presents new challenges. The initial design and installation of all systems at SCSC, including all COTS-based SSDS combat systems and AEGIS Weapon Systems Baseline 6 and above, was very difficult due to the unknowns associated with these systems. Life-cycle support for maintenance and repairs and sustainment of dedicated and experienced maintenance and operator personnel remains a challenge for the immediate future. However, the drive toward a commonality across ship classes with an OA development approach should eventually ease this maintenance and modernization. A SSDS MK 2 Tech Refresh at the SSD Facility was completed June 2004 and provided common hardware for the majority of the LPD, LHD and CVN

platforms. Several tech refresh efforts are planned for the AEGIS facility beginning with Baseline 7 Phase 1C-CR1 in 2005 and will include a modernization upgrade for the Baseline 4 Cruisers (CG 65-73). Other tech refresh upgrades are targeted for new commission Destroyers (DDG 103-114).

D. SCSC PROGRAMS

SCSC facilities will play a major role in replicating all AEGIS and SSDS combat systems with live sensors in a maritime environment. This capability, combined with NASA/WFF's capability to launch ballistic missile targets, should provide the Missile Defense Agency (MDA) an excellent opportunity for supporting Ballistic Missile Defense (BMD) development initiatives in the future. The leveraging of scheduled NASA launches and inexpensive sounding rockets can provide the opportunity for an expanded land-based and shipboard missile defense training capability on the east coast. A list of the sponsors and customer trends is provided to describe the current track of these programs and how they may affect SCSC in the future.

1. AEGIS Programs

The AEGIS shipbuilding program continues on track with three ship deliveries per year until 2007, at which point shipbuilding is reduced to two ships per year until 2012. This will mark the end of AEGIS SCN funding, although modernization is expected to continue for the foreseeable future. The current plan is to continue upgrading the inventory of ships so that eventually all ship combat systems are upgraded to an open architecture configuration. It is then expected that war-fighting improvements can be initiated into a majority of the fleet at a reduced cost.

A breakthrough in BMD testing that is not available at any other site or ship was realized this past summer when NSWC Dahlgren engineers successfully demonstrated tracking a ballistic missile target utilizing the SPY-1D combat system and Digital Radio Frequency Modulation (DRFM) towers at SCSC. This capability is much more robust than using a simulator to simulate a ballistic missile track and will be invaluable to the authorization and certification efforts for BMD.

a. Program Life-Cycle

The AEGIS cruiser has a 40-year life and a destroyer has a 35-year life, both are approximately one-third of the way into the total program life cycle. The oldest ship in the AEGIS fleet, the USS TICONDEROGA, retired in the fall of 2004. The Program Objective Memorandum (POM) plan for 2004 called for the early retirement of the five Baseline 1 ships. Currently, AEGIS ships currently make up 60% of the surface combatant fleet and are projected to represent 75% of the surface combatant fleet by 2013 when all Spruance (DD 963) class destroyers and Perry (FFG 7) class frigates are scheduled to be fully retired.

b. Baseline Installation

SCSC is the only AEGIS LBTS with nearly every AEGIS sub-system and computer program baseline (more than any of the other LBTS) in a maritime environment, as shown in Figure 31.

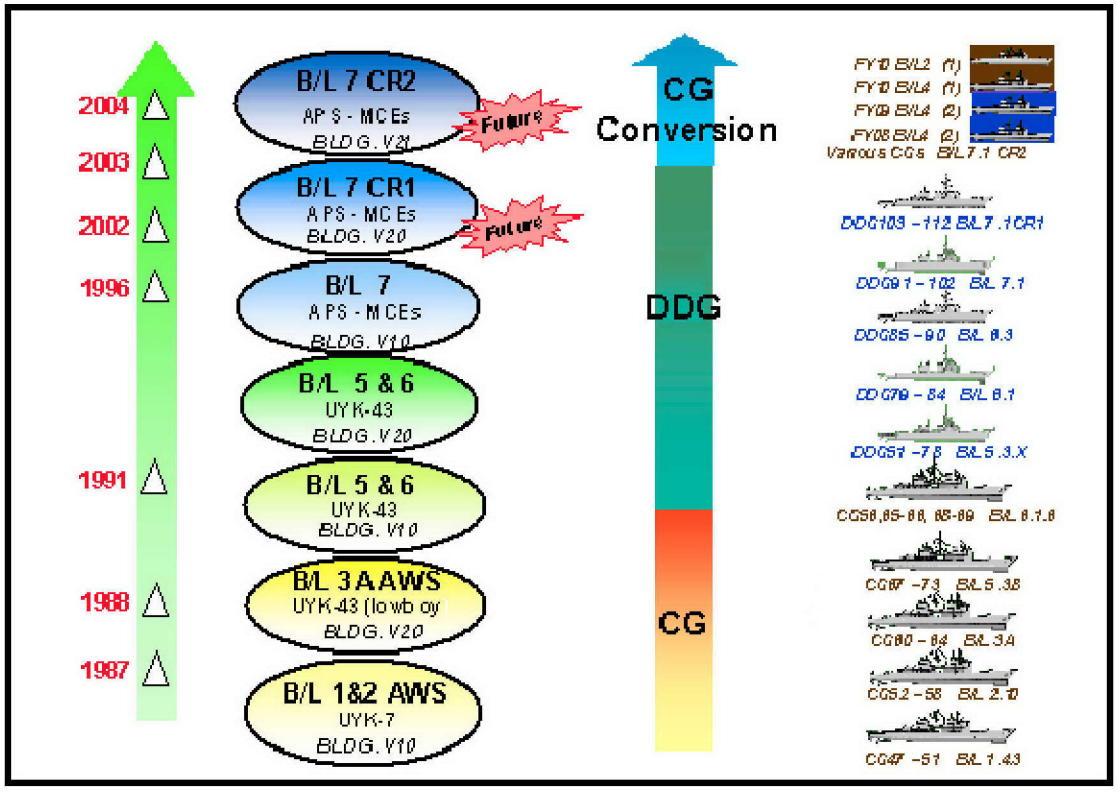


Figure 31. SCSC AEGIS Weapons System (AWS) Baselines (From Ref. 17, 17)

In June 2003, the initial installation of the Baseline 7 Phase 1 equipment suite at SCSC was completed and is currently being utilized with simulators. The SPY-1D(V) radar installation to support live operations for Baseline 7 Phase 1 and Phase 1 is due to be operational in the summer 2005. As AEGIS cruisers and destroyers receive new system upgrades, legacy capabilities at SCSC will be eliminated or replaced by the new equipment and software to maintain the life-cycle support mission of SCSC.

c. Program Funding

AEGIS O&MN funds are not expected to grow significantly for the foreseeable future as the focus of O&MN funding will be directed to the Fleet. Support of the four AEGIS land-based test sites is consistently being evaluated and a consolidation of functions may be likely. Primarily due to the AEGIS, SSD, and DD(X) assets on station and the unique operational environment, SCSC is well positioned not only to continue its role but also to take on additional missions as infrastructure is reduced elsewhere. Increased operational tempo at SCSC can be accommodated by the addition of personnel and work shifts but will place additional demands on SCSC equipment and facilities.

2. Ship Self Defense Systems Programs

The Ship Self Defense System integrates and coordinates all of the existing sensors and weapons systems onboard most classes of non-Aegis ships and makes it possible to automate the detect through engage sequence through the use of identification and engagement doctrine statements. SSDS is not intended to improve the performance of any sensor or weapon beyond the performance of the stand-alone version, it coordinates both hard kill and soft kill systems and employs them to their optimum tactical advantage. The SCSC, SSD Facility currently provides the SSDS MK 1 and MK 2 combat systems.

The SSDS MK 1 system supports twelve Landing Ship Dock (LSD 41) class ships. The current life cycle support effort for this system requires on average 165 hours per month, or 40 hours per week with some weekend time to support system stress tests. The majority of these tests utilizes the "test bed" simulation system instead of live

sensors and requires minimum support from the "Team SCSC" technical support staff. Certification tests, with a one-month duration, are conducted every eighteen months. During this one-month period, required support may increase to two hundred hours including a ten-hour period of live sensor support. The requirement for this level of support is expected to continue for the indefinite future.

The SSDS MK 2 system capability currently consists of the MOD 1 configuration to support CVN 68, 69 and 76, and the MOD 2 configuration to support Landing Platform Dock (LPD) 17 through 20. In addition to these configurations, future capabilities have included a Tech Refresh configuration that was just completed in June 2004. In the 2004 Fielding Plan, SCSC, SSDS MK 2 systems will support a total of twenty-five ships by 2009 including one CV, eight CVN's, six LHD's and ten LPD's .

Since the merger of the SSD facility into the SCSC command, funding for this facility and its operations has been a challenge. A constant effort is required by the Program Office and SCSC to insure sufficient funds to support repair parts purchases and facility operations and maintenance. In addition, funds arrive from multiple sources with various expiration dates, increasing the effort from the government and contract support staff to manage the funds. The current level of funding for the SSD facility should remain stable through 2005, after which the program office expects a significant reduction in the SSDS development effort and funds available to maintain the current operations of one shift a day (8 hours of customer support) with limited overtime for extended operations. SCSC should look at marketing the SSD facility to potential sponsors/customers that could help maintain or increase operations beyond 2005.

3. DD(X) Programs

The new Surface Combatant Family of Ships will include a DD(X), CG(X) and a Littoral Combat Ship (LCS) that will support the following missions:

> The family of ships will be comprised of DD(X), a multimission destroyer with an offensive focus, providing precision surface fires in support of forces ashore; CG(X), a multimission surface combatant with a sea-based theater and area air defense capability and a ballistic missile defense suite; and the Littoral Combat Ship (LCS), a networked, fast, modular, focused-mission ship. This family construct will better address technology risk

> mitigation by applying a spiral development approach, leveraging common systems and equipment where possible, and inserting new technology as it becomes available. (Hamilton and Loren, 2002, 3)

In the spring of 2002, the government directed the DD(X) Design Agent (DA), Northrop Grumman Ship Systems, to use Wallops Island to conduct land-based tests for the Integrated Deckhouse and Apertures (IDHA) Engineering Development Model (EDM). The land-based tests will focus on electromagnetic interference, electromagnetic compatibility and radar cross-section and infrared signatures. At a DA Technical Exchange Meeting hosted by SCSC in December 2002, representatives from the DD(X) Program Office stated that, for planning purposes, SCSC should assume that the DD(X) installation on Wallops Island would be a permanent facility. In addition, SCSC would lead the coordination effort with the DA to locate a test site, provide engineering support for the facility design, equipment installation and development testing. The DD(X) Engineering Test Center, is envisioned as a state of the art test facility. Groundbreaking for this facility is due to begin in December 2004 and facility construction completed by June of 2006. Land-based testing at Wallops Island and selected at-sea testing of the EDMs will be performed with the results engineered into the total ship system design.

In 2003, SCSC completed the construction of the AN/SPY-3 Multi Function Radar (MFR) land-based test facility. The MFR is an X-band active phased-array radar designed to meet all horizon search and fire control requirements for the 21st-century Fleet. MFR is designed to detect anti-ship cruise missile (ASCM) and is a key element of the Dual Band Radar (DBR) design requirement for CVN 21 and DD(X) ship class. The MFR Facility was brought on-line in 2003 and is currently used for research, development and testing of the radar system that will eventually be housed in the new DD(X) Engineering Test Center.

E. NSWC DIVISION SUPPORT

1. NSWC Dahlgren Division (NSWCDD) Department N13:

The mission of Dahlgren N13 staff permanently assigned at SCSC is broken into three parts:

1. To ensure the combat systems at SCSC closely replicate the shipboard configuration, identify deltas between the ships and site, provide impact of deltas to Dahlgren test teams, and produce the Test Engineer's Notebook (TEN) for test team use.
2. Coordinate all Dahlgren test requirements with SCSC, schedule test events, monitor test progress, monitor combat systems readiness.
3. Assure all needed live air asset requirements are identified and requested for funding.

Currently, the N13 staff is made up of one government systems engineer, one contractor systems engineer, and two contractor-engineering aides who operate in the Engineering, Operations, and Management teams to support all AEGIS Baselines.

a. Engineering

N13 engineering works with SCSC and the Sites Planning Agent (SPA), PEO IWS, PEO Ships, NSWCPHD, and CSCS/ATRCD to provide engineering leadership to quantify the components and configuration of the AEGIS Combat System for the following items:

- By identifying the deltas between the ship configuration and the configuration of SCSC.
- To provide analysis of deltas for identifying potential impact to the Dahlgren certification mission performed at SCSC.

An integral part of this is accomplished through active participation with SCSC government and contractor staff in daily coordination meetings and teleconferences. Officially scheduled meetings and briefs include the Engineering Meetings (bi-weekly), Activation Meetings (weekly), and Engineering Strategy Sessions (yearly), which produce action items that impact current and future baseline configurations.

One of the byproducts of this engineering analysis is the Test Engineer's Notebook (TEN) that details specific deltas between shipboard and SCSC configurations. It is produced exclusively by Wallops Island N13 personnel, for element and system T&E

participants who test at SCSC, and provides an advisory of possible impacts these deltas may have on the Dahlgren certification effort. Production of this tool is labor intensive and requires extensive coordination with Fleet personnel. However, it is widely regarded and utilized by the AEGIS element and system test personnel throughout the Fleet.

b. Operations

The SCSC Operations Department schedules for Dahlgren element and system test personnel the test time and configurations needed to perform their mission. To accomplish these tasks, N13 Operations works with the SCSC Operations Department, CSCS/ATRCD and NSWCPHD organizations. The combined action of these commands and departments ensures that the Dahlgren mission is met and ensures all Navy missions are addressed within the constraints of the SCSC schedule, which is dynamic in nature and requires the constant arrangement, rearrangement and reallocation of time and assets. Dahlgren is the primary customer at SCSC, schedules approximately four thousand system hours per year in over six hundred events, and averages two events per week and on numerous weekends. In addition, N13 manages and funds Aircraft Services Coordination testing operations. The aircraft services involve working with element, system test and aircraft services contractors to support the identification of live aircraft test requirements and assets that are required for AEGIS baseline certification.

c. Management

N13 management is broken down into three distinct areas, including the following:

1. Advising and interacting with NSWCDD, PEO IWS and SCSC military and civilian leadership to ensure mission, program management, readiness and statuses are communicated and understood by all agencies.
2. Monitoring the progress of development and certification testing scheduled and performed at SCSC.
3. Actively participating in the planning, activation, and verification of AEGIS Combat Systems at SCSC for NSWCDD certification efforts.

d. Project Engineering

Operations at SCSC are dynamic in nature and project-engineering support is sure to grow in the future with N13 acting as a quality assurance point for the following new programs: AEGIS Baseline 7 Phase 1 and Baseline 7 Phase 1C, Ballistic Missile Defense (BMD), Open Architecture (OA), and possibly Ship Self Defense System (SSDS), DD(X), and CV(X). A detailed description of N13 projects is provided as follows:

- Planned Future Work: SCSC will support Dahlgren efforts including additional work for cruiser conversion, certification efforts on Baseline (B/L) 6.1.7, 2.10.3, as well as conducting AEGIS Integration Events (AIEs) for existing AEGIS Weapons Systems (AWS) baselines, shown as an example of the current and future work schedule in Figure 32. Baselines 6.1.7, 2.10.3, 7.1C and the AIEs will be accounted for as existing work. However, the current level of staffing of N13 at SCSC cannot support additional requirements.

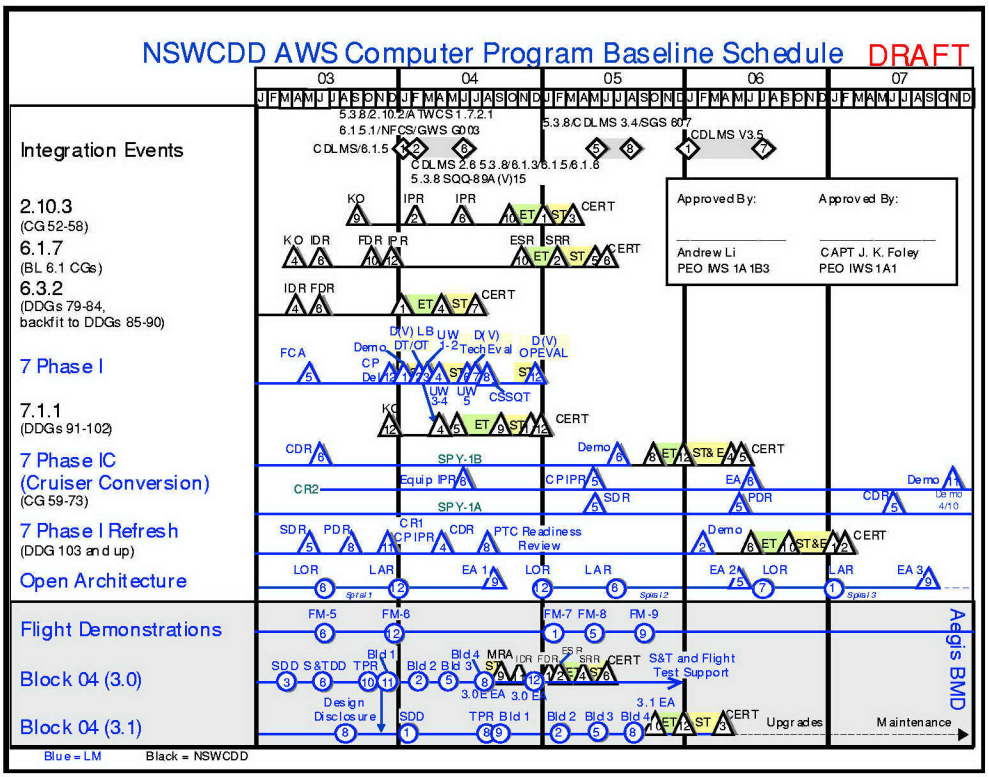


Figure 32. AWS Computer Program Baseline Schedule (From Ref. 18, 17)

- Ballistic Missile Defense (BMD): BMD Block 04 will come to SCSC at the end of 2004. While initial requirements for BMD at SCSC will be minimal, the scope of the work will increase significantly in 2005 with most of the version 3.1 development and certification testing taking place at SCSC. BMD will require extensive engineering and operations support and will correspond with the addition of the AEGIS SPY-1D(V) installation and activation in 2005, which is designed to support future BMD development efforts.

- Open Architecture (OA): OA Spiral 1 came to SCSC in May 2004 and although the changes were minimal, the scope of the work will increase dramatically in 2005. OA will initially require mostly operational support and some engineering support in 2005. Subsequent growth in 2006 will require extensive engineering and operation support.

- Ship Self Defense System (SSDS): The SCSC SSDS Facility supports live equipment and sensors and is DEP capable. Currently, N13 does not provide SSDS software support and will require engineering and operation staff to support this effort.

- DD(X): Northrop Grumman will break ground for a DD(X) facility in December 2004 and will mirror the activities currently in place at the AEGIS and SSDS facilities. Dahlgren will be the software certification agent for DD(X), but unlike the certification process used by AEGIS, the government role is envisioned to be limited to witnessing testing and spot-checking test results until the completed system is turned over to the US Navy.

2. NSWC Port Hueneme Division (NSWCPHD)

NSWCPHD fulfills the In-Service Engineering Agent (ISEA) function for the AEGIS program and provides an onsite representative to coordinate and schedule NSWCPHD related activities at SCSC. These include investigation of fleet Casualty Reports (CASREP), development and validation of maintenance documentation,

validation of equipment modification procedures, coordination with engineering activities to provide technical assistance, and other similar types of activities.

NSWCPHD is also responsible for executing Combat System Ship Qualification Trials (CSSQT) for new surface combatants and ships undergoing post-overhaul qualification testing. The CSSQT event for an individual ship is about an eight-week-long process that tests the ship in several different mission areas including Air Defense Warfare (ADW), Anti-Surface Warfare (ASUW), Electronic Warfare (EW), and Anti-Submarine Warfare (ASW). Major portions of east coast CSSQT events had been normally conducted at the Atlantic Fleet Weapons Test Facility (AFWTF). However, since its closure, CSSQT exercises have been performed at Wallops Island and other locations on the east coast and Gulf of Mexico.

3. Center for Surface Combat Systems (CSCS) and AEGIS Training & Readiness Center Detachment (ATRCD) Wallops Island

The CSCS/ATRCD trains officers and enlisted personnel in the knowledge and skills required to properly operate the AEGIS Combat System, utilizing the AEGIS Console Operators course of instruction and Combat Information Center Team Training events for both pre-commissioning and in service ships, and to develop, maintain and train all personnel in all aspects of the Embedded Training Systems.

Operator courses are broken into three AEGIS Console Operator Course (ACO) tracks. Pre-Commissioning Unit (PCU) team trainers, ACO Track II condensed Officer training, and the AEGIS Display System (ADS) course for Prospective Commanding and Executive Officers. Training saw a significant drop in 2003 compared to 2002. However, requirements are due to increase in 2004 and should continue to grow for the next several years.

F. SCSC PROJECT DEVELOPMENT SUPPORT

1. Cooperative Engagement Capability

The Cooperative Engagement Capability is a major component of the AEGIS & SSDS combat system and will be a major NCW component of the Navy's and

Department of Defense's FORCEnet architecture. SCSC's combat system capabilities have been a major contributor to successful CEC integration events such as the Hawkeye 2000, and could continue to support other CEC integrations efforts. In addition, the Tactical Component Network (TCN), an alternative to the current CEC network software, will provide additional support opportunities. SCSC should maintain and reinforce the lines of communication with the CEC Program Office and continue to support their initiatives. The CEC, Link 16, and Link 11 networks, coupled with our Distributed Engineering Plant (DEP) and live connectivity capabilities, can provide a high-fidelity test facility for supporting future NAVSEA 06 multi-site battle force interoperability test events. The recent success of the USS Nimitz (CVN 68) Action Team live multi-site interoperability test events are a key indication of our ability to continue to support the interoperability mission area.

2. Battle Force Interoperability Testing (BFIT)

In May 1998, NAVSEA was assigned the responsibility for addressing all issues required to resolve fleet interoperability problems. Out of this decision, the Distributed Engineering Plant (DEP) was developed as a test tool to enable the engineering community to test interoperability in a battle group environment utilizing land-based sites across the country. DEP description and locations are as follows:

> The DEP consists of several land-based test sites each providing one or more test platforms in the form of a complete combat system. The sites are dispersed throughout the country and are connected via a state-of-the-art secure networking system to create a virtual carrier-based battle force environment for testing combat systems interoperability and identifying the source of interoperability failures. Test sites use actual fleet hardware and tactical computer software loads to provide the Navy with a controllable, repeatable environment to detect, quantify, and verify resolution of battle force interoperability problems prior to deployment. ICSTD has participated in DEP test events since the DEP was established and has provided CVN, LHA, LHD, FFG and DD combat systems for interoperability testing. Other DEP test sites include: AEGIS Computer Center, NSWCDD, Dahlgren, VA; AEGIS Training and Readiness Center, NSWCDD, Dahlgren, VA; Surface Combat Systems Center, Wallops Island, VA; Space and Naval Warfare Systems Command, San Diego, CA; Combat Direction System Activity, Dam Neck, VA; Naval Air

Aircraft Division, Patuxent River, MD; Naval Air Warfare Division, Point Mugu, CA and China Lake, CA; DEP Operations Center, NSWCDD, Dahlgren, VA. (Intergrits, 2004)

Results of Battle Force Interoperability Tests (BFIT)/DEP tests are provided to the Battle Group in the form of a capabilities and limitations document describing problem areas within the Battle Group configuration and recommended approaches to get the most from the available ship resources. In addition to BFIT, NAVSEA sponsors Operational Advisory Group (OAG) Interoperability System Engineering Tests (ISET) to examine the root cause problems identified during previous BFIT's and Engineering Integration Events (EIE) to qualify new configuration items on the DEP. NAVSEA also maintains configuration management of the DEP elements and has established a master schedule for land-based test sites involved in DEP testing.

SCSC participates in BFIT testing at roughly five hundred test hours per year, develops test procedures, and provides a test team for all events. Only the AEGIS Facility has participated in BFIT testing to date, although the SSDS Facility has been qualified as a DEP node. Both the AEGIS Facility and SSDS Facility participate in other testing using DEP connectivity, principally CEC Independent Validation and Verification (IV&V) testing.

3. Combat System Ship Qualification Trials

Due to the AFWTF closure, the US Navy utilized SCSC shore and range facilities to conduct a joint, US and Spanish, Navy Combat System Ship Qualification Trial (CSSQT) for two AEGIS destroyers in July 2003. Navy CSSQT activities, as shown in Figure 35, have continued to be developed and planned since SCSC capabilities have become known as the AFWTF alternative for T&E Events. Future events at SCSC include CVN, AEGIS, LPD, and LHD surface combatants and Foreign Military Sales (FMS) tests including CSSQT events for two Spanish (F-101 class) and six Norwegian (F-310 class) AEGIS Frigates over the next six years.

G. NASA/WFF PROGRAMS

NASA/WFF is part of the Goddard Space Flight Center (GSFC), located in Greenbelt, Maryland. Goddard is made up of seven directorates dedicated to the study of earth science. The Sub-Orbital and Special Orbital Projects Directorate, located at WFF, is the only directorate located outside of Greenbelt. Wallops has several programs that support the study of earth science, including the Balloon Program that is currently developing a balloon that can support a heavy payload at altitudes up to 120,000 feet for 100 days, and the Sounding Rocket Program that plans to continue launching several rockets per year with a steady increase each year through 2008, at which time the number of launches should level off. In addition, NASA plans to test a new Hybrid (solid & liquid fuel) rocket that will provide a safe and cost-effective vehicle for accessing space.

In 1997, GSFC developed the Wallops Mission 2000 Implementation Plan. This plan was chartered by the NASA Administrator to address the impacts of the programmatic workforce restructuring affecting WFF, and provided strategies designed to ensure the continued relevance and alignment of WFF with NASA goals. These goals were identified in Mission 2005, which outlined environmental changes that have affected the existing WFF mission. These changes have included commercial launch activities that have not materialized and new opportunities, such as the expansion of Navy tenant programs at WFF as a result of a stronger emphasis on next-generation ship systems and ballistic missile defense.

The Range & Mission Management Office roadmap to the future provides a clear set of short-term and long-term goals and objectives that should put NASA WFF in the right position to provide increased opportunities for NASA and DoD research activities. Improvements to the Range Control Center and range surveillance capabilities could have a direct impact on SCSC if it continues to increase their capability to conduct Combat System Ship Qualification Trials (CSSQT) and MDA programs and initiatives.

NASA and SCSC have worked closely to strengthen the partnership that began with the signing of a Host Tenant Agreement in 1983 and a Partnership Agreement between NASA, the Navy and the Virginia Space Flight Center in 1998. Working together as a team will improve relationships with outside activities and provide increased

opportunities, test support infrastructure, and reduced costs for customers. (Wallops Flight Facility, 2004)

H. SCSC OPPORTUNITIES AND THREATS

The SCSC opportunities and threats outlined in Table 9 are for a command SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. The purpose is to

> Explore the environments outside the organization in order to identify the opportunities and threats the organization faces (and perhaps to identify key success factors. (Bryson 1995, 87)

All of the items listed represent the opportunities and threats that have been outlined in the Section VI: SCSC External Analysis. Although many more can be derived from this list, these may represent the items that could be the focal point for discussion during strategic planning and business planning meetings that may be held in the future.

OPPORTUNITIES	THREATS
SSDS MK2 Lifetime Support Engineering	Inadequate funding to operate SCSC (Operations)
SSDS MK2 Operational Training	Inadequate funding to operate SCSC
Multi-site BF Testing w/V24	SSDF may close in the future
Multi-site Battle Group Training	Fleet related tasking adversely affects current mission tasking
Long-term AEGIS CSSQT Support	DD(X) work goes to another site
FLEETEX/MISSILEX Air Defense Warfare Exercise support	SCSC forced to take on NASA/WFF infrastructure costs
Addtion of the NAVSEA Corona Detachment at Wallops Island	SCSC operations restricted because of NASA/WFF operations
Interoperability Test Bed	NMCI transition disrupts ability to operate
DD (X) Radar Development and Testing site	Use of land-based test facilities minimized or excluded in the future
DD (X) Combat System Test Site	NASA/WFF Master Plan does not allow enough space at the main base or on the island for future NAVY/SCSC
CEC/LINK 16 Training Node	NASA costs become prohibitive for Navy customers wanting to use the "Range"
BMD Test Support	SCSC families adversely affected by CNI claimancy transition
Navy UAV Integration Testing	
Baseline 7/1C-CR2 Development Testing	
System-of-Systems T&E Site	
Open Architecture Development Testing	
Expand SCSC AEGIS facility to provide for more people space – anticipating increasing requirements for combat system spaces by new systems	
Re-align SCSC organization structure to reflect new claimancy requirements	

Table 9. SCSC Opportunities and Threats

VII. RECOMMENDATIONS

A. OVERVIEW

The Surface Combat Systems Center, Wallops Island, Virginia began operations for the US Navy in 1985 when it opened as a testing facility for the AEGIS Combat System. Since that time, it has gone on to add a testing facility for the Ship Self Defense System (SSDS) and will soon add a new facility called the DD(X) Engineering Test Center. With it's growing "fleet" of assets, SCSC can replicate operations for virtually every Navy surface combatant and provide the operational facilities to support a large variety of testing programs for other US agencies and branches of the military. In many ways, the command has been silently growing among the many other naval combat system test facilities and test ranges throughout the US. This slow growth process may be the reason that other organizations are now realizing SCSC's potential and have said that it is one of the best-kept secrets in the Navy. In the beginning, the goal of the US Navy at Wallops Island was to provide AEGIS combat systems training, lifetime and in-service engineering support, that role, however, has changed significantly over the past twenty years. Like the US Navy today, the SCSC organization must take a step back and re-evaluate it's growth and business practices and make its own transformation roadmap based on a new goal. For SCSC, the new goal should be to move from being a land-based test site for research, development, test and evaluation of naval combat systems to becoming the US Navy's East Coast Weapons Range Facility or, otherwise named, the Wallops Island Test and Evaluation Range Facility (WITERF).

SCSC's growth has seen it develop from a remote site for testing a single combat system to being the most capable test site on the east coast that can host T&E operations for all surface combatants. The evolution of combat systems supported by SCSC from AEGIS to SSDS, and the planned DD(X), reflects the growth and requirements of the US Navy transformation policies as it moves to become more competitive while meeting the challenges of combat systems that have become more complex. SCSC's role in this scenario of growth and transformation can be enormous in the future and the opportunities that exist are not just beginning to show themselves--they are here now.

The time has come for SCSC to take its place as one of the premier land-based test sites in the US Navy. However, the culture of the way SCSC does business internally and externally must change in order for it to move ahead. For SCSC, these changes are grouped into three major areas:

1. NASA/WFF and SCSC: Working with NASA/WFF as an equal partner on Wallops Island.
2. Transformation: Transforming Current and Future T&E Capabilities at SCSC.
3. SCSC Planning Concepts: Improving Strategic and Business Planning Practices Within the Command.

B. NASA/WFF AND SCSC: WORKING WITH NASA/WFF AS AN EQUAL PARTNER ON WALLOPS ISLAND

As the host agency at Wallops Flight Facility, NASA's safety requirements and regulations are closely monitored and adhered to by SCSC to ensure that all customers are in compliance during the planning and execution of US Navy operations. Close coordination with NASA's financial office and range safety office is also required. One of the main reasons that US Navy operations are subject to NASA regulation is the R-6604 range area directly adjacent the beachfront on Wallops Island, as shown in Figure 33. NASA controls this OPAREA and in order for any live-fire launches to take place from Wallops or within this area, NASA range surveillance and range safety must be involved in the operation. Although NASA provides excellent support to Navy operations, future operations at WFF may be at risk due to increased costs and bureaucracy at the operations planning level.

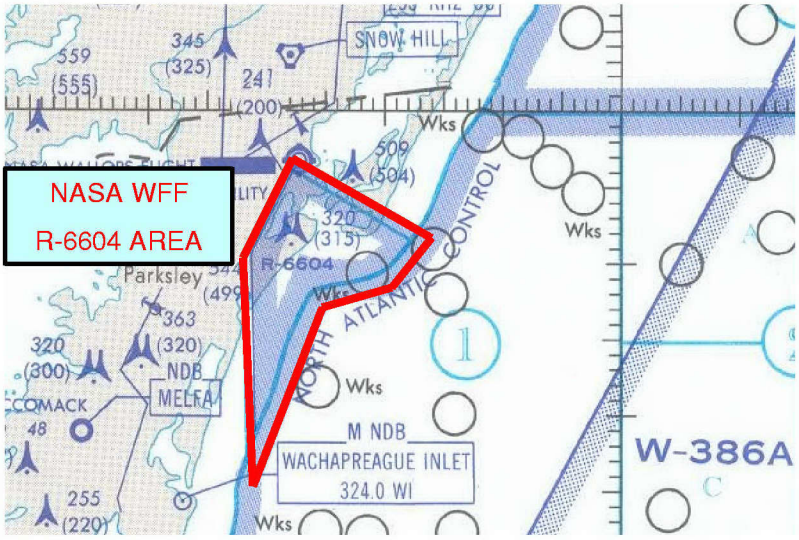


Figure 33. NASA Range Area R-6604 (From Ref. 94, 1)

1. Cost

Currently, the US Navy has a Host Tenant Agreement with NASA and pays for SCSC's share of the base operating expenses, the support of operations on Wallops Island and OPAREAs R-6604 and W-386, the Navy OPAREA. Although the cost for base operating expenses is passed on to the customer, it is the NASA operations support costs that are a prime concern for the future. For example, the cost of completing operations at Wallops Island is expensive compared to other maritime range facilities and these costs continue to rise. This past year, one customer found it more beneficial for the US Navy to pay the ship transit costs to the west coast and do a significant portion of their required exercises at Naval Western Test Range complex at Point Mugu, California than it was to conduct these events at Wallops Island.

2. Infrastructure

Although specific safety regulations and requirements are expected at any government facility, the lack of consistent communication from one event to another has given rise to some concern. Many Navy customers view the NASA chain of command for live-fire operations at the program- or project-manager level as counterproductive and feel that NASA really does not want the Navy business. The following examples are

provided to decrease the appearance of excessive the NASA management infrastructure when dealing with the Navy T&E community:

1. Limit the amount of meetings that are held for planning and ensure that they are not subject to cancellation at any time.
2. Limit the amount of documentation requirements beyond those absolutely necessary to carry out the operation safely and effectively, and the documents that may inhibit the completion of planning operations in a timely manner.
3. Ensure that the NASA personnel who work with the Navy T&E community are well versed in combat systems operations and are proactive when planning for test exercises, operations, and facility growth.

3. Future Growth

Over the past three years, SCSC has experienced increased growth with the addition of new AEGIS and SSDS combat systems, the Multi Function Radar (MFR) facility and the first multi-national Combat System Ship Qualification Trial (CSSQT) exercise. Many of the Navy activities associated with this growth required daily interaction with NASA personnel that was extensive and time consuming. The following examples are provided to illustrate some of the obstacles that may impede future growth for SCSC.

a. Facility Site Selection

The NASA/WFF Master Plan that is based on the development of a commercial spaceport drives the site selection for new US Navy facilities on Wallops Island. Not unlike other DoD test sites, the risk of future encroachment and development is a dynamic that drives NASA to control the growth of SCSC. For example, the DD(X) site was changed numerous times over a period of fourteen months and, when the location was finally decided, it was in a low-lying area that needed vast improvement before any construction could take place.

b. Range Activities

One of the problems associated with T&E exercises and ranges activities at Wallops Island is that NASA/WFF does not utilize the radar systems and link infrastructures between the SCSC combat system facilities and ships at sea. In addition, it does not recognize US Navy safety standards and documentation for range safety and surveillance that is used at all DoD ranges throughout the world. For example, the first multinational CSSQT exercise at Wallops Island in 2003 was very successful. However, the planning process and considerations experienced by Navy participants with NASA/WFF personnel and policies were viewed as very frustrating due to inexperience and the redundancy involved with range safety and surveillance processes.

c. Future Growth Comments

During the planning of the MFR and DD(X) facilities and the planning of the CSSQT, the SCSC Director had to request that the NASA Director/Senior Manager of Wallops Flight Facility intervene on behalf of SCSC when it became apparent that that NASA personnel assigned to these tasks would not provide clear direction in order for the projects to proceed on schedule. For its part, SCSC understands that the range belongs to NASA/WFF and that the US Navy needs to learn and understand how to do business at Wallops Island. However, the prospect of developing a range capability separate from NASA should be explored in order to reduce the costs to the Navy customers and provide SCSC with an avenue to control its own ranges activities. At a minimum, the growth for SCSC and its partnership with NASA/WFF should require that business processes for range activities should be identified and adhered to in the future.

3. NASA Scenarios

The future growth and success of the SCSC is literally in the control of the NASA/WFF. It is in the best interest of both entities to co-exist for the common good. However, from a business standpoint, SCSC may never reach its full potential as a LBTS or independent test range for the US Navy as long as daily operations and future growth are dictated by one over the other, as is the case of NASA/WFF over SCSC. With this in

mind, three potential alternatives currently exist that address business operations between NASA/WFF and SCSC. They are as follows:

a. NASA Base and Range Activities

NASA continues to control the base facilities and range activities. The US Navy will continue to do business with NASA as they have since 1985.

1. Funding: SCSC will continue to operate as a mission-funded activity within the PEO/IWS organization.
2. Land-Use: NASA will remain the primary landowner under the Host Tenant Agreement.
3. Operations: All naval live-fire operations where targets originate from Wallops Island will be controlled by NASA regulations.
4. Future Growth: The future growth of all facility and range operations will be dictated by NASA Strategic Planning guidelines.

b. NASA Base and Shard Range Activities with SCSC

NASA continues to control the base facilities. The US Navy and NASA will each have free access to the open range adjacent to Wallops Island.

1. Funding: SCSC will continue to operate as a mission-funded activity within the PEO/IWS organization.
2. Land-Use: NASA will remain the primary landowner under the Host Tenant Agreement.
3. Operations: All naval live-fire operations will be controlled by SCSC using US Navy regulations. Operations and launch services will be coordinated with NASA on an as-needed basis.
4. Future Growth: The future growth of all facility and range operations will be dictated by NASA Strategic Planning guidelines.

c. Chincoteague Naval Air Station/Wallops Island Test & Evaluation Range Facility and NASA Wallops Flight Facility

The US Navy will develop a long-term strategy to annex all or part of the NASA facility and re-establish the Chincoteague Naval Air Station/Wallops Island Test & Evaluation Range Facility as a US Navy shore installation should NASA diminish support for operations at the Wallops Flight Facility.

1. Funding: SCSC will become a fully funded, Naval Surface Warfare Center, CNI activity, and a Major Range and Test Facility Base (MRTFB).
2. Land-Use: Chincoteague Naval Air station and NASA will co-exist on the mainland and on Wallops Island. The airfield and other base facilities will fall under the management of the US Navy with NASA operations being covered under a Joint Usage Agreement.
3. Operations: The US Navy will coordinate all operations and launch services.
4. Future Growth: The future growth of all facility and range operations will be outlined in a joint US Navy and NASA Strategic Plan.

C. TRANSFORMATION: TRANSFORMING CURRENT AND FUTURE T&E CAPABILITIES AT SCSC

Although SCSC is one of the prime LBTS for US Navy T&E activities, the NAVSEA T&E office: SEA 62T, does not recognize the SCSC command on its official web page. Under the heading, "Where We Test", the SCSC command is classified as follows:

> Wallops Flight Facility, Wallops Island, Virginia
> Established in 1945 under NASA`s predecessor, the National Advisory Committee for Aeronautics (NACA), Wallops Flight Facility—one of the oldest launch sites in the world—is located on the Virginia Eastern Shore. Our support of scientific research and orbital and sub-orbital payloads places us at the center of NASA`s space and Earth sciences. (NAVSEA (SEA 62T): Where We Test, 2004, 1)

This example serves to illustrate the fact that SCSC needs to change not only how others view the command, but also how the command views itself, so that it can evolve with Department of Defense transformation policies and the complex technology associated with the US Navy's combat systems and ships. The transformation of SCSC is echoed in General Richard B. Myers, Chairman, Joint Chiefs of Staff article, "Understanding Transformation" which states,

> Transformation is a process and a mind-set. Adopting a transformational mind-set means applying current fielded capabilities—in the current environment—to accomplish any assigned mission. In today's dynamic

> world, no armed service's core competencies can accomplish the mission alone. Transformation unites unique service capabilities into a seamless joint framework to accomplish the joint force commander's objectives.
> To achieve transformation, the war fighters must understand its intellectual, cultural, and technological elements. The most important breakthroughs will take place between the ears of war fighters and planners. Soldiers, sailors, airmen, Marines, Coast Guardsmen, and Department of Defense civilians must know their units' technical and operational capabilities. Joint leaders must comprehend the joint force commander's intent and adapt their capabilities—sometimes in an unanticipated environment—to fulfill that intent. They must understand the probable employment of their unit and appreciate its possible employment. In some cases, transformation may mean reaching beyond doctrine—because doctrine may not have described the specific scenario faced by the war fighter. As a result, transformation involves taking operational risks. (Myers, 2003, 3)

The following recommendations for transforming SCSC's capabilities are based on General Myers three fundamental elements of transformation, including intellectual, cultural, and technological.

1. Intellectual

The first step in transformation is the intellectual element that keys in on the personnel associated with the SCSC command. In order for these personnel to be intellectually secure they need to know their mission or who they are; their organization and what their job is within that organization; and lastly, their responsibilities or what is expected of them.

For many years, SCSC has operated its business "under the radar", which may have been good for the command during its initial growth period when no one in the armed services could identify, or question, the command capabilities and limitations. Because of this growth outside the mainstream, the command personnel may not have the experience or the intellectual growth associated with similar organizations (cultures) and therefore, it may have inhibited the inclusion of new technologies and ideas. In many ways, NAVSEA's attitude toward SCSC, as shown on its web site, is indicative of how the command is viewed in Washington, DC and by other naval commands. Conversely, many of the personnel who are employed at SCSC have never worked or visited other naval commands for any extended period of time.

The primary mission of SCSC is to provide integrated warfare system services in a maritime environment for the acquisition and T&E communities by focusing on fleet operations, engineering, research, development, testing, and training. One of the primary objectives of the SCSC command should be to increase the knowledge of its own personnel by focusing on their learning about the T&E community, other land-based test sites, and the assets that currently exist at the command.

For example, the AEGIS, SSDS, and soon, DD(X) facilities at Wallops Island will represent virtually every surface combatant in the US Navy. Of these three, the AEGIS combat system, which has been in existence over the last 23 years, has been at the cutting edge of developing system test and certification efforts. The certification efforts that were used for AEGIS now have a direct bearing on SSDS and DD(X) combat systems and how they will be tested and certified. Many of the test and certification efforts for these systems were set up and completed by personnel who thought "outside of the box" to make things happen for testing events such as a Battle Group exercise that involves ships, facilities, and personnel from across the country. SCSC is fortunate to have talented personnel on-site who can make the impossible a reality by making problems disappear during a scheduled event. However, although these same personnel know how to make a test event happen, they have no idea what direction the command is going as it moves toward developing its transformation goals. On the other hand, it is the command that is at a loss, because it does not utilize the intellectual assets of the technical personnel it possesses to develop these goals.

The idea of being intellectually secure at the command can only be achieved in three ways:

1. Breaking down the hierarchy that limits the flow of information between management and the technical personnel on-site and by flattening out the organizational structure.
2. By personnel sharing their knowledge of the AEGIS, SSDS, and DD(X) facilities and combat systems among each other during planning sessions for the renovation of existing facilities, the construction of new facilities, and combat systems T&E operations.

3. By the command leadership sharing their vision for the long-term prospects of the facilities and the command as a whole.

2. Cultural

The second step in transformation is the cultural element that focuses on the leadership personnel within the SCSC command. In order for the SCSC command to expand its cultural boundaries, it needs to address the internal and external stovepipe approach to management that has been part of the SCSC culture since its inception. This stovepipe approach to management is most evident internally within the DoD civilian organization and between the prime contractors associated with "Team SCSC: Lockheed Martin and Northrop Grumman".

The organization has undergone a shift from the "old" to "new" leadership within the past several years. The "old " represented leadership that had been in place since the command was established and has been associated with the government workforce that did not hire new personnel for many years. In many respects, this leadership was the antithesis of the transformation movement that exists today and the vacuum it created still lingers. In the opinion of many of the engineering staff currently on station, the old management did not like any of their personnel to "rock the boat" with new ideas that questioned the operating culture. The environment embraced a government bureaucracy of procedures and techniques that reinforced known quantities, familiar faces, and strict hierarchical structure. The "new" leadership has recognized the need to embrace new concepts, to break down barriers, to change within the command, and to encourage innovation within the workforce.

For example, SCSC now has the fortune to be at the right place, at the right time, with the right assets to take advantage of opportunities that exist due to the closure of AFWTF and the establishment of a requirement for the DD(X) Engineering Test Center (ETC) at SCSC. The building of the DD(X) ETC has the potential to bring about the biggest changes due to the addition of new technology and the increase in visibility of SCSC among Navy senior leaders. The visibility could not help but have a positive effect on the SCSC culture because the SCSC DD(X) Team of government and contractor

personnel who were involved in bringing the project to SCSC were allowed to act autonomously with senior leaders outside of the SCSC command from the very beginning. The SCSC command leadership had to trust their subordinates to accomplish the mission, and assumed the risk of letting them do their job. This success was based on the fact that they (management and staff) trusted each other's judgment and experience, and as result, the mission was successfully accomplished. Because of this trust, SCSC will now field a third land-based test facility that will house the next generation radar for a new ship class.

The SCSC command leadership needs to build on the DD(X) success by enabling other members of the SCSC engineering and technical staff personnel to learn how the DD(X) Team was able to bridge the gaps between government and contractor personnel. The issue of equal accountability exemplifies one of the best examples of how the team came into being. From the beginning, the team felt that it had to work together and eliminate the disparity between these two groups. The team operated on the following doctrine:

1. The amount of hours that were spent working program issues were shared and distributed equally. Everyone worked overtime to complete assigned tasks.
2. The project responsibilities were shared and distributed to ensure that the work was completed as directed and in a timely manner. A team effort was used to define and resolve all issues.
3. The team members felt confident in each other's ability to represent the command at any meeting on and off site.
4. The government program manager had the final decision on all matters that were recommended by the team.
5. The team members were highly motivated to see the project succeed.

When SCSC forms a team of government and contractor personnel who feel that they are equally responsible and held accountable for their work and actions, it has the

power to transform the culture of the command, fueling the desire to lead and perform future engineering and operational challenge in a similar fashion.

3. Technological

The third step in transformation is the technological element that keys in on the infrastructure associated with the SCSC command, internally and externally.

a. Internal Technological Elements

The internal technological capabilities of SCSC are based on its facilities that are located in a maritime environment on a base that is shared with NASA facilities. Although there are many potential topics for this discussion, only two items regarding this internal infrastructure will be discussed: the electrical power quality to the buildings and combat systems and the local area network (LAN) that provides the communications between the facilities and other commands outside of SCSC. The internal power and the LAN systems infrastructure were never intended to handle the amount of growth that has occurred at the command aver the past twenty years. Because these systems were not properly laid out with the future in mind, the command has seen its power and LAN systems grow in a piecemeal fashion during the construction of one facility after another, and with the introduction of additional combat systems. The following examples are provided to highlight infrastructure problems that are currently experienced at SCSC.

Electrical Power Quality: The power quality at the AEGIS Facility is a problem that seriously affects the ability of SCSC to perform its mission of providing a stable platform capable of sustaining AEGIS combat system operations and testing. At the command, power failures are a fact of life and continue to impact or delay operations and test events in the form of power outages, voltage dips, transients, and harmonics. All SCSC facilities are provided power through the NASA power grid on Wallops Island, which has been the subject of many power outages due to breaks in the grid. For example, during a Battle Group exercise, the SPY-1A experienced a power failure prior to the exercise. The repair time required ran into the exercise, however, it did not affect the operation due to the outstanding efforts of the on-site personnel who were able to bring the combat systems back on-line in time to support the event. If the same failure

were to occur while an actual Battle Group exercise was underway (a live-fire event), the operation would have to be cancelled or delayed in order to facilitate the necessary repairs. The results of this type of cancellation would have a profound effect on ships at sea and personnel ashore. The problem of providing clean power to the SCSC facilities has been an ongoing issue for many years. Although SCSC has completed several studies with conclusions and recommendations that included providing the equipment that could possibly reduce and hopefully eliminate power problems in the future including a freestanding 500 kV Motor Generator or a Uninterrupted Power Source (UPS), they were never funded or implemented.

Telecommunications Network: The fiber optic and copper telecommunications network at SCSC is another example of a critical asset that is shared by SCSC and NASA, with NASA having a leading role in managing the backbone that exists between the SCSC facilities. Although the backbone of this network is in an operational state, the degree of readiness for future growth needs to be addressed as new projects being brought to SCSC are relying more and more on fiber optic capability. The introduction of these new fiber optic networks depends on SCSC knowing its current configuration and plans for future growth. The degree of work needed to bring the SCSC network up to an industry standard of readiness may be extensive. For example, there are currently two main fiber optic cable trunks that connect the island facilities to the main base facilities. It was a known fact that one of the trunks was laid out across the marshland and waterways surrounding the island and that there was a risk of a break occurring. The fears were realized when a local commercial fisherman snagged the line and broke the cable to clear his fishing gear. The resulting loss of time to repair the line inhibited communications, however, the implications that were highlighted by this occurrence could not be measured. The problems associated with having a telecommunications network that is subject to being damaged at a moments notice is a SCSC infrastructure item that should be addressed in order to avoid greater problems in the future.

b. External Technological Elements

The external technological elements that made SCSC the place to test combat systems have been driven by the need of the US Navy to have a location to

complete testing in a maritime environment. Because of this need, the AEGIS, SSDS, and DD(X) programs selected SCSC for their base of operations, which have continued to gain precedence due to the closure of AFWTF and increased encroachment around other LBTS. For SCSC, it seems that opportunities in the future will only be limited by the amount of space required to house newer, state-of-the-art facilities and combat systems. SCSC is well positioned to take on new projects and programs that currently exist outside of the command, including the following examples.

Combat System Ship Qualification Trial (CSSQT) Operations: SCSC needs to continue to develop and evaluate lessons learned from the DDG 87 and Spanish F101 combined CSSQT that was held in 2003 in the VACAPES OPAREA and supported by SCSC. The goal of this effort should be to continue the working-group-level meetings that will provide constructive recommendations on range infrastructure improvements and to gain an OPNAV resource sponsor to invest in a future CSSQT operations office at SCSC. By acting as the host for upcoming Foreign Military Sales (FMS) CSSQT's, future customers will demand the same quality of work that their US counterparts demand and still have their independent FMS capabilities safeguarded. Providing complete CSSQT coverage that ranges from target services to data analysis, SCSC can demonstrate a capability that exists nowhere else in the world. SCSC should consider foreign and domestic CSSQT programs as one of the primary business ventures to pursue and develop.

East Coast Range Working Group (ECRWG): The ECRWG study by NAVSEA recommended that SCSC is the best candidate to replace AFWTF operations on the east coast. Recently, NAVSEA recommended that SCSC should take on a leadership role in the ECRWG based on its assets, location, and ownership that it can provide as the best choice for range activities in the future. SCSC can embrace this challenge by providing the leadership needed to guide the group as it moves forward to develop and exploit the range capabilities of individual LBTS's along the east coast and Gulf of Mexico.

Data Extraction/Data Reduction (DX/DR) Capability: SCSC should continue to establish the permanent Data Reduction/Data Extraction capability by

supporting the NAVSEA Corona personnel who are currently slated to begin operations at SCSC later this year. The acquisition of a missile telemetry read station from Oceana Naval Air Station, Virginia in 2004 and the future acquisition of Ku band transmitters in 2005 will make SCSC the only LBTS on the east coast with these capabilities.

D. SCSC PLANNING CONCEPTS: IMPROVING STRATEGIC AND BUSINESS PLANNING PRACTICES WITHIN THE COMMAND

SCSC strategic and business planning concepts have been an ongoing concern for the command since it first opened in 1985. The course of this research uncovered many methods for an organization to complete strategic and business planning, outlined many methods and plans that failed, and showed that strategic and business planning is not a goal to be reached but, similar to the US Navy's transformation, is a process and mind-set to be followed and embraced by command personnel. The good news is that SCSC is on the right track due to the personnel who understand the importance of change in an organization and how it will affect the future. Many of the products that were uncovered in this research clearly showed that work was being done. However, the main problems encountered showed that the implementation of many of these concepts were not carried out to the end.

The following items are provided to highlight several of the changes that could enable SCSC to reach its goal of becoming a test and evaluation range facility.

1. Improve the Strategic Planning Model

SCSC's existing model for strategic planning is designed as a singular method to address all of the issues and goals defined by the planning team. Currently, SCSC has two Strategic Goals for many, many issues. Instead, SCSC should try to address each issue separately and attack it in a manner that is not defined to one goal. By doing this, the command may find that the goal it wants to reach may be the real issue after all.

2. Call in the Troops

One of the best ways for SCSC to improve its processes would be by involving staff personnel from the bottom up to participate in the development of the strategic and

business planning products. The effect will be that the command as a whole will change its mindset and "think" strategically. By having input into these planning products, the increased buy-in should, or will, increase the motivation to succeed, create a new sense of ownership, and provide a conduit to identify "crisis management" choke points in the command engineering process.

3. Make it Part of the Job Description

At SCSC, strategic planning is viewed as a side job for the senior engineering staff who are already over tasked with management duties. Normally, strategic planning is a job for the company business office to direct, with input provided by the engineering and technical staff that is heavily involved with the work on-site. Many of these personnel would welcome the chance to provide input for future plans that would ultimately affect their jobs and careers. However, many of them have never seen the end-product of the strategic and business sessions that take place at the command. SCSC should seek their input when defining the strategic planning issues that affect their jobs and the command.

4. Increase the Knowledge

The lack of subject knowledge by the Strategic and Business Planning Teams assigned to action items is a by-product of the top-down approach to strategic planning. Simply put, engineers and technicians do not understand business, and conversely, business personnel do not understand engineering. Strategic and business planning has everything to do with business. In many cases at SCSC, the existing paradigm is that the senior engineering staff does not effectively communicate with the engineering, technician, and business staff who are involved on a daily basis with the work at hand. This lack of communication and knowledge has led to re-engineering of several projects, hinders the ability to plan new projects, and has led to the recycling of strategic planning and business plan development. The SCSC staff needs to get in touch with what is happening on the site, in the facilities, and with its personnel instead of leading and directing from afar.

5. Implement the Changes

SCSC has the mind and the will to investigate the strategic and business planning that need to take place to improve the command. In the past, the Strategic and Business Planning Teams' idea of making a plan to make a plan in the future cannot be conducive to any organization achieving its strategic planning goals. If the business-planning group states that it should prepare a business plan in six months, it should stick to that goal and implement the processes that need to be done to complete that goal.

6. Closing Comments for Planning Concepts

The idea of strategic and business planning is not new and the suggestions offered in this research are designed to assist the teams with their research, their agendas, and their knowledge of SCSC and its place in the T&E community. For these planning agendas to succeed, SCSC needs to do the following:

1. Break down the barriers among its own personnel so that they can freely exchange ideas and information.
2. Seek and welcome new ideas for planning from outside organizations.
3. Ensure that personnel can speak up regarding unresolved issues without fear of retribution. Their ideas need to heard and heeded so that the issues can be resolved.
4. The command needs to get more "buy-in" from its leaders to implement the changes that are required.
5. Strategic and business planning processes must be implemented in order for them to succeed.

By implementing some of these changes, SCSC can then write its own success story as an example of how the US Navy transformation process took hold and prospered at a small LBTS that started out "under the radar".

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VIII. CONCLUSIONS

SCSC stands on the brink of becoming one of the premier test sites in the US Navy. This is primarily due to its east coast location in a maritime environment and because of the assets it currently possesses and the ones it will possess in the future. In order to meet this challenge, SCSC must take steps to prepare the planning concepts it needs to sustain, develop, and test complex naval combat systems that will have a far-reaching effect on the command and the US Navy well into the future.

This research examined SCSC's strategic and business planning capabilities and found that a specific analysis of existing US Navy T&E practices, facilities, and ranges and a basic internal and external analysis of the SCSC organization and its planning practices does not currently exist. This examination is designed to fill that need by providing a comprehensive document that can be used to educate the SCSC personnel about their command and other US Navy organizations that have similar capabilities. It also provides material the SCSC organization can utilize to prepare new strategic and business planning documents for the command. This research answered the following questions:

1. Wallops Island Test and Evaluation Range Facility (WITERF): This research was designed to establish and define a new goal that would be used to transform SCSC's current role as a LBTS for research, development, test and evaluation of naval combat systems into the US Navy's East Coast Weapons Range Facility or, otherwise named, the Wallops Island Test and Evaluation Range Facility (WITERF). The establishment of this goal is the central theme of this thesis as shown in detail in Section IV: Analysis of Selected US Navy Land-Based Test Sites. In addition, this study was geared to show the command that this goal could only be achieved by examining, defining, and focusing on new strategic and business planning criteria.

2. SCSC Strategic Planning: This research examined the history of SCSC's strategic planning processes and provided new insight and concepts for the preparation of strategic planning documentation. These

items were covered and discussed in Section II: SCSC Strategic Planning and were designed to give the SCSC planning teams a review of "lessons learned" from previous strategic planning efforts at the command.

3. SCSC Internal and External Analysis: This examination was designed to provide the background information needed to form an internal and external analysis of the SCSC command and organization. A complete assessment is provided in Section V: SCSC Internal Analysis and Section VI: SCSC External Analysis. These sections contain a comprehensive review of the combat system capabilities at SCSC and the planning options that are currently being implemented by the US Navy transformation process, including Sea Power 21 and how they can and will affect the command in the future.

4. US Navy T&E Practices and Facilities Analysis: The research provided is intended to educate SCSC planning personnel about naval command capabilities that are available to support the T&E of multiple-ship-class operations at other sites. These items were provided in detail in Section III: Analysis of US Navy T&E Practices and Facilities Analysis and serve to act as a reference for personnel to utilize when comparing and contrasting the capabilities of SCSC during the planning and decision-making processes.

During the course of this research it became apparent that the scope of the project was very large and that the topics that were covered could become individual thesis topics in there own right. The original objective of providing a case analysis of existing US Navy testing and evaluation practices, facilities, and ranges, and a basic internal and external analysis of the SCSC organization and its planning practices, was achieved by combining existing information that was available from various resources. The contributions that this thesis has to offer include the following items:

1. The SCSC goal of re-establishing the command as full-fledged naval command under the name of the Wallops Island Test and Evaluation

Range Facility (WITERF) is now a viable option that exists in print. The East Coast Range Working Group provided a study that pointed to SCSC, Wallops Island as being the best option to complete naval T&E operations. However, no goals were assigned to provide a catalyst to pursue this option. This research provides that catalyst and matches it to a name that can be used to reach that goal.

2. The SCSC planning teams now have the basic information needed to define, develop, and prepare the SCSC Internal and External Analysis section for the SCSC Strategic Plan and SCSC Business Plan. These items did not previously exist and are intended to provide a complete, comprehensive product for their use by the SCSC command.

3. Finally, this research provided the background information that is needed to ask the hard business questions associated with the SCSC command and its business partners. Many of the points covered in this thesis did not exist until now in a stand-alone volume of work that could reference items inside and outside the command. These items can now be addressed as recommendations in Section VII and argued effectively by referencing back to this document.

The planning concepts that SCSC adopts and utilizes to sustain, develop, and test complex naval combat systems will have far-reaching effects on the command and the US Navy well into the future. Therefore, it is the responsibility of the senior leadership at SCSC to ensure that the personnel, facilities, and combat systems it is charged with overseeing and maintaining today, are not left unprepared to meet the challenges of tomorrow.

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IX. SUGGESTED TOPICS FOR FUTURE RESEARCH

This research was conducted to provide the SCSC senior leadership team products it would need to prepare the internal and external analysis of the SCSC command, both of which are critical for the organization to develop its strategic plan and business plan. In addition, a review of the test and evaluation community and the land-based test sites was also provided. The goal of presenting these items was to provide the SCSC command personnel with a complete view of the T&E community and its mission, the locations where it conducts business, and a snapshot of the many attributes associated with the SCSC command. It is apparent that the planning concepts and doctrine at SCSC need to be researched and developed even further by considering the following topics for further review.

1. Examine other strategic planning methods that may provide a more flexible means to quantify and qualify planning issues. A singular, strategic planning method that is utilized in the planning process should not be forced on a group of specific issues in order to resolve them. Instead, SCSC should consider investigating and procuring planning methods that can be tailored for each individual issue for resolution.

2. Reassess the documentation that has been gathered at the command over the past twenty years and build a library that makes the retrieval of old and new information easily accessible. In the course of this research it became apparent that strategic and business planning information that has been prepared over the years has been stored improperly in the command library and on the database network. Many of the documents were redundant in nature and stored under several different headings and locations. A standardized method for organization and storage in a centralized location would enable the planning teams to have access to a wide range of information from the old to the new.

3. Analyze the lessons learned from previous projects and prepare documentation that can be utilized for the development of the

requirements definition phase of new projects and programs. Many of the items that are being analyzed as strategic and business planning issues have been the subject of project engineering and programs that have taken place at SCSC in the past. By creating and implementing the use of documentation that is the subject of lessons learned, new insight can be gained as to how to deal with new issues that are similar in nature to projects and programs that were previously completed at the command.

4. Analyze the options that are needed to increase the command presence as the east coast range facility for naval T&E operations and train and operate a tiger team that can deal specifically with developing SCSC range activities. The command is ideally suited to expand its role and the best way for SCSC to defend its position in the future as a viable land-based test site or premier test and evaluation range facility is to attack the options that currently exist on the table in the T&E community and expand its presence accordingly.

LIST OF REFERENCES

1. Abell, B. (2004, March 23). SPY-1D(V) Deckhouse Renovation & Installation Plan. *Presentation to SCSC Command* (pp. 1-62). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

2. *Aberdeen Test Center*. (2004). Retrieved August 2, 2004, from http://www.atc.army.mil/visitor/index.shtml

3. Anechoic Chamber Picture. (2004). Courtesy of Lockheed Martin Public Relations Department, Moorestown, NJ. Permission granted by Marilyn Bidrawn, Manager, Communication Services (marilyn.h.bidrawn@lmco.com). (856-722-6642).

4. *Atlantic Fleet Weapons Training Facility (AFWTF)*. (2003, December 1). Retrieved August 6, 2004, from http://www.globalsecurity.org/military/facility/afwtf.htm

5. *Atlantic Undersea Test and Evaluation Center (AUTEC)*. (2004, September 6). Retrieved August 6, 2004, from http://www.npt.nuwc.navy.mil/autec/

6. Axiotis, G. (2004, January). East Coast Range Working Group Long Range T&E Resources Study, Study Findings and Recommendations. *Presentation to NAVSEA/PEO Managers*. pp. 1-23. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

7. Baker Jr., F.E. & Monteith, G.E. (2002). The Distributed Engineering Plant, Lynchpin of Battle Force Interoperability [Electronic Version]. *Seapower Magazine*. Retrieved August 4, 2004, from http://www.navyleague.org/seapower/distributed_engineering_plant.htm

8. Bengston, A. (1995). Strategic Planning: A Comparison Methodology. *Masters Degree Technical Report to American Military University* (p. 1-16). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

9. Bodmer, Gerald A. (2003). Test and Evaluation in the United States Navy, and How it Must Evolve to Support Future Systems Acquisitions (Master's Thesis, Naval Postgraduate School).

10. Bryson, J.M. (1995). *Strategic Planning for Public and Non-Profit Organizations*. New York: Jossey-Bass.

11. *Carderock*. (2002, March 2). Retrieved August 6, 2004, from http://www.globalsecurity.org/military/facility/carderock.htm

12. *China Lake*. (2004, May 26). Retrieved August 2, 2004, from http://www.globalsecurity.org/military/facility/china-lake.htm

13. Clark, V. ADMR. (2000a, July). *Chief of Naval Operations Top Five Priorities*. Retrieved August 2004, from http://www.chinfo.navy.mil/navpalib/cno/cno-top5.html

14. Clark, V. ADMR. (2002b, October). *Sea Power 21 Official CNO Brief* (pp. 1-31). Retrieved September 12, 2004, from Navy League Web site Press Room, under Sea Power 21: http://www.navyleague.org/public_relations/press_room.php

15. Clark, V. ADMR. (2002c, October). Sea Power 21: Projecting Decisive Joint Capabilities [Electronic Version]. *Proceedings*. 128(10). Retrieved September 12, 2004, from http://www.chinfo.navy.mil/navpalib/cno/proceedings.html

16. *Cooperative Engagement Capability*. (2000, February 16). Retrieved August 6, 2004, from http://www.fas.org/man/dod-101/sys/ship/weaps/cec.htm

17. Couto, T. (2004, May). SCSC Infrastructure. *Brief to Mr. G. Kamilakis, PEO-IWS5B2D* (pp. 1-22). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

18. Cress, S. (2004, 14 May). Dahlgren at SCSC. *Presentation to SCSC Command* (pp. 1-21). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

19. *Dahlgren*. (2002, May 14). Retrieved August 2, 2004, from http://www.globalsecurity.org/military/facility/dahlgren.htm

20. *Department of Homeland Security*. (2004). Retrieved September 12, 2004, from http://www.whitehouse.gov/omb/budget/fy2005/defense.html

21. DeVincent, N., & Bennett, B. (2001). *Images of America-Wallops Island*. South Carolina: Arcadia Publishing.

22. *DD(X)*. (2004, August 18). Retrieved September 11, 2004, from http://www.globalsecurity.org/military/systems/ship/dd-x.htm

23. *DD(X) Ship Picture*. (2004, August 14). Retrieved August 2004, from http://www.globalsecurity.org/military/systems/ship/dd-x-pics.htm

24. Director, Force Transformation, Office of the Secretary of Defense. (2003). *Network Centric Warfare: Creating a Decisive Warfighting Advantage*. Retrieved September 11, 2004, from http://www.oft.osd.mil/library/library_files/document_318_NCW_GateFold-Pages.pdf

25. DoD Resource Center. (2004, April 6). *Directive 5000.1: The Defense Acquisition System* and *DoD Instruction 5000.2: Operation of the Defense Acquisition System*. Retrieved August 2004, from http://dod5000.dau.mil/DoD5000Interactive/DoDDirective5000.asp

26. DoN/NAVSEA 62T. (2003, December). *East Coast Range Working Group Long Range T&E Resources Study & Appendices*. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

27. Eastern Shore of Virginia Network. *Geographic Index of Local Businesses*. Retrieved, August 4, 2004, from http://www.esva.net/geodex.cgi

28. Eaton, J. (2004, July 28). Wallops Island Range Capabilities and Potential. *Presentation* (pp. 1-24). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

29. Fahrenthold, D.A. (2004, July 18). MD Development Affects DE Traffic [Electronic Version]. *The Washington Post*. Retrieved September 11, 2004, from http://www.delawareonline.com/newsjournal/local/2004/07/18mddevelopmentaf.html

30. *FORACS*. (2003, October 2). Retrieved August 6, 2004, from http://www.nato.int/related/foracs/admin.htm

31. Fredrickson, J.W. (1983). Strategic Process Research: Questions and Recommendations. *Academy of Management Review*, 8(4), 565-575.

33. Gallagher, M. (2001, April). Compatible Economic Development on Virginia's Eastern Shore. *Shoreline*, 14. Retrieved September 11, 2004 from http://www.cbes.org/SL%20Economic%20Dev%20on%20ES.html

34. Gallet, M.,CDR. (1999, June 28). Netted Air Defense Opeval Strategy. *Presentation for CEC Techeval/Opeval Schedule* (pp. 1-18). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

35. GAO/GGD-97-109. (1997, June). *The Government Performance and Results Act: 1997 Governmentwide Implementation Will be Uneven*. Washington, DC: U.S. Government Accounting Office.

36. Groszyk, W. (1995). *Implementation of the Government Performance and Results Act of 1993*. Paper prepared for a November 1995 meeting of national experts on performance measurement convened by the Organization of Economic Cooperation and Development. Washington, DC: Office of Management and Budget. Retrieved August 6, 2004, from http://govinfo.library.unt.edu/npr/library/omb/gpra.html

37. Hamilton, C. RADMR & Loren, D., RADMR. (2002, August). It's All in the Family [Electronic Version]. *Proceedings*. 128(8). Retrieved September 12, 2004, from http://www.military.com/NewContent/0,13190,NI_Family,00.html

39. Integrits Corporation. *PHD NSWC Detachment San Diego Receives Award for Outstanding DEP Test Site,* Retrieved August 2004, from http://www.integrits.com/events.htm

40. *Major Range and Test Facility Base*. (2002, May 14). Retrieved August 6, 2004 from http://www.globalsecurity.org/military/facility/mrtfb.htm

41. Miller, M. (2004, January). A Home of One's Own An American Dream for the Eastern Shore. *Shoreline*, 17. Retrieved September 11, 2004 from http://www.cbes.org/SL%20Economic%20Dev%20on%20ES.html

42. Mintzberg, H. (1994). *The Rise and Fall of Strategic Planning*. New York: The Free Press.

44. Myers, R.B., GEN. (2003, October). Understanding Transformation [Electronic Version]. *Proceedings*. 129(2). Retrieved September 13, 2004, from http://www.military.com/NewContent/0,13190,NI_Transformation_0203,00.html

45. Nagle, D. (2002, May 17). Naval Fires Network: The Transformation of Naval Warfare. *Navy Newsstand*. Retrieved September 12, 2004, from http://www.news.navy.mil/search/display.asp?story_id=1709

46. *National UUV Test & Evaluation Center (NUTEC)*. (2004, January 30). Retrieved August 6, 2004, from http://www-keyport.kpt.nuwc.navy.mil/NUTEC/NUTEC_Home.htm

47. *Naval Undersea Warfare Center-Newport*. (2004, July 20). Retrieved August 6, 2004, from http://www.npt.nuwc.navy.mil/

48. NAVSEA (SEA 62T). (2004). *Factory T&E*. Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/process_summary.asp?txtDataID=1230&txtTypeID=70

49. NAVSEA (SEA 62T). (2004) *Land-Based System Integration Testing*. Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/process_article.asp?txtTypeID=70&txtDataID=1228

50. NAVSEA (SEA 62T). (2004). *Ship and Combat Systems Test and Evaluation.* Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/about_summary.asp?txtDataID=1395&txtTypeID=69

51. NAVSEA (SEA 62T). (2004). *Ship Industrial Testing: Total Ship Test Program (TSTP)*. Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/process_summary.asp?txtDataID=1225&txtTypeID=70

53. NAVSEA (SEA 62T). (2004). *Post-Industrial Ship Test and Certification Programs*. Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/process_article.asp?txtTypeID=70&txtDataID=1224

54. NAVSEA (SEA 62T). (2004). *Weapon & Combat System T&E* . Retrieved September 11, 2004, from http://www.navsea.navy.mil/navysea-te/process_summary.asp?txtDataID=1229&txtTypeID=70

55. NAVSEA (SEA 62T). (2004). *Where We Test.* Retrieved September 12, 2004, from http://www.navsea.navy.mil/navysea-te/whereWeTest.asp?sWhereIn=t1.iStatusID=3&nCurPage=2

56. NAVSEA 5135. (2000, September 1). *Surface Combat Systems Center, Naval Sea Systems Command Contract #N00024-00-C-5135*. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

57. NAVSEA Test & Evaluation Office (SEA 62T). (2004). *Ship Test and Certification Sites (Map)*. Retrieved August 6, 2004, from http://www.navsea.navy.mil/navysea-te/about_summary.asp?txtDataID=1393&txtTypeID=69

58. NAVSEA Test & Evaluation Office (SEA 62T). (2004). *Ship Industrial Testing: Total Ship Test Program (TSTP)*. Retrieved August 6, 2004, from http://www.navsea.navy.mil/navysea-te/process_summary.asp?txtDataID=1225&txtTypeID=70

60. *Navy Transformation Roadmap: Open Architecture*. (2003). Retrieved September 11, 2004, from http://www.chinfo.navy.mil/navpalib/transformation/trans-pg80.html

62. Office of Management and Budget. (2004). *Department of Defense FY 2005 Budget*. pp. 1-19. Retrieved September 12, 2004, from http://www.whitehouse.gov/omb/budget/fy2005/defense.html

63. *Pacific Missile Range Facility (PMRF) NS Barking Sands*. (2002, May 14). Retrieved August 6, 2004, from http://www.globalsecurity.org/military/facility/pmrf.htm

64. *Pacific Northwest Undersea Warfare Range (PNUWR)*. (2004, January 20). Retrieved August 6, 2004, from http://www-keyport.kpt.nuwc.navy.mil/Leadership.htm

65. *Patuxent River*. (2002, May 14). Retrieved August 6, 2004, from http://www.globalsecurity.org/military/facility/patuxent-river.htm

66. PEO/IWS. (2004, September 1). *PEO All Hands Brief*. pp. 1-18. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

67. PEO/TSC. (2003). *ASAMMP (AEGIS Sites Activation, Maintenance and Modernization Program Guide)*. pp. 1-13. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

68. *Point Mugu Air Station*. (2004, May 26). Retrieved August 2, 2004, from http://www.globalsecurity.org/military/facility/point-mugu.htm

69. *Port Hueneme*. (2002, January 1). Retrieved August 2, 2004, from http://www.globalsecurity.org/military/facility/hueneme.htm

70. Rednor, S. (1992). But Ships Are Different. *ITEA Journal of Test and Evaluation,* 13, 2, 1-2.

71. Rhem, K.T. (2002, October 23). Bush Signs Defense Bill, Says "Nation Faces New Dangers". *American Force Press Service* [Electronic Version]. . Retrieved September 12, 2004, from http://www.defenselink.mil/news/Oct2002/n10232002_200210234.html

72. Roberts, N., Professor. (1998, November). Strategic Planning and the Results Act: Lacking Good Fit with the Political Context. *Technical Article for the Naval Postgraduate School*.

73. Rumsfeld, D.H. (2001, January 11). *Statement of the Honorable Donald H. Rumsfeld*. Prepared for the Confirmation Hearing Before the U.S. Senate Armed Services Committee. pp. 1-7. Retrieved September 12, 2004, from http://armed-services.senate.gov/statemnt/2001/010111dr.pdf

74. *SCORE*. (2004). Retrieved August 6, 2004, from http://www.score.com/about/introduction.php?page=1

75. SCSC Business Plan Draft. (2004, June 17). (pp. 1-25). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

76. SCSC/G1. (2003, December 1). *Strategic Planning Quarterly Review: SPWG #1*. pp. 1-7. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

77. SCSC/G2. (2003, December 3). *Strategic Planning Quarterly Review: Goal #2*. pp. 1-8. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

78. SCSC/G4. (2002, December 5). *Strategic Planning Quarterly Review, Goals 1-4*. pp. 1-30. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

79. SCSC Infrastructure Team Brief. (2003, June 30). (pp. 1-27). (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

80. *SCSC Location Map*. (2004, July 21). Retrieved August 6, 2004, from http://www.scsc.navy.mil/about/directions.htm

81. SCSC OPNAV Brief. (2004, 13 August). *OPNAV N766 Visit*. pp. 1-26. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

82. SCSC Public Works Standard Brief. (2004, August 1). pp. 1-22. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

83. SCSC Standard Presentation. (2004, June 7). pp. 1-55. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

84. SCSC Strategic Planning Meeting #1. (2004, August 19). *SCSC Strategic Planning OFF-SITE Preparation Meeting Minutes for October 2004*. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

85. SCSC Unit Self-Assessment. (2003, July 16). pp. 1-82. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

86. *SESEF (Shipboard Electronic Systems Evaluation Facilities)*. (2004, July 28). Retrieved August 4, 2004, from http://www.npt.nuwc.navy.mil/Sesef/

87. SPY-1D(V) Status Presentation. (2003, November). pp. 1-31. (Document stored locally at SCSC, contact: pbodley@scsc.wal.nswc.navy.mil)

89. Training Resource Strategy Targets Efficiency. (2003, January 14). *The Navy Newsstand*, [NNS030113-17]. Retrieved August 4, 2004, from http://www.news.navy.mil/search/display.asp?story_id=5354

90. TSTP/NAVSEA. (1995). Total Ship Test Program Manual (NAVSEA Department 91T, Document #S9095-AD-TRQ-010/TSTP, Section D-1). pp. 1-75.

91. *US Census Bureau Quick Facts*. (2004). Retrieved August 4, 2004, from http://quickfacts.census.gov/qfd/states/51/51001.html

92. U.S. Public Law 103-62. 103rd Cong., 1st sess., 5 January 1993. *The Government Performance and Results Act of 1993*.

93. *VAST, Virtual At Sea Trainer*. (2004, March 26). Retrieved August 6, 2004, from http://www.globalsecurity.org/military/systems/ship/systems/vast.htm

94. *Wallops Flight Facility*. (2004). Retrieved July 2004, from http://www.wff.nasa.gov/

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