



NAVY EXPEDITIONARY COMBAT COMMAND



SCIENCE & TECHNOLOGY STRATEGIC PLAN

DECEMBER 2009

Navy Expeditionary Combat Command Top 15 Science and Technology Objectives

- 1. Improved Protection for Individuals [P/Mit 7.2-1] [pg 36]**
- 2. RPG Defense for Watercraft and Vehicles [P/Mit 7.2-2] [pg 37]**
- 3. Tactical, Autonomous or Semi-Autonomous Mobile Sensor Platforms [BA/ISR 2.1-1] [pg 21]**
- 4. Advanced Lethal Waterborne Weapons for use Against Small, Fast Watercraft and Vehicles [FA/Engage 3.2-1] [pg 29]**
- 5. Stand-Off Detection of Explosive Hazards (Underwater/Land) [FA/MVR 3.1-1] [pg 25]**
- 6. Enhanced Lightweight Armor Systems for Watercraft [P/Mit 7.2-3] [pg 37]**
- 7. Advanced Non-Lethal, Non-Destructive Waterborne Platform Stopping/Repelling Capability [FA/Engage 3.2-2] [pg 29]**
- 8. Persistent and Scalable Unattended Maritime Sensor Networks [BA/ISR 2.1-4] [pg 22]**
- 9. Scalable, Mobile, Secure OTH Digital Communication Networks [NC/NM 6.3-1] [pg 35]**
- 10. Swimmer Defeat [FA/Engage 3.2-3] [pg 30]**
- 11. Hardened Expeditionary Facilities and Infrastructure [P/Mit 7.2-4] [pg 38]**
- 12. Persistent and Scalable Unattended Ground Sensor Networks [BA/ISR 2.1-2] [pg 21]**
- 13. Advanced Power Sources for Field Applications [Log/LS 4.4-1] [pg 32]**
- 14. Advanced High-Fidelity, Fixed and Field-Exportable Expeditionary Training and Simulation [FS/FPrep 1.2-1] [pg 19]**
- 15. Intelligent Expeditionary Installation Security [BA/ISR 2.1-3] [pg 22]**

DISTRIBUTION STATEMENT

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Promulgation Letter

**NAVY EXPEDITIONARY COMBAT COMMAND
Science and Technology Strategic Plan
FY 2010**

The *Navy Expeditionary Combat Command (NECC) Science and Technology (S&T) Strategic Plan* establishes the priorities and direction for science and technology investment needed to ensure that Navy expeditionary forces of the future possess the tools needed to succeed across the operational spectrum.

The first S&T Strategic Plan, approved in October 2007, established the initial set of requirements for S&T investment. The release of the FY 2010 S&T Strategic Plan is a continuation of efforts to shape future technology and capability in order to increase warfighting effectiveness.

At the heart of this plan is the first comprehensive listing of NECC Science and Technology Objectives (STOs) representing technology areas that NECC believes should be addressed by the Navy and Department of Defense (DoD) technology development community. Many of these STOs match similar objectives of the Joint Force and other Navy Enterprises. Some are unique to specific elements within NECC. In each case, they align to previously identified capability gaps, guided by the Naval Operational Concept as an overarching vision for the future. The prioritization of STOs, as set forth in this document, places the highest emphasis on seeking technology solutions for NECC's most pressing current and near-term capability shortfalls.

This document is an evolving effort by NECC to establish an S&T investment priority for an extraordinarily diverse warfare enterprise. It is NECC's intention to establish a more formalized technology process to bring all Navy Expeditionary Combat Enterprise (NECE) stakeholder representatives together in developing a plan for execution of technology programs of interest, performing updated gap analysis, developing capability needs, and updating STOs based upon emerging operational requirements. The NECC S&T staff is dedicated to working closely with the Systems Commands, Warfare Centers, Office of Naval Research (ONR), U.S. Fleet Forces Command (USFFC), OPNAV, industry, and academia to continually review priorities and update this plan on a regular basis.



***Rear Admiral Carol Pottenger,
Commander, Navy Expeditionary
Combat Command***

A handwritten signature in black ink, appearing to read 'C. Pottenger', written over a horizontal line.

Rear Admiral, U.S. Navy
Commander, Navy Expeditionary Combat Command

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1.0 Introduction

1.1 Background

The Navy has historically relied upon advanced and emerging technology to provide operational advantages and superior warfighting capabilities to its Sailors. Developing and acquiring the required operational capabilities to execute future expeditionary missions must become a core competency across the NECE. This effort demands a continued S&T investment paired with a clearly articulated path that spans the entire spectrum from documenting a warfighter's need to the creation of a Program of Record (POR).

This document outlines a continuously evolving process that shapes and links required capabilities to corresponding S&T focus areas in support of Navy expeditionary combat forces. The NECC S&T Strategic Plan is updated and published regularly in an effort to meet these objectives and to aid in depicting and sharing NECC critical research areas with the Chief of Naval Research (CNR), Industry, the Defense Advanced Research Projects Agency (DARPA) and other DoD commands for S&T planning and budgeting purposes.

Aligning investments with NECC requirements is critical to increasing the efficient use of limited fiscal resources to counter the rapidly evolving threat environment facing expeditionary Sailors and Marines. To ensure maximum return on investment, NECC requirements must be aligned with the Navy's S&T program, as well as associated technology objectives of the United States Marine Corps (USMC), Naval Special Warfare (NSW), Surface Warfare Enterprise (SWE), and the Naval Aviation Enterprise (NAE). When applicable, leveraging of Joint Service and commercial technology investments will be encouraged to further the return on investment for the Department of Defense.

1.2 Purpose

The S&T Strategic Plan describes the vision, strategy, functions and areas of interest for NECC. It provides a link between the S&T Enterprise, the command, and its components, serving as a framework to assist in understanding the requirements and the process for delivering capabilities to the warfighter, whether near, mid or far-term.

An important goal of this document is to simplify understanding of the technology transition process (as it applies to NECC) and increase stakeholder insight. Through simplifying the procedures and maintaining focus on the big picture, this document should assist the reader in identifying the relevant information required to successfully move forward with acquisitions in support of our Sailors.

1.3 Strategic Direction: The Importance of Navy Expeditionary Forces Today and Tomorrow

The Secretary of Defense (SECDEF) has highlighted the need to rebalance the armed services towards population-centric activities. The recent promulgation of Department of Defense

Directive (DoDD) 3000.07 recognizes that Irregular Warfare (IW) is as strategically important as traditional warfare and identifies stability operations as “a core U.S. military mission that the DoD shall be prepared to conduct” with proficiency equivalent to combat operations. Finally, the Chief of Naval Operations (CNO) has adopted IW as a core Navy mission, with an emphasis on balancing and sustaining our maritime forces on both the seas and ashore. As a majority of the world’s population inhabits coastal regions, NECC is positioned to provide key support as a force provider for integrated maritime expeditionary missions.

Remaining forward and engaged Where we are currently & recent past

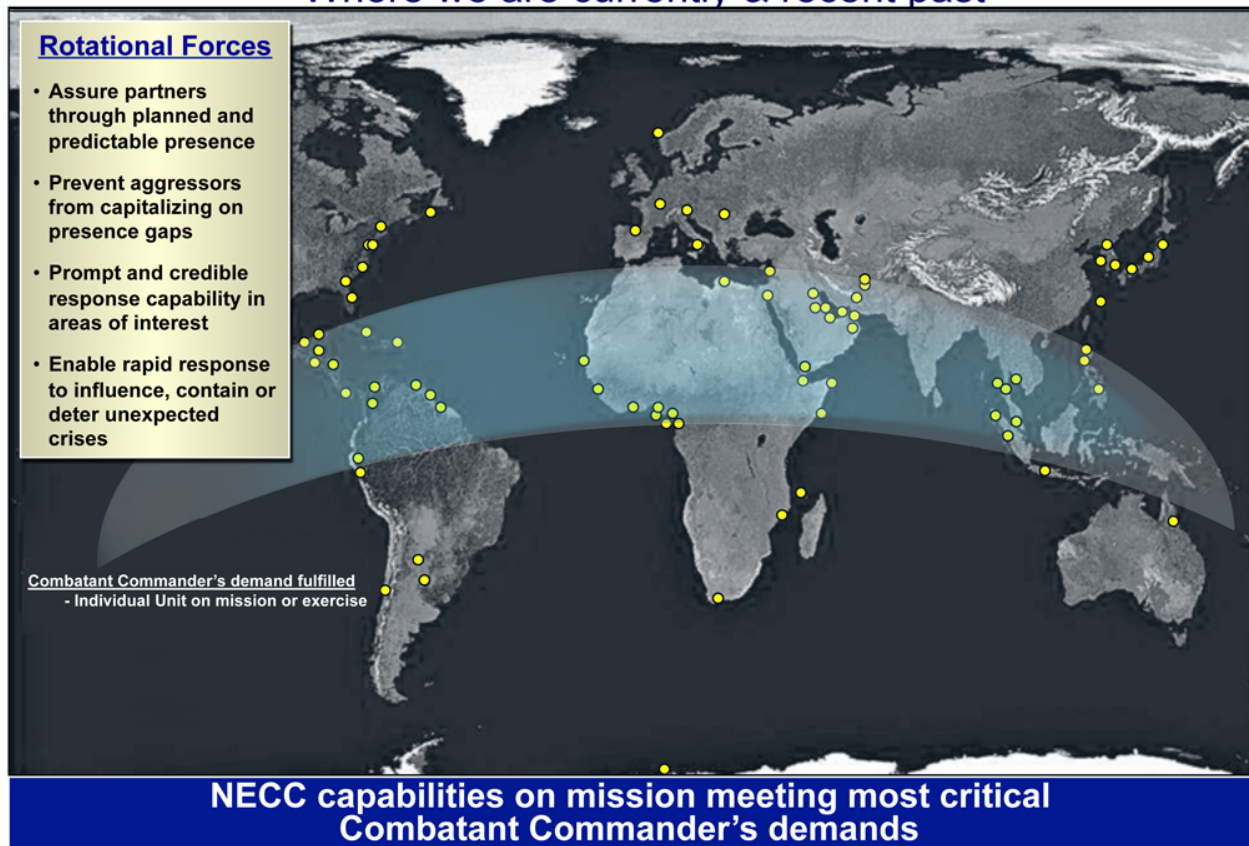


Figure 1.1: NECC Force Locations

NECC Forces span the full spectrum of warfighter support, from combat arms (Riverine Forces), to Combat Service (Naval Construction, Explosive Ordnance Disposal, Expeditionary Diving and Salvage, Expeditionary Intelligence and Maritime Expeditionary Security), to Combat Service Support (Expeditionary Logistics Forces, Maritime Civil Affairs and Security Training Command, Combat Camera, and Expeditionary Combat Readiness). NECC Forces are critical to the larger Navy in their ability to deliver soft power in the form of Theater Security Cooperation and partnership building. Of particular relevance to projected operations is the scalability of NECC forces, which facilitates engagement with Partner Nations who may lack the capacity to accommodate large units. The yellow dots in Figure 1.1 indicate areas of the world where NECC forces are currently or have recently been engaged. Of particular note, those areas where NECC forces are found in concentration correspond closely to the so called “arc of instability”

running through the Caribbean Basin and across much of Africa, the Middle East and Central and South Asia.



Figure 1.2: Smart Power

The focus areas shown in Figure 1.2 graphically display wide ranging NECC capabilities that either employ or contribute to the application of “Smart Power.” Smart Power stresses the importance of enhancing regional awareness through partnerships and collaboration with other federal agencies; defeating irregular threats by denying sanctuary to violent extremism and its infrastructure through use of maritime training teams; and pursuing effects that address security force assistance, civic and disaster assistance, maritime security, counter-piracy, counter narcotics, counter-terrorism, counter-insurgency and enhanced partner capabilities.

1.4 NECC Strategic Overview

The following are NECC vision and mission statements.

NECC Vision

“The Navy Expeditionary Combat Command will prepare task organized, interoperable expeditionary maritime combat, combat support and combat service support units that are

aligned to be effective, flexible, and responsive to theater requirements in support of Geographic Combatant Commander (GCCs) demands.” (NECC Commander 15 JUL 09)

NECC Mission

“Organize, man, equip, and train NECC forces to execute combat, combat support, and combat service support missions across the spectrum of joint, combined, and multinational operations in the near-coast, inshore, and riparian environments to include irregular warfare and other shaping missions that secure strategic access and global freedom of action.” (NECC Commander 15 JUL 09)

NECC N9 Mission

To anticipate future demands of the Navy’s expeditionary force; develop appropriate technology objectives; identify and leverage the technology community to provide sufficient, realistic and technologically sound capability in a fiscally responsible manner.

N9 exists to place required new capabilities in the hands of Navy expeditionary warriors that enable supremacy in the maritime and littoral environment today and tomorrow.

2.0 The Technology Transition Process

Technology development and transition to a POR is often a very difficult process to accomplish. This discussion outlines the process to connect NECC vision to the required resources.

2.1 NECC Science & Technology Strategy

A key aspect to successful technology transition is maintaining a formal dialogue and continuous communication amongst stakeholders. All stakeholders must remain aware, appraised, and in agreement with the technology transition roadmap to ensure success for transitioning to a POR or other procurement process. Relevant stakeholders include:

- **The Capability Needs Community** (also known as the Requirements Community) — Warfighters, end-item users, or their representatives who develop new warfighting concepts and outline the capabilities needed to support them. OPNAV Program Sponsor acts as the Force Requirements Officer, and is responsible for the development of capability needs documentation.
- **The Science and Technology (S&T) Community** — Scientists and managers of S&T programs who develop knowledge about the key technologies that will be needed for future material solutions to capability needs.
- **The Acquisition Community** — Program managers, product managers, staffs, and organizations that manage the development, procurement, production, and fielding of systems. This includes Systems Command (SYSCOMs), Program Executive Officers (PEOs), and Program Management Offices (PMOs).
- **The Financial Management Community** — Government organizations and personnel who manage the resources needed by the other communities, and secure funding for the programs and systems needed to transition technology. Again, this refers to the OPNAV Sponsor Staff in their role as Resource Sponsors.
- **The Research and Development (R&D) Community** — Scientists, engineers, and other professionals who possess the necessary expertise to field the technologies in military systems. This is typically conducted by Warfare Centers and Labs under the management of activities in the Acquisition Community.

The combined efforts of the listed communities will assist in identifying and developing available technologies that may satisfy the material solution to a valid capability need of the warfighter. Once that technology solution reaches an acceptable level of maturity, it can then be transitioned to the acquisition community that will, in coordination with the financial community, arrange the necessary resources to further develop the technology along with the R&D community.

On the next page, Figure 2.1 illustrates the path by which technology development efforts can be identified, aligned to validated needs, and maneuvered through a process of development, assessment, and risk reduction which will eventually lead to a Technology Transition Agreement

(TTA) or other defined process, and culminates with insertion into an acquisition milestone or phase as deemed appropriate.

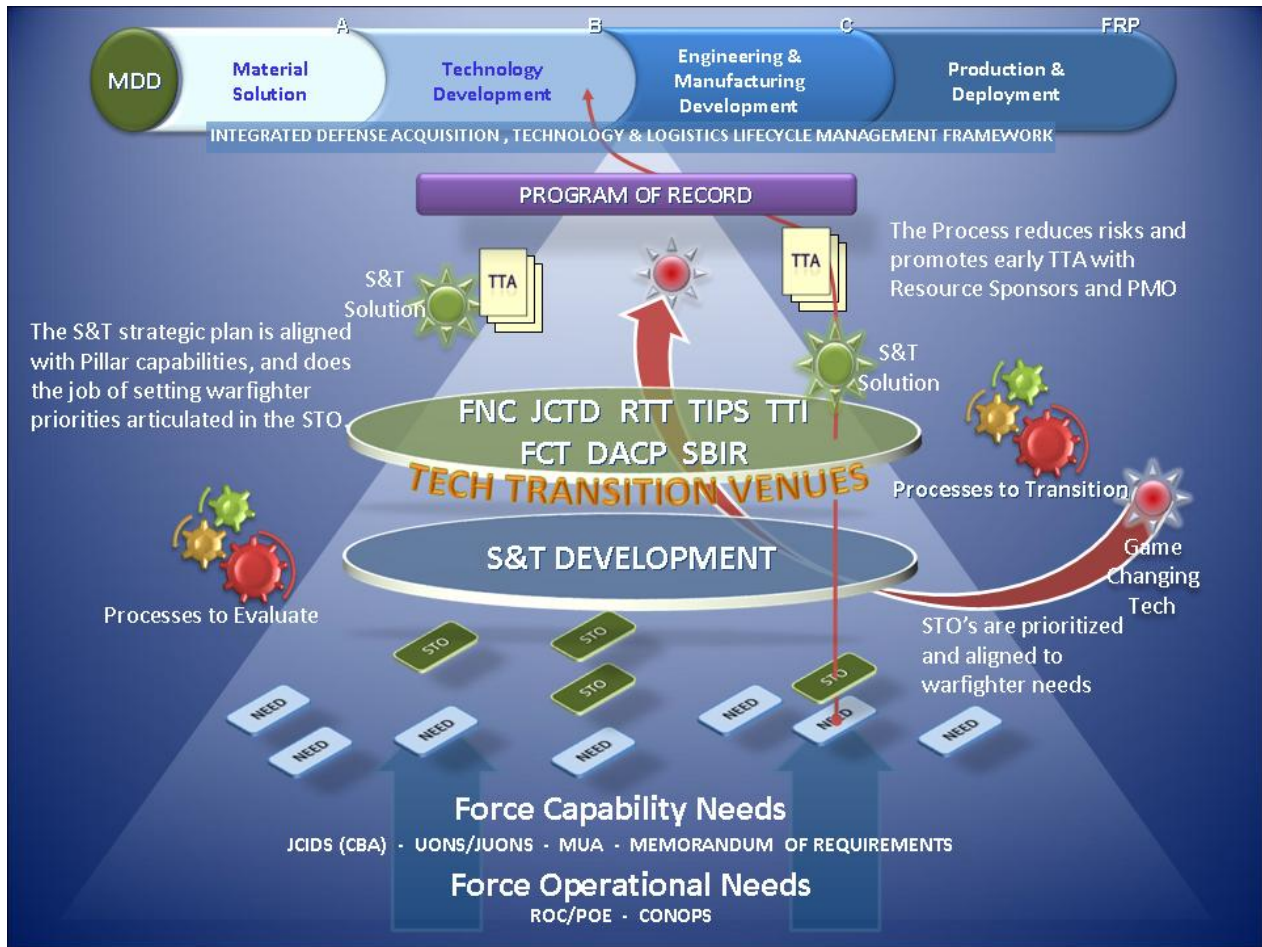


Figure 2.1: The Technology Transition Process

The process begins at the base of the pyramid with NECC **Force Operational Needs**. Ranging from very broad or foundational to more specific and executable, these documents provide some description of DoD capability needs, derived from the National Security Strategy and then presented in a document such as a Required Operational Capability/Projected Operational Environment (ROC/POE) or a Concept of Operations (CONOPS).

The formal DoD process for determining **Force Capability Needs** is the Joint Capabilities Integration and Development System (JCIDS). Integral to the JCIDS process is a series of analytical studies that make up the Capabilities Based Assessment (CBA) which identifies Force Capability Needs. Also known as capability gaps, capability needs are defined as follows:

The inability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of standard tasks.

A capability need occurs when an operational need (a requirement to perform a task) cannot be fulfilled. The gap may result from a lack of existing capability, lack of proficiency or sufficiency in existing capability, or the need to replace an existing capability (represented by the chips labeled **NEED** in Fig 2.1 on the previous page).

The first step in the CBA process involves combining existing guidance and specifying the military problem to be studied. Once identified, the problem is then examined to assess how well the DoD can address it given its current capabilities. Where the problem cannot be adequately addressed, a capability gap exists and an identified force capability need will be addressed by DoD. The final step in the process involves using the assessment to generate recommendations for solutions to the need. This is accomplished by examining the gaps for possible solutions through the Doctrine, Organization, Training, Material, Leadership and Education, Personnel and Facilities (DOTMLPF) analysis which looks at a set of change categories that may provide a resolution to the capability deficit. If other solutions are not appropriate, the final option is a material one. The process must specify the questions, estimate current and projected capabilities, and recommended actions.

The Joint Urgent Operational Needs Statement (JUONS), Military Utility Assessment (MUA) and Memorandum of Requirements are some alternatives to conducting a CBA for documentation of **Force Capability Needs**. Included in the “Need” chip is a description of attributes (physical or functional characteristics) required to effectively and suitably execute one or more tasks, that when combined, provide a needed capability to the warfighter. The chip in this example is not a single attribute, but representative of a type of need defined by one of the processes listed above.

Further up the pyramid in Figure 2.1 are chips labeled **STO** which is a broad term to describe an area that the Navy and Marine Corps considers important for tasking and/or investment for achieving a major technological advancement. In the diagram, the STOs are aligned with a **NEED**. In practice, one or more STOs may be aligned with more than one capability need. The key element is aligning with a known need. The STO itself may read very much like the capability need, but is expressed in terms of a type of technology solution, and more importantly, represents NECC’s expression of the types of potential technology solutions that best fit their battlespace, organization, operational environment, CONOPs, tactics, and doctrine. The STOs, validated by their alignment to approved capability gaps and needs, are prioritized by the operational commands under COMNECC leadership. The importance of prioritization has to do with the interplay and close coordination of the stakeholders in the S&T, R&D, Acquisition, Financial, and Capability Needs communities as described above. Understanding and knowing the priorities of the end-user is invaluable to applying limited resources to address the capability gaps, and guiding S&T development in finding, developing, and maturing emerging technologies with the potential to transition to an acquisition program.

S&T Development is conducted to reduce risks and further mature technology candidates to an acceptable level for transition. **Technology Transition Venues** represent formal programs that select candidate technologies and provide a process, resources (funding and organization) and pathway to obtaining a TTA.

While TTAs are not the only defined process to inject technology solutions into the Acquisition Framework (as depicted at the top of Fig 2.1), it is a key example of a document that acts as a formal agreement between technology developers and the Acquisition Community that a particular technology solution meets the minimum risk criteria under which the program manager and resource sponsor can agree to fund and further develop the technology into a POR. The shared goal is to rapidly deliver the capability, enabled by the technology, into the warfighter's hands. Furthermore, and assuming all the stakeholders maintained close communication within a formal process, the proposed technology solution meets the attributes and conditions set in the operational needs source document from which this process began.

The following sections provide additional information in reference to the steps and processes discussed above.

2.2 Science and Technology Objectives (STOs) Defined

STOs represent technology areas that NECC desires to address through the technology development community. STOs are technology “demand signals” from the warfighter that are viewed as critical to closing capability gaps and are derived from the assessment of the NECC Force requirements.

S&T solutions that support resolution of the STOs may come from the warfighting community, ONR, government labs, industry, or academia. Concepts are vetted through analysis, requirements review, and validation. The Navy has established S&T focus areas based upon guidance and demand signals from the Secretary of the Navy (SECNAV), Combatant Commanders (COCOMS), OPNAV, and Navy and USMC customers. In addition, these focus areas are constructed to capitalize on emerging technologies and S&T opportunities to assist in reducing future surprise threats.

For many NECC Forces, the validation process is still a work in progress. It is worth noting that in some cases an S&T effort may be undertaken that provides a “game changing” capability that is not necessarily a validated requirement. In those cases, the technology may provide a significant improvement in the forces ability to execute its mission. Annex B provides an NECC force summary and context for these requirements.

2.3 Test and Evaluation (T&E) and Military Utility Assessment (MUA)

The S&T community consists of government, academia, scientists, and managers of S&T programs who understand the technologies needed for future systems. The community includes technology development sources, such as government labs and agencies (e.g., DARPA) and industry labs. ONR “coordinates, executes, and promotes the science and technology programs of the United States Navy and Marine Corps through schools, universities, government laboratories, and nonprofit and for-profit organizations.” In addition to its involvement in Basic and Applied Research projects, ONR also focuses “...on rapidly transitioning technology to affordable products and teaming with acquisition and sustainment Program Managers (PMs) to address user needs.” To accomplish their goals, the S&T community uses programs and processes, such as:

- Joint Capability Technology Demonstrations (JCTDs)
- Joint and Service experimentation programs
- Small Business Innovation Research (SBIR) program
- Independent Research and Development (IR&D).

S&T planning balances the need to support future warfighting concepts with the need to support research in other areas that may produce breakthroughs warfighters have not yet envisioned. This is the basis behind a technology push into PORs, and is depicted as a game-changing technology. In general, S&T programs that align with specific future warfighting needs will receive the highest priority for funding, and those documented needs form the basis of technology pulls into Pre-Systems Acquisition and Systems Acquisition phases of the Defense Acquisition Management Framework.

The T&E community independently assesses how well systems perform technically; how well a system fulfills documented requirements; and whether systems are safe, operationally effective, and suitable and survivable for their intended use in military operations. There are two general types of testing: developmental and operational.

Developmental tests answer the question: Does the system do what it was intended and designed to do? Developmental tests are any engineering-type tests used to verify the status of technical progress, verify that design risks are minimized, substantiate that contractually required technical performance has been achieved, and certify readiness for initial operational testing.

Operational tests answer the question: Will the system give the warfighter the needed capability under demanding military operational conditions and when operated and maintained by warfighters? Operational tests are the field tests, under realistic conditions, of an item (or component) of weapons, equipment, or munitions.

The Military Utility Assessment (MUA) is an independent evaluation of the results of a completed experiment by a group of "operators" to assess the impact on current warfighting capabilities. They are conducted to determine the military utility and worth of proposed technologies for use in military operations by typical military users.

The T&E community does not develop the requirements for their tests, but obtains them from capability needs documents and other sources. It is of the utmost importance to include this community in the collaborative process of system development. The community must have input into the process and receive clear and well-defined guidance regarding expected system performance. The evolutionary acquisition concept challenges the capability needs, acquisition, sustainment, and T&E communities to coordinate closely and continually when developing and testing "phased" programs. This ensures that the T&E community is aware of what will constitute a "militarily useful increment" of capability. Only with this knowledge can the T&E community design appropriate tests. T&Es and MUAs are foundational Science and Technology activities in determining the best solution for meeting warfighter needs.

2.4 Technology Transition

Figure 2.2 provides a simplified view of how S&T efforts can proceed in parallel with programs in the acquisition process.

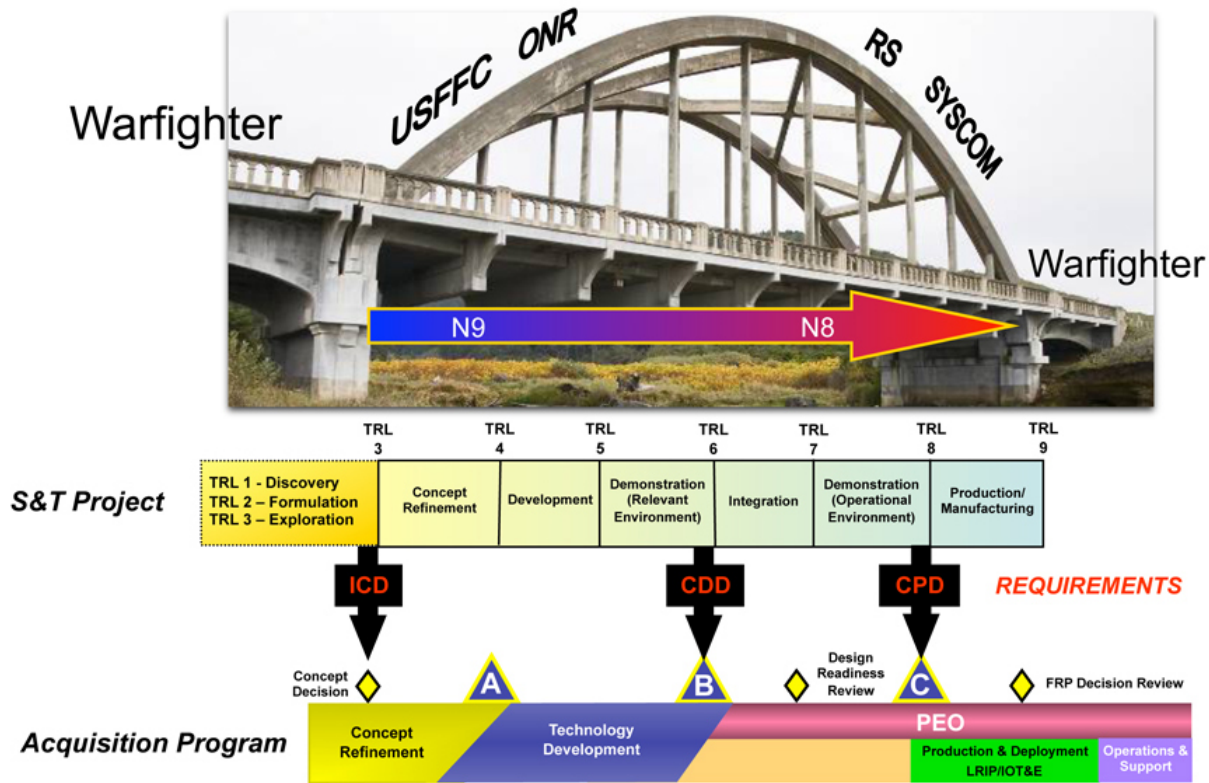


Figure 2.2: Science and Technology Process and Milestones

The goal of an *acquisition program* is to provide a materiel solution to the warfighter that fills a capability need. Generally speaking, the intent of an *S&T project* is to produce a prototype that, if successful, will be incorporated in that materiel solution at some point in the acquisition process. While the two efforts should be mutually supportive, the scope of each is slightly different (as displayed in the “S&T Project” and “Acquisition Program” timeline bars in Figure 2.2). When managed in concert, S&T programs can provide valuable technologies for integration into acquisition, which accelerates the development and fielding of effective materiel solutions.

The bridge depicted in Figure 2.2 symbolizes a roadway across a capability gap in the pursuit of acquiring a materiel solution to a warfighter’s need. It emphasizes the fact that the road, from *need* to *solution*, must be properly planned and carefully “engineered” to clear many hurdles designed to ensure responsible program execution. A “structural failure” at any point on the bridge will result in mission failure.

The DoD Joint Capabilities Integration and Development System (JCIDS) governs many aspects of this journey across this bridge and is beyond the scope of this plan. That being said, it is important to note that development of key JCIDS documents such as Initial Capability Documents (ICD) and Capability Development Documents (CDD) set the stage for smoothly transitioning technology projects into the acquisition process.

Although there are many players in the system, NECC Headquarters (particularly the N9 and the N8) plays a key role in building the Technology Bridge. Typically, pursuit of a new capability will primarily be the responsibility of N9 at the start, and (as shown by the large arrow in the figure) gradually shift to an N8 lead as the Technology Readiness Level (TRL) of the proposed solution matures and is integrated in to an acquisition effort.

Along with the combined efforts of the N9 and N8 leads, NECC Headquarters must aggressively track development from initial warfighter need, through primary advocate, USFF Force Requirements Officer, OPNAV Resource Sponsor, and appropriate SYSCOM, until the required capability transitions to the warfighter with complete Integrated Logistics Support (ILS).

2.5 Technology Transition Venues

Specific programs designed to assist in developing new successfully transitioned technologies are available. These and other venues provide a marketplace for the technology and appropriate applications for those technologies. In some cases, the programs offer another source of funds in addition to the specific program that supports the transition. These programs, as illustrated in Fig 2.1, are listed in order of current application to NECC:

Future Naval Capabilities (FNC) Program

As part of its execution of the Naval S&T program, ONR has developed the Future Naval Capabilities Program. This Program is under the oversight of the Technology Oversight Group (TOG), which is chaired by OPNAV N8, Marine Corps Combat Development Command (MCCDC) Commanding General, USFFC Deputy Commander (DCOM), Assistant Secretary of the Navy for Research, Development and Acquisition, (ASN RDA) and the CNR. This effort provides a three to five year technology development path with the purpose of ultimately transitioning a capability into a program. The day-to-day planning and execution of the effort is managed through the following Integrated Product Teams (IPTs):

- Naval Expeditionary Maneuver Warfare (NEMW)
- Sea Strike (STK)
- Sea Shield (SHD)
- Sea Base (BAS)
- FORCEnet (FNT)
- Enterprise and Platform Enablers (EPE)
- Capable Manpower (CMP)

- Force Health Protection (FHP)

FNC Warfighting Gaps are defined under the appropriate IPT by incorporating input from the warfighting entities. After the gaps are identified, ONR and the research enterprise develop proposals to flesh out Enabling Capabilities (EC) in order to address those gaps. These proposals are evaluated internally within ONR and a list of proposed ECs is developed for execution in the appropriate fiscal year and submitted for approval by the TOG. Due to yearly fiscal constraints, many FNC gaps are not addressed, and not all of the proposed ECs are funded.

Execution reviews are conducted throughout the three to five year process to ensure sufficient technical progress and a viable transition path. If progress stalls or a transition path fails, the TOG may cancel an EC and shift the funds to other ongoing efforts, or initiate a new EC that may not have been addressed.

Joint Capability Technology Demonstration (JCTD)

A JCTD is an Office of the Secretary of Defense (OSD) funded program to exploit mature technologies that solve important military problems and rapidly transition new capabilities to COCOMs. Emphasis is placed on the COCOMs' demand signal and funding is shared between OSD and the services.

Rapid Technology Transition (RTT)

Administered by ONR, this program provides for a rapid technology transition from any source into a DoN POR to meet emergent and urgent naval needs. The TOG that approves FNC efforts also has oversight of RTT efforts

Technology Transition Initiative (TTI)

This program is designed to facilitate rapid transition of new technologies into operational capabilities after demonstrating that capability in an operationally relevant environment.

Foreign Comparative Testing (FCT)

Funded by OSD, this program provides for test and evaluation of foreign non-developmental or commercial off-the-shelf equipment that demonstrate the potential to satisfy warfighter and/or warfighter support requirements.

Joint Experimentation Program

The U.S. Joint Forces Command (USJFCOM) Joint Concept Development and Experimentation (JCD&E) Directorate (J9) leads the development of emerging joint concepts, conducts and enables joint experimentation, and coordinates DoD JCD&E efforts in order to provide joint capabilities to support the current and future joint force commander in meeting security challenges. The enterprise designs, conducts, and enables focused projects and experiments to

more quickly and effectively address the problems in terms of DOTMLPF. The annual JCD&E campaign plan lists and describes the projects for the current and following year.

Defense Acquisition Challenge Program (DACP)

The DACP provides opportunities for both innovators and the DoD. It can provide a faster entry into the defense acquisition system for innovators, and may assist with the increase of technology insertions to improve systems for the DoD PM. The DACP provides opportunities for the introduction of innovative and cost-saving commercial technologies or products into existing DoD acquisition programs. Furthermore, the DACP is specifically designed to provide small and medium-sized companies with the opportunity to introduce new technologies and inject innovation into current DoD Programs. The DACP ultimately expands opportunities for emerging defense suppliers, widens the U.S. defense industrial base, and leverages unique innovations for the benefit of the warfighter.

Small Business Innovative Research Program (SBIR)

This program stimulates technological innovation by increasing small business participation in federally funded R&D. The program is funded via a 2.5% “set-aside” of the extramural RDT&E budget in excess of \$100 million and is implemented through a uniform, three-phase competitive process.

Tech Solutions

An innovative, transformational business process created by the CNO, Tech Solutions is focused solely on rapidly delivering needed technology to the Fleet/Force. The goal is to provide Sailors and Marines web-based access to the NRE. This access, via both the Internet and SIPRnet, targets the E-4 through O-4 at the deckplate/ground level on finding ways to improve mission effectiveness through the application of technology. Improvements from this effort are intended to assist the sea services in moving toward a more effective and efficient use of personnel.

Tech Solutions is not a substitute for the acquisition process and is not a replacement for the SYSCOMs. Its goal is to provide the Fleet/Force with prototypes that deliver 50–70% solutions addressing immediate requirements that can be easily transitioned by the acquisition community. Tech Solutions works with appropriate SYSCOM elements in an Integrated Product Team concept which ensures that transition “hook points” are built into the solution which enables the acquisition authority to move directly to final prototyping or a decision to buy. To learn more about Tech Solutions, go to:

www.onrglobal.navy.mil/techsolutions/login.asp?backlink=/techsolutions/Default.asp

Regardless of the venue or process utilized to facilitate the transition, the job is not complete until the capability is in the warfighter’s hands and is fully supported in the life cycle. For NECC, the last step in the process is transitioning a capability/system into the Table of Allowance (TOA). An overview of the TOA process is included in Annex C.

2.6 Roles and Responsibilities

NECC forces only benefit in the long term from successful S&T projects that transition to acquisition programs. Successful transition depends on close partnership of the three principal communities involved in delivering science and technology to the forces: Combat Development, Technology Development, and Material Development. Figure 2.3 provides a pictorial view of the relationship and responsibilities of these Communities:

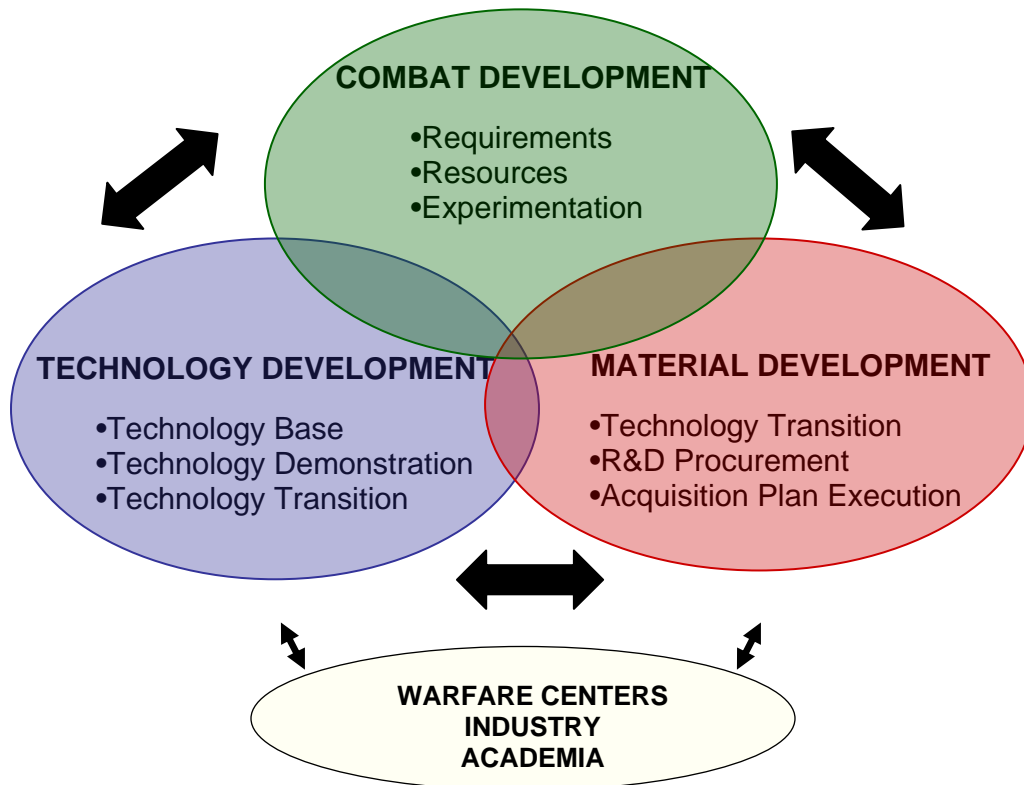


Figure 2.3: Collaborative Technology Environment

Combat Development – Combat development is the responsibility of Commander, Navy Expeditionary Combat Command, USFFC and OPNAV. They develop and validate requirements, provide resourcing strategy, and conduct or augment experimentation of promising new concepts.

Technology Development – Technology development is performed by ONR, the Naval Research Laboratory (NRL) and/or other elements of a Research Enterprise, or DoD research establishment. Technology developers create the technology base, perform technology demonstrations, provide resources, and play a critical role in technology transition.

Material Development – Material development is conducted by the applicable SYSCOMs and/or Research Laboratory development divisions. Technical Manager responsibilities include technology transition path, R&D testing, Plan of Action and Milestones (POA&M) development,

acquisition plan development, and R&D contracting. Technical Managers are the primary liaisons with industry to develop and test a product to requirement specifications.

2.7 NECC Levels of Commitment

The previous discussion emphasizes the importance of collaborative relationships in transitioning S&T projects. Determining the appropriate balance of time, effort and resources in solving a capability need is an important part of the transition process. Sifting through possible materiel solutions and separating out significant technologies that may make a difference in advancing warfighter capabilities down the road requires continued foresight and engagement in the process.

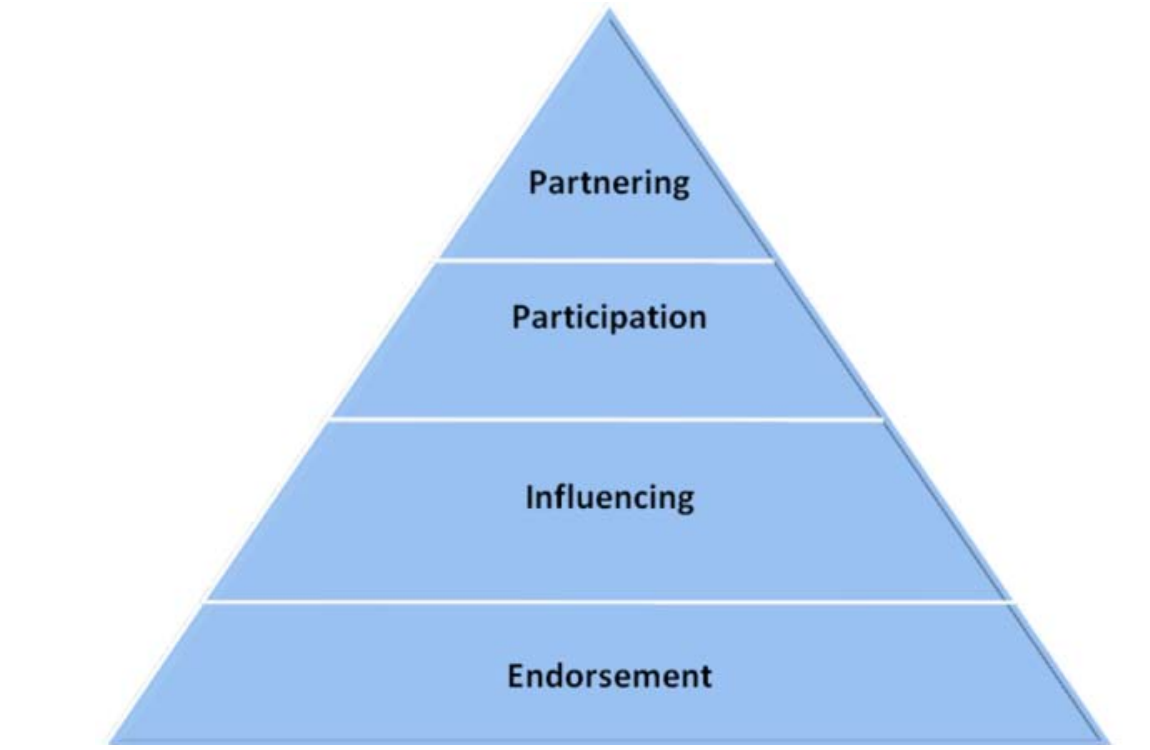


Figure 2.4: Priorities - Levels of Commitment

Figure 2.4 displays the various levels of commitment that a technology solution may receive depending on where it falls at any given time in the “rack and stack” process and based on the level of priority it is assigned as a possible materiel solution to the warfighter needs.

Endorsement – NECC may choose to state an interest in or support for an area of basic research or exploratory development that could satisfy a technology goal, but may not have a high priority for that effort. Usually no assets other than those required to monitor project progress are dedicated.

Influencing – NECC may choose to influence the design characteristics, form, and function of an S&T project to meet a need. Generally, some support is committed to this effort and NECC works in conjunction with the project lead.

Participation – NECC provides manpower to assist in developmental testing and evaluation of technologies which is currently the most common approach to assist in the transition to an acquisition program.

Partnering – NECC encourages a cooperative S&T effort funded by multiple agencies or Services, where the end item is intended for service commonality.

NECC supports synergistic partnerships with OPNAV, OSD, SYSCOMS, ONR, NRL, DARPA, the Defense Threat Reduction Agency (DTRA), International Threat Reduction Agency (ITRA), Department of Energy (DOE), and other federal laboratories and organizations.

3.0 Science & Technology Objectives (STOs)

This section provides a comprehensive listing of NECC Science & Technology Objectives. These STOs identify technology areas that NECC desires to be addressed by the Navy and DoD technology development community to meet present and future mission needs.

3.1 Guiding Technology Principles

As discussed in Section 2, it should be recognized that solutions to Force Capability Needs must provide opportunity that results in value. Therefore, technologies offered to meet NECC capability needs should:

- Fill a validated and documented Force Capability Gap
- Be Effective, Efficient and Safe – Technology solutions that enhance human performance and provide improved situational awareness or standoff from danger are considered key areas for evaluation
- Be Affordable – Solutions that provide overall force cost reductions and Total Ownership Cost (TOC) will be given significant consideration in the selection process
- Be Leveragable – Technologies that can be leveraged across other forces and enterprises for reduction in cost or to capitalize on efficiencies will also be viewed favorably. In most cases, a 90% solution across the force is better than a 100% solution for one element.
- Incorporate open architecture and network solutions that are consistent with DoD and Navy strategy and policy

3.2 Priorities

Based on the Guiding Technology Principles above, individual STOs have been prioritized within each subcategory of the Joint Capability Areas (JCA) using the following methodology:

- **Urgency** – Priority is given to cutting edge technologies that could save lives and offers a solution to an immediate demand from the force.
- **Linkages** – Aligning requirements and solutions with other services and commands. The objective is to capitalize on opportunities that focus S&T efforts where the greatest gains can be accomplished for multiple end users, reducing duplicate efforts and wasted man-hours. See Annex A for the linkage tables.
- **Feasibility** – Takes into consideration the practicality of a technology by looking at the following:
 - TRL in terms in of maturity and readiness for deployment
 - The price (relatively inexpensive COTs technology versus more costly cutting edge)
 - Weighing benefits of cost versus return on investment.

- **Demand** – Takes into account the demand signal from the operators and the level of need for a given capability. Most S&T or RDT&E efforts will be the result of a recognized need from the fleet.

3.3 NECC Top 15 S&T Objectives

The following list of STOs reflect NECC's top concerns in order of priority and is intended to assist the S&T community in focusing efforts where the greatest gains can be accomplished. The list will be re-evaluated and promulgated annually due to potential for changing mission requirements and revolutionary technologies.

1. **Improved Protection for Individuals [P/Mit 7.2-1] [pg 36]**
2. **RPG Defense for Watercraft and Vehicles [P/Mit 7.2-2] [pg 37]**
3. **Tactical, Autonomous or Semi-Autonomous Mobile Sensor Platforms [BA/ISR 2.1-1] [pg 21]**
4. **Advanced Lethal Waterborne Weapons for use Against Small, Fast Watercraft and Vehicles [FA/Engage 3.2-1] [pg 29]**
5. **Stand-Off Detection of Explosive Hazards (Underwater/Land) [FA/MVR 3.1-1] [pg 25]**
6. **Enhanced Lightweight Armor Systems for Watercraft [P/Mit 7.2-3] [pg 37]**
7. **Advanced Non-Lethal, Non-Destructive Waterborne Platform Stopping/Repelling Capability [FA/Engage 3.2-2] [pg 29]**
8. **Persistent and Scalable Unattended Maritime Sensor Networks [BA/ISR 2.1-4] [pg 22]**
9. **Scalable, Mobile, Secure OTH Digital Communication Networks [NC/NM 6.3-1] [pg 35]**
10. **Swimmer Defeat [FA/Engage 3.2-3] [pg 30]**
11. **Hardened Expeditionary Facilities and Infrastructure [P/Mit 7.2-4] [pg 38]**
12. **Persistent and Scalable Unattended Ground Sensor Networks [BA/ISR 2.1-2] [pg 21]**
13. **Advanced Power Sources for Field Applications [Log/LS 4.4-1] [pg 32]**
14. **Advanced High-Fidelity, Fixed and Field-Exportable Expeditionary Training and Simulation [FS/FPrep 1.2-1] [pg 19]**

15. Intelligent Expeditionary Installation Security [BA/ISR 2.1-3] [pg 22]

3.4 Organization

The STOs beginning in section 3.5 are organized based upon the overarching categories of the Joint Capability Areas (JCA) as promulgated on 12 January 2009 by the Joint Staff.

- Force Support (FS)
- Battlespace Awareness (BA)
- Force Application (FA)
- Logistics (Log)
- Command and Control (C2)
- Net-Centric (NC)
- Protection (P)
- Building Partnerships (BP)

3.5 S&T Objectives

Force Support (FS)

The ability to establish, develop, maintain and manage a mission ready Total Force.

1.2 Force Preparation (FPrep)

FS/FPrep 1.2-1: Advanced High-Fidelity, Fixed and Field-Exportable Expeditionary Training and Simulation

Develop technologies that provide training in a high fidelity, physically accurate, synthetic natural-like environment including accurate geo-specific terrain and realistic, culturally accurate artificial intelligence (AI)-driven entities (friendly, enemy, and civilians).

Develop instructional/training tools, simulation technologies, and systems which enable forces to train the way they fight, provide greater situational awareness and enhanced after-action review of live fire and force on force training evolutions. Optimally simulate live fire in areas where actual weapons firing is impossible.

Develop instruction/training tools, methodologies and systems that enable forces to adapt to varied social and cultural environments. These tools will enhance operator capabilities in Security, Stability, Transition and Reconstruction missions, mil-mil training missions and irregular warfare/counterinsurgency operations.

Develop low cost, deployable training technologies that can be effectively operated and deployed in field conditions to provide realistic, tactical decision-making, scenario based training for individual expeditionary operators, small distributed units, and tactical operations center staffs.

1.4 Health Readiness (HR)

FS/HR 1.4-1: Improve Life-Support for Casualties at Point of Injury through Evacuation

Develop lightweight, man-portable systems that improve life expectancy from time of injury until evacuated to a medical facility. Desired technologies include:

- a. Advanced means of reducing the immediate effects of shock and blood loss.
- b. Autonomous diagnosis/treatment of severe injuries, illness, and disease under austere conditions and in remote sites.
- c. Medical reach-back.
- d. Remote physiological monitoring of individual expeditionary operator.
- e. Lighter, smaller, more durable and versatile versions of existing lifesaving devices (such as the oxygen concentrator, mobile ventilator, and multifunctional monitoring devices) that are better suited for air and ground vehicle patient movement.
- f. Lighter, more durable and versatile field X-ray equipment interoperable with reach-back capabilities

FS/HR 1.4-2: Digital Combat Casualty Tracking

Develop technologies to support field medical personnel in the management and tracking of patients from point of injury to arrival at a CONUS medical facility.

FS/HR 1.4-3: Improved Diver Survivability and Performance

- a. Develop technologies to provide lightweight diver survivability suits to increase mission effectiveness, increase diver dexterity, and maintain proper core temperature during prolonged diving conditions in extreme thermal environments. Suit must provide protection in contaminated environments, provide adequate freedom of movement, and allow performance of all missions including in diving in influence minefields.
- b. Develop technology to provide enhanced protection to divers and life support systems against full arsenal of underwater explosives.
- c. Develop technology to provide the divers with situational awareness of life support equipment regardless of water clarity and ambient lighting.

Battlespace Awareness (BA)

The ability to understand force disposition and combatant or friendly intentions as well as the characteristics and conditions of the operational environment that inform national and military decision-making.

2.1 Intelligence, Surveillance, and Reconnaissance (ISR)

BA/ISR 2.1-1: Tactical, Autonomous or Semi-Autonomous Mobile Sensor Platforms

Develop an organic, integrated, multi-intelligence (multi-INT), multi-node persistent ISR sensor network of both manned and unmanned mobile platforms employed in all physical domains including air, surface, subsurface, and ground for small-unit operations. Considerations include:

- a. Networked system should provide an integrated tactical picture to an expeditionary tactical operations center (TOC) or an afloat/mobile operations center, and should be interoperable with operational unit command, control, and communications systems.
- b. Sensor/sensor platforms should be man-portable and/or self-deploying.
- c. Desired sensor/system capabilities should support multi-INT surveillance/ reconnaissance; imaging; target detection/identification; transmitting/receiving audio, video, and digital data to/from surface, subsurface, air and land based communications nodes at extended ranges.
- d. Systems should be able to locate and deconflict friendly sensors, and possess the capability to evade, disrupt, or deceive unfriendly sensors.
- e. Systems should be capable of launch/recovery from expeditionary craft; data relay via unmanned vehicles should have commonality of control interface across platform types; and a reduced cost to “near-disposable.” The system should minimize personnel required to operate and maintain, and allow local sharing of sensor data among distributed tactical units.
- f. Develop smaller underwater vehicles for reconnaissance, surveillance, hydrographic survey, multi-INT collection, high data rate communication, bathymetry, and other underwater tasks in any sea state. Develop indigenous squad element recon micro air vehicle capability for Military Operations on Urban Terrain (MOUT) with internal building of three-dimensional situational awareness.

BA/ISR 2.1-2: Persistent and Scalable Unattended Ground Sensor Networks

Develop technologies that enable self-forming, multi-INT, hyper-spectral, multi-modal, unattended ground sensor networks, for persistent wide area surveillance and/or perimeter defense for expeditionary forces.

- a. Develop sensors, triggers, gateways, and tools that can operate and communicate in multiple environments from triple canopy jungle, to desert terrain and urban environments.

- b. Sensor network should be capable of translating a Commander's intelligence requirements into tailored sensor fields that provide situational awareness, cuing, and target discrimination in complex terrain.
- c. Systems must be secure, tamper-evident, and unobtrusive.
- d. Technologies that reduce the size of sensors, power sources, communication devices, and support employment over extended periods of time can contribute to this capability.

BA/ISR 2.1-3: Intelligent Expeditionary Installation Security

Develop technologies to provide fully integrated situational awareness, decision support, and scalable response for expeditionary perimeter and installation security. Elements include multi-spectral sensor integration including centralized control, display and monitoring; change detection technologies, including intruder detection; access control system to detect explosives, weapons, and unauthorized personnel at critical access control points; and event-based alert with automated recommendations for security personnel and decision makers. Develop non-lethal capabilities to determine dismounted persons or vehicle/watercraft operator intent and if necessary to warn, deter, incapacitate and or disable.

BA/ISR 2.1-4: Persistent and Scalable Unattended Maritime Sensor Networks

Develop improved multi-INT, multi-spectral sensors that provide greater granularity and discrimination, with reduced size, cost, and power requirements for manned and unmanned surface and underwater mobile platforms and unattended maritime sensor networks. Objects of interest include, but are not limited to, swimmers, divers, underwater mines, limpet mines, IEDs, boats, ships, vehicles, obstructions, and other targets of interest ashore. Included within this objective:

- a. Develop a littoral underwater sensor network to conduct reconnaissance, surveillance, communications, and tracking. (Elements might include clandestine multi-INT collection sensors, communication nodes, and pop-up gateway/sensor buoys.) Network should be capable of operating in harbors, very shallow water areas, choke points, and Riverine/inland waterway environments, to detect, identify, and track low-air, surface, and subsurface craft of interest; and alert/cue expeditionary forces.
- b. Develop and employ small, reconfigurable sensor arrays capable of autonomous operation from mobile platforms, or being operated remotely from expeditionary TOCs.
- c. Develop passive acoustic sensors for surface and underwater surveillance capable of cueing, tracking, and identifying underwater threats.
- d. Maritime sensors should be capable of penetrating all maritime environments and weather conditions, including low light, darkness/night, fog, mist/salt spray, clouds, underwater, smoke and other deliberate obscurants.
- e. Technologies that reduce the size of sensors, power sources, communications devices, and support employment over extended periods of time can contribute to this capability.

BA/ISR 2.1-5: Smart Tactical Sensor Technology for Managing Bandwidth

Develop smart, unattended, tactical sensors able to conserve bandwidth. One approach might be to transmit only the actionable or relevant data/intelligence by converting raw sensor data at the point of collection. Sensors should be low in weight, cube, and power requirement; capable of storing and processing data, cueing other air or ground sensors, and providing alerts. Technology should be adaptable to ground, hand-emplaced, UAS-mounted, and vehicle/boat mounted sensors designed for employment at the lowest tactical level for wide area persistent surveillance.

BA/ISR 2.1-6: All Source Level 1, 2, & 3 Fusion and Distribution of Data Relevant to Irregular Warfare and Combating Terrorism

Develop technologies that fuse the results of multi-source persistent surveillance and all source data through a federation of tactical data bases, permit the movement of intelligence information across multiple levels of security, and enable the distribution of actionable intelligence data across the network in near real time. Included within this objective:

- a. Develop algorithms that can queue sensors, translate useful tactical sensor data across all nodes/INTs and security domains in an AOR to tactical understanding (unusual, interesting) and generate automated indications and warnings.
- b. Depict normal activity and perform statistical determination of entity to event relationships.
- c. Create algorithms to relate data and entities to aggregates. Facilitate integration of data and ontology development to understand entity and aggregate activity.
- d. Continually assess the relative suspicion level associated with data, entities and entity aggregates.
- e. Identify technology research requirements supporting distribution requirements, including video streaming to tactical level required to support Distributed Operations.

BA/ISR 2.1-7: Advanced Power Sources (Sensors)

Develop a reliable power source for unattended sensors in both submerged and land environments that minimize/eliminates the need to replace batteries for the required life of the sensor.

BA/ISR 2.1-8: Generation of Actionable Intelligence Enabled by Small Unit Situational Awareness

Develop an intelligent, scalable and non-intrusive tactical user knowledge discovery interface that allows an individual warfighter to harness the power of the local mission-aware tactical sensor field, and integrate with other networks. Provide models of cooperative behavior between sensors that provide situational awareness (visualization within a grid). Develop technologies that enable tactical ISR to support current operations in near real time.

BA/ISR 2.1-9: Specific Entity Awareness (Tag, Track, and Locate)

Develop technologies that enable the ability to positively and clandestinely identify, tag, track, and locate (TTL) entities of interest, and disseminate locating information in real time to Special Operations Force (SOF) assets. Entities of interest include persons, vehicles, structures, surface vessels and underwater platforms. Tagging technologies applicable to vessels transporting Weapons of Mass Destruction (WMD), munitions, explosives, or other contraband are of special interest. The target should be detectable only by own force, design should ensure the process of tagging can be accomplished without detection.

BA/ISR 2.1-10: Autonomous Sensor Deployment in Denied Areas

Develop modular low-signature expeditionary platforms for clandestine autonomous deployment of robotic systems or special multi-INT sensors packages within denied areas ashore or in a maritime environment (wet). Advanced systems could include incorporation of broad area maritime surveillance capabilities.

BA/ISR 2.1-11: Structure-Penetrating Sensors

Develop man-packable urban structure-penetrating sensors capable of detecting and classifying personnel (moving and stationary), detecting firearms, explosives, and identifying construction features from standoff range. Urban structures include buildings, basements, sewers and subterranean complexes.

- a. Develop technologies that provide the same capabilities for shipboard use.
- b. Desired technology should permit the expeditionary operator to determine if building/shipboard compartments are occupied without having to enter; and determine orientation and intent of personnel/behavior prior to entry or engagement.
- c. System should process raw data from penetrating sensors and all intel sources into optimum own-course-of-action decisions enabled by data mining and visualization.

BA/ISR 2.1-12: Sensor Field Planning and Management

Develop tools that enable the design of multi-INT sensor systems that are optimized for the specific mission requirement. Automate sensor field designs that specify the sensor modalities & densities to counter a specific threat against a specified unit and place. Develop tools that can dynamically and autonomously manage/task large numbers of networked sensors.

BA/ISR 2.1-13: Investigative Technologies and Methodologies

Develop technologies enabling maritime security forces to perform real-time onsite exploitation of a scene of interest; to employ investigative forensic methods, pattern analysis, and related capabilities to reconstruct events, establish social connections, and track substances/materials back to their source.

BA/ISR 2.1-14: Expose Enemy Networks, and Anticipate or Influence Their Behavior

Develop automated techniques for establishing causality between entities, considering geo-cultural influences. Develop technology to model enemy decisions and behaviors of interest, and enable their manipulation. Develop techniques to reliably anticipate the actions of irregular actors. Develop algorithms that translate sensor data, tactical understanding and generate automated indications and warnings. Develop the ability to continually assess the relative threat level associated with entities and aggregates.

BA/ISR 2.1-15: Crowd Scanning Systems

Develop a sensor system capable of identifying individuals of interest that could pose threats. The system must have a feedback mechanism that will provide an "alert" to the affected Expeditionary Operators. System should be capable of identifying and providing an operator alerts regarding a person-of-interest within a crowd or approaching a checkpoint, etc. that requires closer inspection. A minimum classification distance of 30 meters is required.

BA/ISR 2.1-16: High-Speed Watercraft Tracking

Develop advanced technologies for light, mobile, land-based detecting and tracking systems for high speed boats in coastal areas.

BA/ISR 2.1-17: Identifying Threat Marksmen

Develop technologies for the mounted and dismounted expeditionary operators to detect, locate and report snipers, trained marksmen, and armed persons through the entire enemy engagement cycle. Integration with current operating picture (COP) is desired.

Force Application (FA)

The ability to integrate the use of maneuvers and engagement in all environments to create the effects necessary to achieve mission objectives.

3.1 Maneuver (MVR)

FA/MVR 3.1-1: Stand-Off Detection of Explosive Hazards (Underwater/Land)

Develop technologies enabling the detection and mitigation of explosive hazards from a safe standoff distance in complex terrain and littoral environments.

- a. Counter-Bomber: one specific application of this technology should enable naval expeditionary personnel at checkpoints and entry points to detect explosives at sufficient distance to enable effective response to the threat of a suicide bomber. Technologies must be capable of screening multiple individuals rapidly over a wide area and not

limited to a single point or isolated individual. Assessment and warning must be near instantaneous.

- b. Detection technologies should address the entire improvised explosive device (IED) kill chain (to include the recruitment of bombers and acquisition of IED components at one end and the identification of the detonators on deployed explosive devices at the other end).

FA/MVR 3.1-2: Multi-Fuel Outboard Engine for Expeditionary Craft

Develop a high-density outboard engine capable of burning F 76 and commercially available diesel fuel as well as jet fuel (JP5/JP8) to eliminate safety and logistical issues associated with shipboard storage and use of gasoline. New technologies should minimize performance reduction when changing from one fuel to the other, and have little or no impact over existing maintenance requirements.

FA/MVR 3.1-3: Mine Detection and Classification from the Surf Zone to the High-Water Mark and Inland

Develop technologies to enable the detection of mines and minefields, from the surf zone through to inland objectives, for sustained operations ashore. Detection technologies must encompass a variety of threats, including surface laid and fully buried mines, as well as both near-field/far-field detection and include multi-spectral approaches with particular emphasis on detecting low-metallic and non-metallic mines. Classification technologies must be able to identify key characteristics of known military ordnance to include ordnance fuzing.

FA/MVR 3.1-4: Organic Mine Clearance Without Cued ISR

Develop systems to clear large areas of mines in shallow water without cued ISR. The intent is to significantly reduce the current MCM timeline for detecting, classifying, identifying, and clearing moored and bottom mines in shallow water.

FA/MVR 3.1-5: Limpet Mine Removal Tool

Develop technologies to enable EOD forces to remotely remove and recover for safety, exploitation and intelligence gathering purposes, threat explosive devices, and special attack charges that may be attached to underwater surfaces of ships, piers, or other underwater structures.

FA/MVR 3.1-6: Watercraft Command-and-Control Station Technology

Develop and integrate multiple technologies that will produce the future “cockpit environment” for families of high-speed expeditionary watercraft. The combination of integrated advanced systems, human interface design, and consoles and displays that are adaptability, scalable, and flexible will provide tactical awareness and enable tailored command and control stations that meet the requirements of future small combatant craft.

FA/MVR 3.1-7: All Terrain Launch/Recovery of Watercraft

Develop an advanced light-weight all-terrain system capable of ground-based insertion and extraction of expeditionary craft across soft mud, sand, or rocky shores. Capabilities must include variable ground clearance for air transport and rough terrain loading, and rapid area ingress and egress in various tidal or water level conditions at random sites that meet operational security requirements.

FA/MVR 3.1-8: Weight Power Generation Systems

Develop advanced power generation systems for increased C4ISR capability that provides two to three times the power rating of conventional generators with weight-to-power ratios less than or equal to 20-30 lbs/Kw without sacrificing payload weight, craft speed, or personnel transport capability. Technologies must be able to supply clean AC and DC power simultaneously, withstand severe marine operational duty cycles, endure harsh maritime environments with corrosion resistance, embody ruggedness to withstand repeated wave impacts, and demonstrate extended life performance.

FA/MVR 3.1-9: Advanced Waterjet Technology

Develop advanced technologies for expeditionary craft that significantly increase acceleration by providing more power output per RPM for waterjets; including cavitation reduction, reduced acoustic signature, variable geometry nozzles, air injection, contra-rotating impellers, and rim drive systems.

FA/MVR 3.1-10: Acoustic and EO/IR Signature Reduction for Watercraft

Develop technologies for significantly reducing the acoustic (air-borne and underwater), electro-optic, and infrared signatures of high-speed craft employed by expeditionary security and Riverine forces.

FA/MVR 3.1-11: Advanced High-Speed Watercraft Load-Isolation Systems

Develop advanced technologies capable of protecting people and mission critical systems from the damaging effects of repetitive loads created at high speeds, including both high frequency vibrations and lower frequency slamming loads. Capabilities should include autonomous systems that sense craft base motions and adapt to protect embarked personnel and equipment.

FA/MVR 3.1-12: On-Command Neutralization of Underwater Explosive Hazards

Develop technologies to either neutralize underwater mines and IED's from a safe distance or induce a pre-detonation/ deflagration in order to remove the threat from maneuvering forces. These technologies include active and passive countermeasures to devices, energetic neutralization methods to kill devices, and mechanical methods to rapidly clear devices.

FA/MVR 3.1-13: UW Explosive Object Recovery

Develop advanced technologies to enable EOD divers to remotely recover for safety, exploitation and intelligence gathering purposes, the full arsenal of underwater explosive objects including influence-actuated naval threat mines.

FA/MVR 3.1-14: MCM and Expeditionary Diving Apparatus

Develop technology for advancements in weight reduction, ergonomics and physiology for underwater breathing apparatus for Explosive Ordnance Disposal (EOD) and divers conducting MCM throughout the water column against a full arsenal of explosives and/or while conducting expeditionary diving operations.

FA/MVR 3.1-15: Advanced Performance Craft for Expeditionary Operations

Develop advanced hull forms or material solutions for the hull structure that will reduce weight fractions by 25 to 30 percent and deliver improved mission payload on the order of one to two thousand pounds. Advanced structural concepts and new material applications for a family of scalable manned or unmanned combatant craft should reduce acquisition and life cycle costs while addressing the need to provide improved payload capacity and sustained speed in challenging operating environments, including exposure to sand, mud, oils, and seawater spray, as well as potential ballistic hazards.

FA/MVR 3.1-16: Advanced Watercraft Transmission Drive Trains

Develop semi-automatic, computer-controlled transmissions for expeditionary craft that increase craft acceleration by providing more power at lower engine RPMs.

FA/MVR 3.1-17: Anti-Fouling Coatings for Aluminum Hulls

Develop advanced coatings for aluminum hulls capable of resisting performance-degrading growth of marine organisms. The coating must be affordable and sufficiently rugged to resist damage or wear from impact or abrasion loads. Coating must also be environmentally compatible.

FA/MVR 3.1-18: High-Speed Amphibious Vehicles

Develop technologies for a high-speed expeditionary craft for Riverine, Maritime Expeditionary Security Force, and other expeditionary missions capable of entry and self-extraction from waterways, and able to transit over both water and rough terrain. Capabilities should include high-speed amphibious maneuver for harbor or Riverine patrols; seamless transition between land and water environments; and the ability to employ weapons while traversing water or land, in projected operational environments.

FA/MVR 3.1-19: Advanced Lightweight Propulsion System

Develop advanced lightweight propulsion systems for combatant craft that enable higher payload fractions without loss of speed, and achieve weight-to-power ratios less than or equal to 1.0 in the 100 Hp to 700 Hp range. The new systems must withstand severe marine operational duty cycles, harsh maritime environments with corrosion resistance, the shock of repeated wave impacts, be jet fuel or diesel fuel compatible, and possess extended life performance.

3.2 Engagement (Engage)

FA/Engage 3.2-1: Advanced Lethal Waterborne Weapons for Use Against Small, Fast Watercraft and Vehicles

Develop advanced lethal, lightweight stand-off weapons systems for use by expeditionary watercraft in both direct and indirect fire support role against inbound small, fast watercraft used as suicide bombers (the “go-fast” threat), and moving ground vehicles near the shoreline. System should be able to defeat multiple craft engaged in swarm tactics. Technologies that should be considered include multi-role precision-guided munitions and advanced man-portable missile systems suitable for the maritime/littoral environment.

FA/Engage 3.2-2: Advanced Non-Lethal, Non-Destructive Waterborne Platform Stopping/Repelling Capability

Develop technologies that provide non-lethal, non-destructive alternatives for maritime expeditionary forces to:

- a. Turn-away, repel, or deter targeted watercraft from approaching: Systems should keep approaching platforms from penetrating an established safe stand-off range around a friendly position, by any means which will not cause permanent damage to the platform or occupants. Concepts for consideration include (but are not limited to) technologies that assume control of platform propulsion/steering; cause discomfort or incapacitate the operator, deny the operator use of his senses or alter his perception, or otherwise cause the operator to turn away. Technologies should permit selectivity of platforms to be influenced, provide near instantaneous and remote activation/employment, and be capable of influencing multiple platforms in rapid succession, day or night, in all weather and environments.
- b. Disable/stop manned watercraft of all sizes: Systems should immobilize platforms without significant damage, breaching hulls or sinking. Capability must permit selectivity of platforms to be stopped, be capable of engaging multiple targets with minimal time between subsequent activations, and allow for remote activation/employment. The capability must function day and night, in all weather and environments. System should allow engagement at a safe standoff range, with initial technology emphasis upon stopping small to medium sized watercraft.

FA/Engage 3.2-3: Swimmer Defeat

Develop advanced technologies for detecting and defeating swimmers/divers, as well as their delivery vehicles and diver propulsion devices, in the littoral maritime environment. Both lethal and non-lethal systems are desired, for the defense and protection of both watercraft and harbor facilities ashore. Systems should be effective in an active harbor/pier environment.

FA/Engage 3.2-4: Mobile Systems to Detect/Engage Low Observable and Low Radar Cross Section (RCS) Threats

Focusing on mobility/expeditionary employment, develop modular and scalable technologies that enable near-real time detection and positive combat identification of UAVs, low slow-flyers, cruise missiles, and other low RCS airborne targets within an integrated fire control network of cooperative engagement weapons and sensors.

FA/Engage 3.2-5: Stabilized Gun Mount

Develop technologies capable of providing low cost and lightweight stabilized mounts for families of weapons systems, including lethal and non-lethal components. Capability must permit selectivity of platforms to be stopped, be capable of engaging multiple targets with minimal time between subsequent activations, and allow for remote activation/employment.

FA/Engage 3.2-6: Lightweight Day-Night Optics

Develop technologies for a durable, lightweight, integrated day/night scope for use on small arms and expeditionary craft-mounted weapons, with target detection and discrimination capability. Desired characteristics include ease of use, low-noise, improved resolution, reduced power consumption, lighter weight, lower cost, and suitable for a maritime environment. Also develop technologies in individual night optics especially in illumination and target designation that are outside enemy light detection spectrums.

FA/Engage 3.2-7: Fires Detection and Engagement Systems for Incoming Direct and Indirect Fires

Develop technologies that enable near-real time detection of incoming fires and position location of the source to facilitate engagement. Technologies that detect and counter small caliber direct fire weapons including snipers in urban terrain are desired. Emphasis should be placed upon advanced lightweight systems suitable for unmanned as well as manned high-speed watercraft and ground vehicles.

FA/Engage 3.2-8: Non-Lethal Technologies to Warn, Deny, Move, Disable and Suppress Individuals (Counter-Personnel)

Develop non-lethal technologies (kinetic and non-kinetic) to warn, deny, move, disable, and suppress individuals or multiple personnel through precision and area engagements that

minimize the risk of significant injury and collateral damage, that produce reversible effects, and that maximize stand-off distance. Technology should prove effective in day, night and all weather environments. Target engagements will focus on locations where the application of lethal fires could be counterproductive to U.S. objectives and strategic goals, and where the threat is irregular and unclear (i.e., environments with a high noncombatant to combatant ratio).

FA/Engage 3.2-9: Non-Lethal Space Clearing

Develop technologies that provide a less lethal alternative to kinetic/blast weapons for employment in urban operations to clear spaces, facilities, or compartments, without the need for naval expeditionary operators to enter the space. Target engagements will focus on locations where the application of lethal fires and/or unintended collateral damage could be counterproductive, and where the threat is irregular and unclear (i.e., environments with a high non-combatant to combatant ratio). Develop technologies that also permit the detection of personnel inside spaces without the need for expeditionary operators to enter or to pre-empt detection systems.

Logistics (Log)

The ability to project and sustain a logistically ready joint force through the deliberate sharing of national and multi-national resources to effectively support operations, extend operational reach and provide the joint force commander the freedom of action necessary to meet mission objectives.

4.1 Deployment and Distribution (DD)

Log/DD 4.1-1: Unmanned Re-Supply and Refueling

Develop advanced packaging and delivery technologies incorporating unmanned, autonomous delivery vehicles (air, surface, and ground) for sustainment of expeditionary forces in remote littoral environments.

Log/DD 4.1-2: Advanced Expeditionary Logistics Chain

Develop technologies that improve the speed and accuracy of the expeditionary logistics chain end-to-end.

- a. Develop packaging technologies that reduce the cube and square of sustainment material, and facilitate point delivery systems and rapid loading/unloading from trucks/vessels (e.g., self-loading/unloading).
- b. Develop advanced unmanned waterborne, aerial, and land delivery systems (connectors) capable of autonomous resupply or refueling to dispersed units of expeditionary operators across the battlespace.
- c. Develop robust, highly mobile automated information technology systems with total asset visibility and assured receipt confirmation, providing an enterprise view of the entire

logistics chain accessible to dispersed units of expeditionary operators across the battlespace.

Log/DD 4.1-3: Cargo Transfer

Develop cargo transfer technologies to increase safety, speed of transfer, and sea-state limits for movement of cargo within sealift ships and discharging to connectors.

Log/DD 4.1-4: Submersible Fuel Storage

Develop advanced technologies capable of providing submersible fuel storage facilities that can be submerged to avoid observation while transiting high threat waterways, and when positioned for resupply operations. Other desirable capabilities could include the unit's ability to transit under its own power while submerged, and the ability to collapse the fuel tanks to minimize the footprint when transported into theater.

4.3 Maintain (Maint)

Log/Maint 4.3-1: Predictive Maintenance System

Develop technologies that allow a comprehensive prognostic/diagnostic and networked maintenance information system that leverages autonomic logistics capabilities embedded in new vehicles and watercraft, and supports legacy vehicle/watercraft to provide for improved predictive and reliability-centered maintenance. Solutions should be compatible with the maritime/littoral environment.

Log/Maint 4.3-2: Long Storage-Life Batteries For Vehicles And Construction Equipment

Develop vehicle batteries that have a storage life of at least 4 years for use aboard Maritime Pre-position Force ships, to enhance readiness and eliminate conventional periodic battery recharging required for vehicles stowed for long periods of time in a pre-positioned status.

Log/Maint 4.3-3: Fuel-Water Ejector Materials

Develop an advanced material solution that provides safe transfer and or separation of fuel and water mixtures in a hazardous fuel tank environment (JP-5, JP-8, diesel) that eliminates the risk of fire and provides reliable service with minimal maintenance.

4.4 Logistics Services (LS)

Log/LS 4.4-1: Advanced Power Sources for Field Applications

Develop advanced portable power sources for field applications that reduce weight and footprint ashore, increase capacity, and lessen dependence on fossil fuels. The ultimate goal is to operate all equipment with a universal or interchangeable self-recharging/ regenerating power source.

Desired characteristics are improved power management, generation, and storage technologies, replacing current batteries with alternatives that are cheaper, environmentally friendly, more compact, lighter weight, and with a longer service life to support expeditionary forces.

Log/LS 4.4-2: HAZMAT/ Field Sanitation

Develop technologies to handle hazardous material to include petroleum spills in harbors and enclosed areas. Develop scalable facilities for waste management (Hazardous Materials (HAZMAT), refuse, human waste) and technologies for reduced waste generation, and the reuse of waste products in order to reduce logistic requirements of naval expeditionary forces.

Log/LS 4.4-3: Agricultural Infestation Control

Develop technology to deter, remove, and/or exterminate vermin, insects, and other pests from vehicles and equipment in order to pass agricultural inspections prior to returning to CONUS from overseas or foreign deployment.

4.6 Engineering (Eng)

Log/Eng 4.6-1: Soil Stabilization System

Develop technologies to prepare terrain for force operations, to include improved material technologies that can be used to rapidly stabilize soils and provide increased bearing capacity, durable surface, and improved dust abatement.

Log/Eng 4.6-2: On-Site Manufacturing of Construction Materials

Develop technologies to enable in-field manufacturing of construction materials with physical properties of wood, steel and concrete.

Log/Eng 4.6-3: Lightweight and High-Mobility Bulldozers

Develop technologies to support a new generation of lightweight (<25,000 lb) and high mobility bulldozers for use in expeditionary operations. The new bulldozers should have the same productivity as the D-7 Bulldozer but be small and light enough to be airlifted by heavy-lift helicopters.

Log/Eng 4.6-4: Untethered Underwater Power Tools for Divers

Develop technologies to power underwater tools for divers without need for attached lines, hoses, or cables (such as are required with current hydraulic tool packages). Examples of diver tool applications include, but are not limited to: powered hacksaw, nut splitter, and power wrench. Target technologies should significantly reduce the weight as compared to hydraulic underwater tools currently employed, permit untethered use, remain neutrally buoyant when submerged, yet

have sufficient torque to drill through 1 to 2 inch steel plate, or a power ratchet that could produce a running torque of 35-90 ft-lbs on a 5/8 inch fastener, as examples.

Command and Control (C2)

The ability to exercise authority and direction by a properly designated commander or decision maker over assigned and attached forces and resources to accomplishment a mission.

5.2 Understanding (Und)

C2/Und 5.2-1: Improved Situational Awareness for Distributed Expeditionary Forces

Develop appropriate cognitive technologies, intelligent agent technologies, information management and other relevant technologies to enable distributed expeditionary forces to effectively converge and utilize the future network of d disparate information. Develop technologies to appropriately access tailored information to automatically provide relevant information to the specific echelon, joint, or combined force in the naval expeditionary battlespace. Provide for incorporation of information and data from existing systems in the emerging architecture. System must be responsive to a dynamic and ever changing environment.

C2/Und 5.2-2: Advanced Blue Force Location and Identity

Develop passive and active methods for real time determination of location and identity of own forces within the battlespace. Provide tools for discovery, retrieval, and presentation of the most relevant/highest quality data and information regardless of source. Must identify both U.S. and coalition entities.

C2/Und 5.2-3: Underwater Heads-Up Display and Enhanced Vision for Divers

Develop a mask or strap-on display for divers that provides high resolution, real-time image capability (using acoustic or other technologies) for the diver in low-visibility environment caused by conditions of low light or turbidity. Develop technologies to incorporate imaging navigation or object location systems and other situational awareness tools into a heads-up type display for the diver.

C2/Und 5.2-4: Ship Identification and Reference Tool

Develop a tool that will enable rapid classification of ships and commercial vessels with the ability to rapidly call up schematics and ship blueprints to enable Visit Board Search and Seizure (VBSS) teams to readily identify ships and boats by class and then provide a blueprint to guide in the conduct of the search. Develop technologies that enable supporting forces to track VBSS team movement within the vessel and enable the team's navigation through the passageways, obviating the need for "pacecounts" or electronic "breadcrumbs. Ensure compatibility with NORAD/USN Maritime Domain Awareness initiatives.

C2/Und 5.2-5: Under Hull Reference Tool

Develop technologies that will enable rapid understanding of under-hull features for navigation and tracking of friendly forces performing force protection services. Technology should include identification of diver hazard areas and provide a method of identifying areas of the hull previously searched by the divers.

C2/Und 5.2-6: Through-Water Communication

Develop technologies to improve communications and command and control capabilities for friendly forces performing force protection services. Technology should explore both tethered and un-tethered systems.

Net Centric (NC)

The ability to provide a framework for full human and technical connectivity and interoperability that allows all DoD users and mission partners to share the information they need, when they need it, in a form they can understand and act on with confidence, and protects information from those who should not have it.

6.1 Net Information Transport (IT)

NC/IT 6.1-1: Self-Deployed Communications Relay

Develop technologies that will enable unmanned or autonomous air, surface, or underwater vehicles to perform as a data relay platform (or deploy relay devices) that extend communications beyond line-of-sight.

6.3 Net Management (NM)

NC/NM 6.3-1: Scalable, Mobile, Secure Over the Horizon (OTH) Digital Communication Networks

Develop network-centric technologies that enable expeditionary operators to securely and reliably communicate digital data, audio, audio/video, and high-resolution imagery OTH and on the move, with each other and to interoperate with other maritime/joint/combined forces and headquarters. Technologies should support distributed and coordinated maneuver, leverage joint fires, and provide searchable, real-time information to both ground-based and waterborne expeditionary operators. Capabilities should include providing a “pipeline” to both indigenous authorities as well as Non-Government Organization (NGO)/Private Volunteer Organization (PVO) entities within theater, in order to aid in their situational awareness.

6.4 Information Assurance (IA)

NC/IA 6.4-1: Multilevel Information Security and Information Assurance

Develop technologies that enable the integration of unclassified and classified systems for joint and coalition operations, while maintaining the unclassified status of the unclassified systems. Develop rapid decision tools to enable segregation of data for injection into classified systems. Provide appropriate authentication, encryption, and information assurance/integrity functions in conditions typical to distributed Navy Expeditionary operations within the littoral environment.

NC/IA 6.4-2: Intelligent Network Monitoring, Maintenance, and Mobility

Develop intelligent network management technologies to enable the real time monitoring, maintenance and distribution of the network status, connected systems, and all factors affecting network availability. Provide technologies that enable automatic recovery, alerting, and countermeasures net intrusion as well as graceful reconfiguration/ degradation of the network as nodes are lost.

Protection (P)

The ability to prevent/mitigate adverse effects of attacks on personnel (combatant/non-combatant) and physical assets of the United States, allies and friends.

7.1 Prevent (Prev)

P/Prev 7.1-1: Adaptive Camouflage

Develop adaptive (active) camouflage technologies to conceal expeditionary operators, platforms, and equipment. Advanced camouflage systems should create the illusion of transparency, allowing expeditionary operators to blend into their surroundings in order to prevent visual detection.

P/Prev 7.1-2: Enhanced CIED and WMD Prevention

Develop technologies in detection, access, diagnostics and disablement/disruption to adapt to future threats in CIED and WMD devices to include unconventional ordnance and asymmetric terrorist threats.

7.2 Mitigate (Mit)

P/Mit 7.2-1: Improved Protection for Individuals

Develop technologies that will provide the following specific improvements in protection for individual operators (items a-h). Desired advancements in personnel protection can be developed and fielded individually or in combination:

- a. Protect operators against injury, impairment, or mission degradation against fragments, projectiles, and blades through improved body armor and helmet systems. Improved body armor should offer increased protection to neck, shoulder and side. Desired characteristics include quick-donning functionality, quick-release, thermal protection (especially cooling), ergonomic, lightweight, and built in physiological monitoring system (smart armor). Develop technology to provide for quick-release, automatic release, and controlled/selectable buoyancy to prevent drowning in the event of incapacitation in water.
- b. Improved, multi-purpose eye protection against hazards in the littoral battlespace including projectiles, chemicals, multi-spectral lasers, bright light, sun, dust, and debris.
- c. Full body protection for chemical, radiological, and biological environment. Capabilities should include integral threat detection, and the means to decontaminate with a reduced (or no) water requirement. Technology should minimize environmental factors such as heat on mission effectiveness.
- d. Full body protection against fire.
- e. Full body protection against lasers/directed energy weapons.
- f. Protect expeditionary operators (including injured and incapacitated personnel) from natural or deliberate infection, parasites, insects and life-threatening organisms.
- g. Full body blast protection.
- h. Personal signature management.
- i. Develop technologies to totally mask the movement, signature and operations of technicians responding within the coverage area of active and passive sensors.
- j. Investigate technologies to integrate environmental (thermal cooling/heating) and Chemical, Biological, Radiological, Nuclear and/or Explosive (CBRNE) protection into EOD Bomb Suits without additional weight.

P/Mit 7.2-2: RPG Defense for Watercraft and Vehicles

Develop lightweight technologies that provide active and passive protection for expeditionary craft and vehicles against rocket propelled grenades and guided missiles without unacceptable threat to supporting forces or non-combatants in the proximity to the craft. Where applicable, develop technologies that enable threat-specific protection to be readily added to vehicles and platforms as needed for a specific mission or to counter an emerging threat.

P/Mit 7.2-3: Enhanced Lightweight Armor Systems for Watercraft

Develop technologies for lightweight armor systems (less than 5 lbs per square foot) for expeditionary security force and riverine craft that protect crew and vital systems against threats up to .50 caliber armor piercing projectiles and explosively formed projectiles. A key goal should be to reduce protection system weight in order to minimize impact on craft speed, maneuverability, and payload. Solutions for both dual-use structures and appliqués are desired (appliqués enable threat-specific protection to be readily added in theater, while dual-use structures incorporate threat protection elements within primary structural members).

P/Mit 7.2-4: Hardened Expeditionary Facilities and Infrastructure

Develop technologies that enhance physical security of individuals and facilities. Specific requirements exist for individual protective shelters, hardened expeditionary facilities, hardened security posts, access control and biometric identification, and other facility protective systems.

Building Partnerships (BP)

The ability to set the conditions for interaction with partner, competitor or adversary leaders, military forces, or relevant populations by developing and presenting information and conducting activities to affect their perceptions, will, behavior, and capabilities.

8.1 Communicate (Comm)

BP/Comm 8.1-1: Speech Translation

Develop man-portable technologies that provide multi-lingual and multi-dialect, real-time two-way audio/reader translator. The system should be capable of storing dialog. It should provide near real-time automated translation of multiple languages to/from English, speech and pattern recognition, inflection, accent, and urgency recognition.

BP/Comm 8.1-2: Portable Translator for Text

Provide near real-time translation of multiple languages to/from the English, including both inputted (keyboarded) text and scanned documents.

8.2 Shape

BP/Shape 8.2-1: Civil Information Management for Civil Military Operations

Maritime Civil Affairs and Security Training (MCAST) Command needs improved capabilities to collect, store, process, analyze, visualize, and disseminate (share) civil information in support of Irregular Warfare, Overseas Contingency Operations, Civil Military Operations, Security Cooperation, Humanitarian Assistance/Disaster Relief Operations, and/or other non-lethal operations across the full spectrum. Standardized collection methods and reporting/analysis tools will enable Maritime Civil Affairs Generalists and other forces conducting Civil Military Operations (CMO) to push raw, unclassified data related to the civil domain to both the supported commander and MCAST Command where a spatial, relational, temporal database will reside, housing both structured and unstructured data in order to enable decision makers to analyze, visualize and understand the civil domain of the operational environment.

BP/Shape 8.2-2: Cultural and Language Proficiency Tools

Develop language and cultural learning tools to enable expeditionary operators to maintain/improve language proficiency while simultaneously expanding their cultural knowledge

and effectiveness. This must include enhancement of culture general skills enhancing the capability to move rapidly between geo-cultural environments. Technologies must be flexible and ideally will be capable of broad application for both military information technology platforms as well as common commercial platforms (e.g., iPod) to provide maximum opportunities for use.

BP/Shape 8.2-3: Influence and Effects Measurement Tools

Develop the science-based technologies to enable expeditionary forces to plan, execute and measure the effects of naval expeditionary force actions to influence contested populations. These tools and methods must be usable by non-subject matter experts.

BP/shape 8.2-4: Operational Data Collection

Develop methodologies for rapid, relevant data collection in existing and emergent operational environments that captures the operationally relevant socio-cultural information by non-subject matter experts.

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4.0 Way Ahead

The goal of the NECC S&T Strategic Plan is to continually develop the integrated Expeditionary Warfare Technology Process and to set objectives that are coherent, defensible and focused on the needs of the Expeditionary Force.

4.1 S&T Operational Goals

The NECC S&T Strategic Plan is a living document that allows for continuous updates and adaptation of processes to better support the needs of the warfighter. The next planned revision should be complete by the summer of 2011. In the interim, the following list of goals and initiatives outline a two year plan for updating the NECC S&T Strategy:

Operational Goal #1: Develop a Technology Review Process that Facilitates and Accelerates the Pace of Technology Transition

Initiative 1.1: Articulate Requirements – Define and document the processes for Expeditionary forces to articulate operational requirements and shortfalls.

Initiative 1.2: Prioritize Investments – Conduct regular S&T assessments and analyses in support of initiatives focused on technological maturity, applicability and priority of mission needs.

Initiative 1.3: Communicate Needs – Provide an integrated Expeditionary Force S&T investment plan recommendation to OPNAV, ONR and other appropriate sponsors on an annual basis for consideration and resourcing.

Operational Goal #2: Investment Plan – Provide Guidelines in Order to Maximize the Effective use of Limited S&T and RDT&E Resources

Initiative 2.1: Quantify Payoffs – Produce an investment strategy that integrates, aligns and prioritizes S&T investments that quantify technology payoffs.

Initiative 2.2: Identify Shortfalls – Align technology investment with Expeditionary Force priority capabilities and invest in critical technologies.

Operational Goal #3: Formalized Process – Create a Process to Track Technology Solution from Identified Need to Delivered Capability (Cradle to Grave)

Initiative 3.1: Advertise Initiative – Communicate to all NECC warfighters the importance of reporting technology deficiencies (need) up their chain of command and to the NECC N9 department.

Initiative 3.2: Encourage Feedback – Create an easy-to-use system that simplifies the technology need process and encourages useful feedback from the operators.

Initiative 3.3: Monitor the Process – Implement a means to provide continuous monitoring and allocates responsibilities for actions and follow up along the technology transition path.

Initiative 3.4: Leverage Efforts – Implement coordination and tracking of initiatives between S&T and R&D activities, PEOs, Program Managers, Resource Sponsors, Warfighters, to leverage and maximize efforts.

Operational Goal #4: Process Measurement – Develop a Means to Gauge the Effectiveness of Transition Efforts

Initiative 4.1: Create Metrics – Develop a system that defines clear milestones, provides tracking, and establishes reporting points for maintaining situation awareness throughout the technology transition process and alerts to potential slowdowns in progress.

4.2 Feedback and Plan Updates

This NECC S&T Strategic Plan will be revised at not less than two-year intervals to keep current with user needs and technology opportunities. This will allow NECC to provide current guidelines for S&T programs and focus communications between researcher and user communities.

Readers are encouraged to provide ideas, feedback and suggestions to NECC N9. Please see Annexes D and E for contact information and directions.

5.0 Conclusion

This NECC S&T Strategic Plan describes an S&T vision, Technology Transition Process, NECC S&T focus areas and specific STOs for NECC. It has outlined the technology requirement identification, development and transition processes. It also addresses who is involved, what is required to be successful, how and where program transition occurs, and why this transition is a valuable tool for rapidly filling warfighter capability needs. Most importantly, successful technology transition is a result of formal dialogue and continuous communication amongst all communities involved.

The S&T Community identifies and develops available technologies that may satisfy the material solution to a valid capability need of the warfighter. The STOs represent technology focus areas that NECC intends to address through the technology development community. STOs are technology “demand signals” from the warfighter that are viewed as critical to closing capability gaps that are derived from the assessment of NECC Force requirements.

T&E and MUAs are foundational S&T activities that will ultimately determine the best solution for meeting the needs of the warfighter. Good S&T planning balances the need to support future warfighting concepts with the need to support research in other areas that may produce breakthroughs warfighters have not yet envisioned. Successful transition relies on close partnering with the principal communities. This plan provides a comprehensive listing of NECC STOs aligned under the Joint Capability Areas and reflects NECC’s top concerns intended to assist the S&T community in focusing efforts where the greatest gains can be realized.

In closing, discussion is underway to establish a technology review process that facilitates and accelerates the pace of technology transition in order to bring together the Warfighter, R&D, Acquisition Communities and Resource Sponsors to leverage technology investments across the various Expeditionary Warfare missions. This process will integrate, align and prioritize investments to meet Expeditionary Warfare strategic technology goals.

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Annex A: Science and Technology Linkage Tables

The tables on the following pages (A1-A10) reflect a mapping of the NECC warfighting STOs to the FNC Pillars, FNC Naval S&T Warfighting Gaps, ONR Focus Areas, and similar STOs from relevant organizations and enterprises. These linkages are provided to identify potential collaboration partners and facilitate leveraging of S&T efforts.

These cross focus areas and FNC gap requirements reflect the integrated nature of the warfare requirements. This is reflected in the cross organizational teams which ONR has developed to address FNC gaps and Warfighter's S&T requirements and also allows for leveraging a wide variety of efforts in bringing capabilities forward. In addition, it maps them to other S&T Plans.

STO Organization.

As previously mentioned in Section 3.2, STOs have been organized into categories based upon the nine overarching tasks of the Joint Capability Areas (JCAs).

- Force Support (FS)
- Battlespace Awareness (BA)
- Force Application (FA)
- Logistics (Log)
- Command and Control (C2)
- Net-Centric (NC)
- Protection (P)
- Building Partnerships (BP)

STO Linkages.

Summary tables of STO linkages are provided on the subsequent pages. After each STO, linkages are indicated that map to related constructs. A description of each linkage category is provided below:

FNC Pillars

For each STO, a FNC Pillar has been proposed as having primary cognizance. The FNC Pillars are:

- Naval Expeditionary Maneuver Warfare (NEMW)
- Sea Strike (STK)
- Sea Shield (SHD)
- Sea Base (BAS)
- FORCEnet (FNT)
- Enterprise and Platform Enablers (EPE)
- Capable Manpower (CMP)

- Force Health Protection (FHP)

OPNAV POM 12 S&T Naval Warfighting Gaps:

Each STO linkage is cross referenced to one or more of the POM FY 2012 Naval S&T Warfighting Gaps. This list is updated annually by the Department of the Navy (DoN) (OPNAV N8 lead) as the basis of FNC investment in advanced technology development. Each gap is assigned to one of eight Flag-led Integrated Process Teams (IPTs) responsible for seeking out appropriate S&T solutions. NECC coordination with these IPTs is critical to leveraging FNC funds.

The FNC Program represents about one-third of ONR's annual budget. Properly leveraged, the FNC Program can be a key avenue to establishing S&T programs to enhance Navy Expeditionary capabilities in the three to five-year timeframe. FNC Naval Warfighting Gaps are defined under the appropriate IPT by incorporating input from the warfighting entities.

For more detail regarding the summary of the TOG approved FY 12 FNC gaps on SIPRnet, go to <http://www.onr.navy.smil.mil>

ONR S&T Focus Areas:

In the Naval S&T Strategic Plan approved 19 January 2007, the Chief of Naval Research established 13 Science and Technology Focus Areas. Each ONR Focus Area represents critical naval warfighting S&T needs, distilled from top-level guidance and stakeholder input. This linkage alerts the appropriate managers within ONR that a particular NECC Technology Objective is possibly an item under their cognizance.

The following 13 S&T focus areas, delineated in the ONR Naval Strategic Plan, are described as they pertain to NECC:

Power and Energy (P&E) – Provide for efficient and secure power systems which support energy security and efficiency.

Operational Environments (OE) – Provide the ability to utilize the environment for tactical advantage in support of mobile autonomous environmental sensing and predictive capability of operational environments.

Maritime Domain Awareness (MDA) – Provide for the ability to locate and track targets of interest using integrated networks of persistent sensor in support of developing and maintaining a coherent operational picture.

Asymmetric and Irregular Warfare (AIW) – Provide the ability of Naval forces to identify, anticipate, preempt and defeat adaptive threats operating within the battlespace, both the physical and the human socio-cultural domain.

Information Superiority and Communication (ISC) – Provide the warfighter the ability to take appropriate actions utilizing automated and integrated decision making tools. Provide the ability to operate in cyber challenged environment.

Power Projection (PP) – Provide precise extended range fires with scalable effects in support of defeating an adversary's ability to conduct operations.

Assure Access and Hold at Risk (AA) – Provide maritime littoral and riverine access to denied areas and hold strategic and tactical targets at risk using lethal and non-lethal means.

Distributed Operations (DO) – Enable dispersed, small units to dominate an extended battlespace through training, network connectivity, and enhanced situational awareness while supported by logistics and fires.

Naval Warfighter Performance (NWP) – Enhance warfighter performance and decision making to provide for improved effectiveness and efficiency across kinetic and non-kinetic missions.

Survivability and Self Defense (SSD) – Provide manned and unmanned platforms and forces to operate safely on hostile environments.

Platform Mobility (PM) – Develop agile fuel efficient and flexible platforms capable of operating in any environment.

Fleet and Force Sustainment (FFS) – Provide the warfighter with accurate and timely supplies and equipment.

Total Ownership Cost (TOC) – Reduce the cost of ownership of systems.

Linkage Tables

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
FS FPREP 1.2-1	Advanced High-Fidelity, Fixed-Site and Field-Exportable Expeditionary Training and Simulation	CMP	34	NWP, DO	HPT&E 5	T&E 1,5, 6, 8,9,10	13	NWP 1

Table 1: Force Support (FS) Force Preparation (FPREP) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
FS HR 1.4-1	Improve Life-Support for Casualties at Point of Injury Through Evacuation	EMW, FHP	32,38-41	NWP	LOG 12	Med 1, 6	none	NWP 3
FS HR 1.4-2	Digital Combat Casualty Tracking	EMW, FHP	32,40,41	NWP	LOG 6	Med 4	none	NWP 3
FS HR 1.4-3	Improved Diver Survivability and Performance	EMW, FHP	29,55	NWP	HPT&E 3	none	none	none

Table 2: Force Support (FS) Health Readiness (HR) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
BA ISR 2.1-1	Tactical Autonomous or Semi-Autonomous Mobile Sensor Platforms	FNT	17	MDA,PM,AA, AIW,DO,OE	ISR 1	Intel 1	2, 6,11	STK 4, C4ISR 4
BA ISR 2.1-2	Persistent and Scalable Unattended Ground Sensor Networks	FNT	17	MDA,DO,AI W,OE,SSD	ISR 2	Intel 1	11	C4ISR 4
BA ISR 2.1-3	Intelligent Expeditionary Installation Security	EMW	29,31	ISC, DO	none	Intel 2, FP 2	none	C4ISR 4
BA ISR 2.1-4	Persistent and Scalable Unattended Maritime Sensor Networks	FNT	17	MDA,DO,OE	ISR 3	none	3, 5, 6, 11, 19	SUW 1, USW 1, C4ISR 4
BA ISR 2.1-5	Smart Tactical Sensor technology for Managing Bandwidth	FNT	15,17	ISC,DO	ISR 4	Intel 6	none	none
BA ISR 2.1-6	All Source Level 1, 2, & 3 Fusion and Distribution of Data Relevant to Irregular Warfare and Combating Terrorism	FNT	15,17	ISC,AIW,DO	ISR 5	Intel 7	11	C4ISR 1
BA ISR 2.1-7	Advanced Power Sources (Sensors)	EPE	4	P&E	LOG 1	Intel 2	1	none
BA ISR 2.1-8	Generation of Actionable Intelligence Enabled by Small Unit Situational Awareness	FNT,EMW	17,29	DO,MDA	ISR 10	Intel 7	11	C4ISR 5
BA ISR 2.1-9	Specific Entity Awareness (Tag, Track and Locate)	FNT,EMW	17,31	AA,MDA,AI W	ISR 6	Intel 4	11	none
BA ISR 2.1-10	Autonomous Sensor Deployment in Denied Areas	FNT	17	MDA,AA,PM	ISR 7	Intel 2	2, 3, 5, 6, 11	none
BA ISR 2.1-11	Structure-Penetrating Sensors	FNT,EMW	17,29,40	MDA,AIW	ISR 8	Intel 3	none	none
BA ISR 2.1-12	Sensor Field Planning and Management	FNT	17	ISC,AIW,MD A,AA	ISR 9	Intel 1	11	none
BA ISR 2.1-13	Investigative Technologies and Methodologies	EMW	29,31	AIW	ISR 12	Intel 10	none	none
BA ISR 2.1-14	Expose Enemy Networks, and Anticipate and Influence Their Behavior	EMW	31	AIW	HPT&E 11	Intel 5	none	none
BA ISR 2.1-15	Crowd Scanning Systems	EMW	31	AIW	none	IW 2	none	none
BA ISR 2.1-16	High-Speed Watercraft Tracking	FNT,EMW	17,29	MDA,SSD	FIRES 8	none	6	none
BA ISR 2.1-17	Identify Threat Marksmen	EMW	29, 31	AIW	none	FP 6	none	none

Table 3: Battlespace Awareness (BA) Intelligence, Surveillance, Reconnaissance (ISR) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
FA MVR 3.1-1	Stand-off Detection of Explosive Hazards (underwater/land)	SHD,EMW	18,29,31	AA,AIW	FP 9	MVR 1	9	FP 2
FA MVR 3.1-2	Multi-Fuel Outboard Engine for Expeditionary Craft	EPE,EMW	4,29	PM,P&E	MVR 8	none	none	none
FA MVR 3.1-3	Mine Detection and Classification from the Surf Zone to the High-Water Mark and Inland	SHD,EMW	18,29,31	AA	FP 10	MVR 7	9	FP 2
FA MVR 3.1-4	Organic Mine Clearance without Cued ISR	SHD,EMW	18,29,31	AA	none	MVR 7	9	FP 2
FA MVR 3.1-5	Limpet Mine Removal Tool	SHD,EMW	18,29,31	AA, AIW	none	none	9	FP 2
FA MVR 3.1-6	Watercraft Command-and-Control Station Technology	EMW	29	PM	C2 7	none	none	none
FA MVR 3.1-7	All Terrain Launch/Recovery of Watercraft	EMW	29	PM	MVR 2	none	none	none
FA MVR 3.1-8	Weight Power Generation Systems	EPE,EMW	4,29	P&E,PM	MVR 5, 6	MVR 1	1	none
FA MVR 3.1-9	Advanced Waterjet Technology	EMW	29	PM	MVR 7	none	none	none
FA MVR 3.1-10	Acoustic and EO/IR Signature Reduction for Watercraft	EMW	29	AA,AIW,SSD,DO	MVR 3	none	17	none
FA MVR 3.1-11	Advanced High-Speed Watercraft Load-Isolation Systems	EMW	29	PM	MVR 4	none	none	none
FA MVR 3.1-12	On-Command Neutralization of Underwater Explosive Hazards	SHD,EMW	18,29,31	AA,AIW	none	none	9	FP 2
FA MVR 3.1-13	UW Explosive Object Recovery	SHD,EMW	18,29,31	AA, AIW	none	none	none	none
FA MVR 3.1-14	MCM and Expeditionary Diving Apparatus	SHD, EMW	18,29	SSD	none	none	none	none
FA MVR 3.1-15	Advanced Performance Craft for Expeditionary Expeditionary Operations	EMW	29	PM	MVR 1	none	none	none
FA MVR 3.1-16	Advanced Watercraft Transmission Drive Trains	EPE,EMW	29	PM	MVR 6	MVR 1	none	none
FA MVR 3.1-17	Anti-Fouling Coatings for Aluminum Hulls	EMW	29	PM	LOG 4	Log 7	none	none
FA MVR 3.1-18	High-Speed Amphibious Vehicles	EMW	29	PM, DO	MVR 9	none	none	none
FA MVR 3.1-19	Advanced Lightweight Propulsion Systems	EMW	29	PM	MVR 7	none	none	none

Table 4: Force Application (FA) Maneuver (MVR) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
FA Engage 3.2-1	Advanced Lethal Waterborne Weapons for Use Against Small, Fast Watercraft and Vehicles	STK,SHD,E MW	13,22,29	AA,AIW,DO, PP	Fires 1	Fires 1	12, 3	none
FA Engage 3.2-2	Advanced Non-Lethal, Non-Destructive Waterborne Platform Stopping/Repelling Capability	STK,SHD,E MW	13,22,29,31	AA,DO	Fires 3,4	EoF 2	18	none
FA Engage 3.2-3	Swimmer Defeat	FNT,SHD,E MW	17,21,29	SSD, MDA	FP 4	none	3, 19	none
FA Engage 3.2-4	Mobile Systems to Detect/Engage Low Observable and Low Radar Cross Section (RCS) Threats	SHD,EMW	22,29,31	SSD	FP 7	FP 3,4	8	none
FA Engage 3.2-5	Stabilized Gun Mount	STK,SHD,E MW	13,22,29	DO,PP	Fires 6	none	none	none
FA Engage 3.2-6	Lightweight Day-Night Optics	EMW	29	DO	Fires 9	Fires 2	none	none
FA Engage 3.2-7	Fires Detection and Engagement Systems for Incoming Direct and Indirect Fires	FNT,EMW	17,29	PP,SSD,DO	Fires 7	Fires 1	none	none
FA Engage 3.2-8	Non-Lethal Technologies to Warn, Deny, Move, Disable, and Suppress Individuals (Counter-Personnel)	EMW	29, 31	AIW, DO	Fires 2	EoF 1	none	none
FA Engage 3.2-9	Non-Lethal Space Clearing	EMW	29	DO	none	EoF 4	none	none

Table 5: Force Application (FA) Engage (Engage) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
LOG DD 4.1-1	Unmanned Resupply and Refueling	EMW	32	DO	LOG 10	Log 4, AVN 12	2	none
LOG DD 4.1-2	Advanced Expeditionary Logistics Chain	DO,FFS	25,32	DO,FFS	LOG 2	Log 1,3 SEA 4,5,6,7	14	ILS 1
LOG DD 4.1-3	Cargo Transfer	EMW	32	FFS	none	SEA 2, 3,8	14	none
LOG DD 4.1-4	Submersible Fuel Storage	EMW	32	FFS	LOG 7	none	none	none

Table 6: Logistics (LOG) Deployment and Distribution (DD) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
LOG MAINT 4.3-1	Predictive Maintenance System	EMW	32	DO,TOC,FFS	LOG 3	Log 2	14	none
LOG MAINT 4.3-2	Long Storage-Life Batteries for Vehicles and Construction Equipment	EPE	4	P&E	LOG 1	SEA 5	1	none
LOG MAINT 4.3-3	Fuel-Water Ejector Materials	EMW	32	PM,FFS	none	none	none	none

Table 7: Logistics (LOG) Maintain (MAINT) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
LOG LS 4.4-1	Advanced Power Sources (Field Applications)	EPE	4	P&E	LOG 1	Log 9	1	none
LOG LS 4.4-2	HAZMAT/ Field Sanitation	EMW	32	FFS	none	none	10	none
LOG LS 4.4-3	Agricultural Infestation Control	EMW	32	FFS	none	none	none	none

Table 8: Logistics (LOG) Logistics Services (LS) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
LOG ENG 4.6-1	Soil Stabilization System	EMW	29,32	PM	LOG 5	none	none	none
LOG ENG 4.6-2	On-Site Manufacturing of Construction Materials	EMW	29	FFS	none	Log 9	14	none
LOG ENG 4.6-3	Lightweight and High Mobility Bulldozers	EMW	29	FFS	none	none	none	none
LOG ENG 4.6-4	Un-tethered Underwater Power Tools for Divers	EMW	29	P&E	HPT&E 4	none	none	none

Table 9: Logistics (LOG) Engineering (ENG) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
C2 UND 5.2-1	Improved Situational Awareness for Distributed Expeditionary Forces	FNT,EMW,CMP	15,17,29	ISC,DO,MDA	C2 4	C2 4	13	C4ISR 1
C2 UND 5.2-2	Advanced Blue Force Location and Identity	FNT	17	AA,DO	C2 5	C2 5	none	C4ISR 6
C2 UND 5.2-3	Underwater Heads-Up Display and Enhanced Vision for Divers	EMW	29	AA	HPT&E 3	none	none	none
C2 UND 5.2-4	Ship Identification and Reference Tool	EMW	29, 31	DO	none	IW 5	none	none
C2 UND 5.2-5	Under Hull Reference Tool	EMW	29, 31	AA	none	none	none	none
C2 UND 5.2-6	Through-Water Communication	FNT, EMW	15, 29, 31	AA, DO	none	none	none	none

Table 10: Command and Control (C2) Understanding (UND) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
NC IT 6.1-1	Self-Deployed Communications Relay	FNT,EMW	15,29	ISC,DO	C2 6	C2 1	none	C4ISR 3

Table 11: Net-Centric (NC) Understanding (UND) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
NC NM 6.3-1	Scalable, Mobile, Secure OTH Digital Communication Networks	FNT	15	ISC,DO	C2 1	C2 1	none	C4ISR 3

Table 12: Net-Centric (NC) Net Management (NM) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
NC IA 6.4-1	Multilevel Information Security and Information Assurance	FNT	15	ISC	C2 2	C2 2	none	C4ISR 2
NC IA 6.4-2	Intelligent Network Monitoring, Maintenance, and Mobility	FNT	15	ISC	C2 3	C2 3	none	C4ISR 3

Table 13: Net-Centric (NC) Information Assurance (IA) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
P PREV 7.1-1	Adaptive Virtual Camouflage	EMW	38,39	DO,SSD	FP 6	none	none	FP 1
P PREV 7.1-2	Enhanced CIED and WMD Prevention	SHD,EMW	18,29	SSD,AA	FP 10	FP 1	none	NWP 3

Table 14: Protection (P) Prevent (PREV) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
P MIT 7.2-1	Improved Protection for Individuals	SHD,EMW	18,29	SSD,AA	FP 10	FP 1	none	NWP 3
P MIT 7.2-2	RPG Defense for Watercraft and Vehicles	EMW	29	SSD	FP2	MVR 2	none	FP 1
P MIT 7.2-3	Enhanced Lightweight Armor Systems for Watercraft	EMW	29	SSD	FP3	MVR 2	none	FP 1
P MIT 7.2-4	Hardened Expeditionary Facilities and Infrastructure	EMW	29	SSD	none	none	none	none

Table 15: Force Protection (FP) Mitigate (MIT) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
BP COMMS 8.1-1	Speech Translation	EMW,CMP	29,34,36	AW	HPT&E 1	EoF 3, IW 6	none	none
BP COMMS 8.1-2	Portable Translator for Text	EMW,CMP	29,34,36	AW	HPT&E 2	IW 2	none	none

Table 16: Building Partnerships (BP) Communicate (COMMS) NECC Technology Objectives

NECE STO DESIGNATION	NECE STO TITLE	RELATED FNC IPT	RELATED POM-12 FNC GAP	RELATED 2009 ONR FOCUS AREA	RELATED 2009 NSW STO	RELATED 2009 USMC STO	RELATED 2009 SWE STO	RELATED 2008 NAE STO
BP Shape 8.2-1	Civil Information Management for Civil-Military Operations	EMW	29	AW, DO	none	IW 3	none	C4ISR 1
BP Shape 8.2-2	Cultural and Language Proficiency Tools	EMW	29, 31	AW, DO	none	IW 6	none	none
BP Shape 8.2-3	Instrument and Effects Measurement Tools	EMW	29, 31	AW	HPT&E 10	none	none	none
BP Shape 8.2-4	Operational Data Collection	EMW	29, 31	AW	none	none	none	C4ISR 1

Table 17: Building Partnerships (BP) Shape (Shape) NECC Technology Objectives

Annex B: NECC Forces, Functions, and Capabilities

1. Navy Expeditionary Combat Command (NECC) Forces.

NECC is the functional command for the following organizations:

- Naval Construction (Seabees)
 - First Naval Construction Division (INCD)
 - Naval Mobile Construction Battalions (NMCB)
 - Seabee Readiness Group (SRG)
 - Naval Construction Regiments (NCR)
 - Underwater Construction Teams (UCT)
 - Construction Battalion Maintenance Units (CMBU)
 - Naval Construction Force Support Unit (NCFSU)
- Maritime Expeditionary Security
 - Maritime Expeditionary Security Force (MESF)
- Explosive Ordnance Disposal (EOD)
- Expeditionary Diving and Salvage
 - Mobile Diving and Salvage (MDS)
 - Underwater Construction Team (UCT)
- Riverine
- Expeditionary Intelligence
 - Navy Expeditionary Intelligence Command (NEIC)
- Expeditionary Logistics
 - Navy Expeditionary Logistics Support Group (NAVELSG)
- Maritime Civil Affairs and Security Training Command (MCASTC)
- Combat Camera (COMCAM)
- Expeditionary Combat Readiness
 - Expeditionary Combat Readiness Center (ECRC)

2. NECC Core Functions.

NECC serves as the single functional command for the Navy's expeditionary forces and as central management for the readiness, resources, manning, training and equipping of those forces. Expeditionary forces are organized to accomplish specific objectives in other countries.

NECC consolidates, aligns and integrates diverse expeditionary capabilities, combat arms, combat support and combat service support elements to create consistent expeditionary practices, procedures, requirements and logistics in the joint battle space. NECC's enterprise approach yields improved efficiencies and effectiveness through economies of scale and common processes.

NECC is a force provider for integrated maritime expeditionary missions. The subordinate units are a core expeditionary force providing "smart power," applying just the right expertise, presence and capability for a variety of missions such as:

- Effective waterborne and ashore anti-terrorism
- Force protection
- Theater security cooperation and engagement
- Humanitarian assistance/disaster relief contingencies
- Supplementing other Governmental agencies for homeland security, upon request



NECC providing the nation options

- Scalable force spanning the full range of military operations – TSC to MCO
- Delivers presence periodically or permanently
- Building partner nation capability and capacity
- Stays close to areas of conflict and crisis without provocation
- Can shift between different modes of response immediately
 - Every day: deterrence, maritime security and humanitarian assistance
 - In conflict: Enabler of sea control and power projection

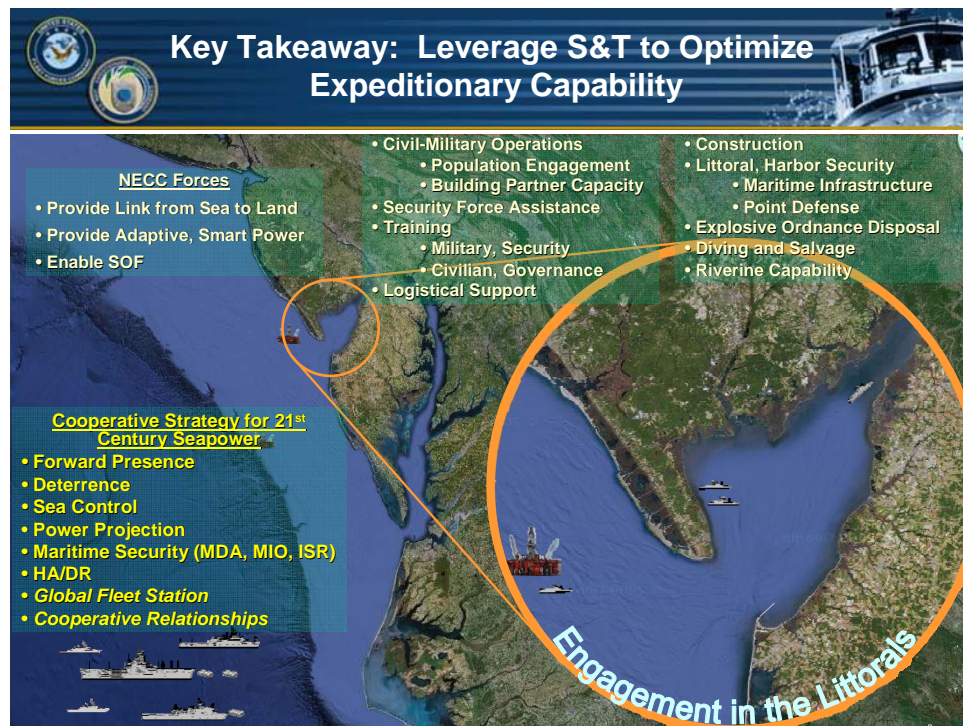


3. NECC Employment Theory.

NECC is focused on developing and preparing mission-ready forces to operate in the maritime expeditionary environment. The NECC area of operation (AOR) spans the full spectrum of environments from the sea base to the near-coast littorals and rivers, and ashore. To meet the challenges of today’s uncertain and changing threat, NECC employment theory must support the primary objective of building relationships and access while also supporting naval forces’ shaping and influencing operations in new and innovative ways. NECC tenets include:

- Seamless operation with naval, joint, interagency, and coalition partners to deliver expeditionary capabilities in support of Major Combat Operations (MCO), Maritime Security Operations (MSO), and Maritime Homeland Security/Defense (M-HLS/D).
- Possession of skills required to build relationships and access for naval and joint forces across the expeditionary environment. Skill sets include conducting maritime security, construction, EOD, and Riverine operations.
- Once ashore, support Stability, Security, Transition, and Reconstruction (SSTR) operations, shaping operations, and TSCP support through expeditionary engineering and construction, expeditionary logistics, enhanced civil-military operations, expeditionary intelligence, security assistance, maritime civil affairs, foreign navy training, support for FID, humanitarian assistance, and crisis response when appropriate.

- Trained and ready to expand JFMCC/NCC areas of influence and situational awareness in the coastal regions, harbors, and riparian areas in order to complement TSCP efforts and position forces to more effectively defeat enemy forces.
- Flexible, scalable, and rapidly deployable to meet mission requirements. Deployable units can be single-mission or flexible multi-mission adaptive force packages tailored for specific operational requirements.
- Provide added value and complement NSW, USCG, USMC, and other joint or coalition partners to increase force capability and capacity in the expeditionary environment.



NECC Support of the Battlespace

4. Capabilities of NECC Forces.

NECC Required Operational Capabilities (ROC) are implicit in the core capabilities of the individual force components described in this section. The individual force component CONOPS or other documents contain a more specific discussion of each component’s ROCs.

a. **Naval Construction (Seabees).** Navy Seabees, with a motto of, “we build, we fight,” are the Navy’s deployable engineer force. In support of maneuvering forces, Seabees provide a wide range of responsive military construction including roads, bridges, bunkers, airfields and logistics bases. Seabee units are adaptive to mission requirements, scalable and agile. They provide responsive military support for disaster preparation and recovery, to include furnishing assistance to civilian agencies. In addition, Seabees complete civic action projects that complement nation-building programs and are known for their worldwide humanitarian efforts. Seabees can protect their projects and themselves wherever they go.

First Naval Construction Division (1NCD) oversees approximately 16,000 active and reserve Seabees. Active duty Naval Mobile Construction Battalions (NMCB) are based in Gulfport, Miss., and Port Hueneme, Calif. A Seabee Readiness Group (SRG) is located at both homeports to provide training and mobilization capability. Seven Naval Construction Regiments (NCR) exercise command and control over the 21 battalions and other specialized units, including two Underwater Construction Teams (UCT), two Construction Battalion Maintenance Units (CBMU) and one Naval Construction Force Support Unit (NCFSU).

Learn more about the Seabees at www.seabee.navy.mil

NAVAL CONSTRUCTION FORCE

- Force Structure: 9 AC / 12 RC NMCB
- **Echelon IV Commands**
1NCD Little Creek, VA
1NCD FWD Pearl Harbor, HI
- **Echelon V Commands**
 - AC Gulfport, MS
 - Port Hueneme, HI
 - RC Various, CONUS

- Conventional & Irregular Warfare
- Re-establishing Iraqi self governance Infrastructure support
- Joint Support
- Greater than 1000 projects completed in Iraq / Afghanistan
- Cooperative Security
- 131 HCA projects valued at \$4.8M across all theaters ISO GFS/TSC

MISSIONS:

- Horizontal and vertical construction
- Fleet Hospital support
- Inspection / Repair of ocean facilities
- Exp FOB set up and maintenance

S&T Focus Areas

- Energy Efficiency
- Persistent Surveillance
- Enhanced Cultural Awareness
- Language Translation
- Personal Protection
- Unmanned Systems

NECC

Adaptive, Responsive, Expeditionary

b. **Maritime Expeditionary Security.** The Maritime Expeditionary Security Force (MESF) provides maritime security forces to COCOMs and numbered fleet commanders. MESF main disciplines include command and control, waterborne security, landward security, and embarked security operations. Missions in support of the maritime strategy include harbor and homeland defense, coastal surveillance, critical maritime infrastructure protection, high value assets (HVA) escort and protection, theater security cooperation, and special missions.

MESF is concentrated in Portsmouth, VA, and San Diego, CA, with reserve units throughout the United States. Forces are permanently stationed in Seventh Fleet and Fifth Fleet Areas of Operation. With approximately 2,400 active and 4,150 reserve personnel, MESF stands ready to protect our nation's assets at sea or inland.

Learn more about MESF at www.necc.navy.mil

MARITIME EXPEDITIONARY SECURITY FORCE (MESF)

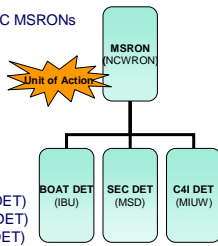
• Force Structure: 1 AC/ 5 Blnd / 4 RC MSRONS

• **Echelon IV Commands**

- MESGRU 1 San Diego, CA
- MESGRU 2 Portsmouth, VA

• **Echelon V Commands**

- Various, CONUS
 - MSRON
 - 3 BOATDET (54 PAX / DET)
 - 3 SECDET (75 PAX / DET)
 - 1 C4I DET (60 PAX / DET)



- Scalable and sustainable security teams capable of defending mission-critical assets in worldwide near-coast, in-shore and embarked environments
- Provide maritime and in-shore surveillance, security, antiterrorism, ground and afloat defense and C4I support in harbors and ports
- Seaward Security and Point Defense
- Operation Vigilant Mariner (OVM)

MISSION OVERVIEW:

- Harbor Security
- Point Defense
- OPLAT Defense
- Embarked Security
- Inshore Surveillance

NECC

S&T Focus Areas

- Persistent Surveillance
- Unmanned Systems
- Enhanced Situational Awareness
- Non-lethal Weapons
- Focused Lethality
- Enhanced Cultural Awareness
- Language Translation

Adaptive, Responsive, Expeditionary

c. **Explosive Ordnance Disposal (EOD).** Navy Explosive Ordnance Disposal (EOD) is the combat force for countering improvised explosive devices (IEDs), WMDs, and hazardous ordnance. An elite team of warriors, EOD operates in every environment around the world, qualified to parachute from 25,000 feet and dive deep to 300 feet. EOD is the force of choice to enable Special Operations and conventional forces access to denied areas. Navy EOD technicians are instrumental in clearing the way for further combat operations.

EOD conducts operations in support of larger combatant forces and homeland security: U.S. Special Operations Command (USSOCOM), Navy SEALs, Army Special Forces, U.S. Secret Service and State Department, U.S. Department of Homeland Security, the U.S. Customs Office, and the Federal Bureau of Investigation (FBI).

NECC's EOD forces are home ported in Little Creek, Va., and San Diego, Calif. Navy EOD has approximately 1,350 active duty and 70 reserve EOD personnel.

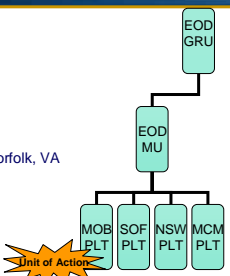
Learn more about EOD at www.eod.navy.mil



EXPLOSIVE ORDNANCE DISPOSAL



- Force Structure: 8 MU / 2 MDSU
- Echelon IV Commands**
 - EODGRU 1 San Diego, CA
 - EODGRU 2 Norfolk, VA
- Echelon V Commands**
 - Concentrated San Diego, CA / Norfolk, VA
 - FDNF EODMU 5 Guam
 - EODMU 8 Sigonella, IT





- Conventional & Irregular Warfare
 - Combating asymmetric threat in Iraq and Afghanistan
 - Training the Iraqi Security Forces
- Key theater engagement asset: Conduct 50% of TSC in CENTCOM
- C-IED
- SOF EOD
- MCM / FP Diving
- UXO Disposal
- Enabling Maneuver

NECC

Adaptive, Responsive, Expeditionary

S&T Focus Areas

- Persistent Surveillance
- Unmanned Systems
- Enhanced Situational Awareness
- Personal Protection
- Enhanced Cultural Awareness
- Language Translation

(NAVEODTECHDIV plays key role in EOD S&T and R&D initiatives)

d. **Expeditionary Diving and Salvage.** The U.S. Navy is the lead agency in military diving technology and training within the Department of Defense. Navy expeditionary diving includes two distinct groups of divers -- Mobile Diving and Salvage (MDS) divers and Underwater Construction divers -- each with individual skill sets. Underwater Construction divers are Seabees & who are dive qualified, while MDS divers are focused on underwater salvage.

MDSU forces conduct operations to defend against threats in the near coast, inshore and harbor/port environments. They conduct combat salvage diving and underwater battle damage repair to both sunken and damaged ships, as well as the recovery of ship wrecks and aircraft.

Underwater Construction Team (UCT), Seabee divers provide a capability for construction, inspection, repair and maintenance of ocean facilities in support of Navy and Marine Corps operations, including repair of battle damage. They also maintain capability to support a Fleet Marine Force amphibious assault, subsequent combat service support ashore, and self-defense for camp and facilities under construction, and in time of emergency or disaster, conduct disaster control and recovery operations.

Expeditionary diving operations are performed by a force of approximately 466 active duty personnel. Of the active duty personnel, 322 are attached to the Mobile Diving and Salvage units, homeported in Little Creek, VA, and Pearl Harbor, HI, and 144 are assigned to the Underwater Construction Team, homeported in Little Creek and Port Hueneme, CA.

Learn more about the Navy Diver Community at www.necc.navy.mil/diver/index.htm

e. **Riverine.** The Riverine force establishes and maintains control of rivers and waterways for military and civil purposes, denies their use to hostile forces, and destroys

waterborne hostile forces as necessary. The Riverine force combats sea-based terrorism and other illegal activities, such as transporting components of weapons of mass destruction, hijacking, piracy and human trafficking.

The Riverine force provides a persistent presence in support of Irregular Warfare (IW) operations. They also participates in Theater Security Cooperation through joint or multi-lateral exercises, personnel exchanges, and humanitarian assistance projects. Riverine force enables power projection by providing fire support through direct fire or coordinating supporting fire, and insertion/extraction of ground forces

The Riverine force is homeported in Little Creek, VA, and is made up of 740 active duty personnel. Dedicated to closing gaps in the maritime environment, the Riverine force is adaptive to mission requirements, scalable and agile.

Learn more about Riverine at www.necc.navy.mil

NAVY RIVERINE

- Force Structure: 3 AC/ 0 RC Squadrons
- **Echelon IV Command**
 - RIVGRU Little Creek, VA
- **Echelon V Commands**
 - RIVRON 1 Little Creek, VA
 - RIVRON 2 Little Creek, VA
 - RIVRON 3 Yorktown, VA

- One Riverine Squadron supporting Operation IRAQI FREEDOM on Euphrates River since February 2007
- Pending focus shift from MND-W to MND-S
- **Mission Overview**
 - Area patrols
 - Insert/Extract
 - COIN
 - Combined operations with ISF
 - Cache sweeps
 - Detainee transfer
 - Point defense

S&T Focus Areas

- Persistent Surveillance
- Unmanned Systems
- Enhanced Situational Awareness
- Non-lethal Weapons
- Focused Lethality
- Enhanced Cultural Awareness
- Language Translation

NECC
Adaptive, Responsive, Expeditionary

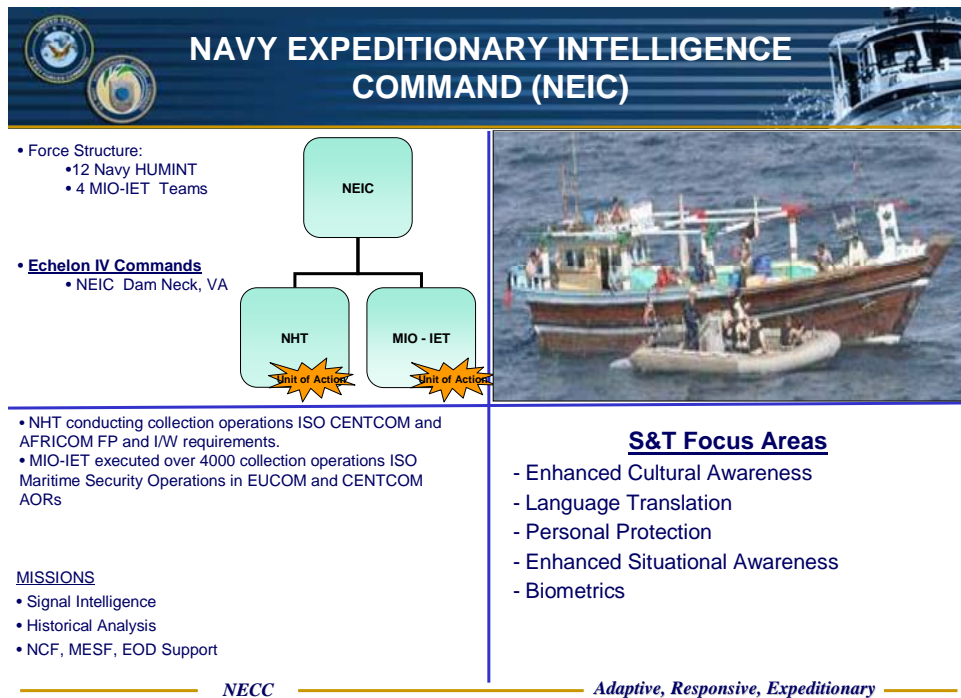
f. Expeditionary Intelligence. Navy Expeditionary Intelligence Command (NEIC) provides tactical maritime intelligence capability and capacity through the provision, support and sustainment of a standing force of ready expeditionary intelligence personnel fully task-organized, manned, trained and equipped to support NECC operating forces and respective theater Naval Component Commanders/Joint Force Maritime Component Commanders (NCC/JFMCCs).

NEIC Forces conducts full-spectrum military source operations, interrogation, Force Military Intelligence Collection Activities (FORMICA) and document/media exploitation providing force protection/indications and warning during all phases of military operations. They provide on-

scene commanders with Visit, Board, Search and Seizure collection teams, technical expertise and mission specific equipment to acquire and exploit information in support of maritime security operations.

NEIC is homeported in Dam Neck, VA, with reserve forces located throughout the United States. NEIC intelligence capabilities are comprised of approximately 147 active duty and 59 reserve mission-trained personnel and material assets with sufficient network capability and capacity to meet requirements while maintaining a solid foundation of core capabilities that can respond rapidly to evolving irregular warfare missions.

Learn more about NEIC at www.necc.navy.mil



NAVY EXPEDITIONARY INTELLIGENCE COMMAND (NEIC)

- Force Structure:
 - 12 Navy HUMINT
 - 4 MIO-IET Teams
- Echelon IV Commands
 - NEIC Dam Neck, VA

NEIC

NHT (Unit of Action)

MIO - IET (Unit of Action)

- NHT conducting collection operations ISO CENTCOM and AFRICOM FP and I/W requirements.
- MIO-IET executed over 4000 collection operations ISO Maritime Security Operations in EUCOM and CENTCOM AORs

MISSIONS

- Signal Intelligence
- Historical Analysis
- NCF, MESF, EOD Support

S&T Focus Areas

- Enhanced Cultural Awareness
- Language Translation
- Personal Protection
- Enhanced Situational Awareness
- Biometrics

NECC *Adaptive, Responsive, Expeditionary*

g. Expeditionary Logistics. The Navy Expeditionary Logistics Support Group (NAVELSG) is responsible for providing expeditionary logistics capabilities for the Navy, primarily within the maritime domain of the littorals. NAVELSG conducts surface and air cargo handling missions, cargo terminal and warehouse operations, fuels distribution, postal services, ordnance reporting and handling, and expeditionary communications. NAVELSG also responds to humanitarian relief efforts and builds allies through humanitarian efforts among host nations

NAVELSG is homeported in Williamsburg, VA, and has reserve units across the United States. Comprised of more than 3,600 personnel (3,240 reserve and 390 active duty), NAVELSG delivers expeditionary logistics capabilities “Anytime, and Anywhere.”

Learn more about NAVELSG at www.necc.navy.mil

h. Maritime Civil Affairs and Security Training Command. Maritime Civil Affairs and Security Training Command (MCASTC), headquartered at Naval Amphibious Base Little Creek, VA, provides civil affairs and expeditionary security training.

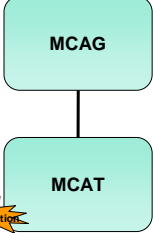

The Maritime Civil Affairs command provides trained and equipped sailors who establish, maintain, influence and enhance relations between military forces, governmental and non-governmental organizations and the civilian populace to collaboratively accomplish missions across the spectrum of operations in the maritime environment.

The command has two subordinate Maritime Civil Affairs squadrons in Yorktown, VA, and Imperial Beach (San Diego), CA. With 174 active duty and 154 reserve MCA personnel, MCASTC is committed to working cooperatively with friends, partners and allies to realize a shared vision of mutual security, stability and prosperity.

Security Training Command provides training that targets the global audience of foreign country military, civil and security personnel. They deliver maritime expeditionary core capability training and instruction with the goal to complement efforts of U.S. forces across the full spectrum of military operations. Teams of Security Training personnel with subject matter expertise train foreign audiences at a basic to intermediate level. Partner nation training supports critical regional security and stability by assisting recipient nations' efforts to improve their capabilities in exercising maritime sovereignty.

With a force of 50 active duty and 25 reserve Security Training personnel, the current vision is to focus efforts on building and enhancing maritime partnerships.

Learn more about MCASTC at www.necc.navy.mil

MARITIME CIVIL AFFAIRS GROUP	
<ul style="list-style-type: none"> Force Structure: 17 AC / 15 RC <ul style="list-style-type: none"> MCAG MCAT Echelon IV Command <ul style="list-style-type: none"> MCAG Little Creek, VA Echelon V Commands <ul style="list-style-type: none"> MCAS 1 San Diego, CA MCAS 2 Williamsburg, VA 	 
<ul style="list-style-type: none"> Providing Civil Affairs Planners ISO NSWGs Executing Civil Affairs Operations for CJTF HOA and JSOTF-P Cooperative Security Supporting Global Fleet Station initiatives GFS SOUTHCOM Continuing Promise Pacific Partnership African Partnership Station <p>MISSIONS</p> <ul style="list-style-type: none"> Conduct CA assessments Provide Port / Coastal Presence Build Partnerships Humanitarian Assistance Disaster Relief efforts 	<p>S&T Focus Areas</p> <ul style="list-style-type: none"> - Enhanced Cultural Awareness - Language Translation - Personal Protection - Enhanced Situational Awareness
NECC	<i>Adaptive, Responsive, Expeditionary</i>

i. Combat Camera. Originating in the World War II era, NECC Detachment Combat Camera (NECC DET COMCAM) Norfolk is one of two Navy Combat Camera units whose mission is to provide video and still documentation of combat operations, contingencies, exercises and events of historical significance.

NECC DET COMCAM has a fully qualified underwater photo team, operating SCUBA equipment at a depth down to 190 feet. Using state-of-the-art multimedia equipment, they acquire high quality still and video imagery digitally, and then deliver that imagery to on-scene commanders or transmit to command authorities directly from the field. Located in Norfolk, VA, and with 49 active duty and 36 reserve personnel, NECC DET COMCAM Norfolk provides world-class imaging services anytime, anywhere.

Learn more about NECC DET COMCAM at www.necc.navy.mil

j. Expeditionary Combat Readiness. Expeditionary Combat Readiness Center (ECRC) provides coordination and supervision of all administrative processing, equipping, training, and deployment of combat trained Navy Individual Augmentees (IA) deployed around the world. ECRC coordinates IA training instruction with the Army in the areas of combat skills and specialized missions to keep them as safe as possible.

Located in Little Creek, VA, ECRC is represented by 69 Active Component Sailors and 71 Reserve Component Sailors, all of whom are dedicated to supporting Sailors and their families.

Learn more about the Expeditionary Combat Readiness Center at www.ecrc.navy.mil

Annex C: Table of Allowance (TOA) Process

Background. NECC equips its forces in partnership with OPNAV and the acquisition community using processes developed and approved through the Navy Expeditionary Combat Enterprise. The Capability Needs (JCIDS/DoD 5000) process provides for the development of materiel solutions to meet force requirements for new technologies. The Science and Technology process provides for the necessary research and maturation of technology to meet those needs. The Table of Allowance (TOA) Development/Review process (see Fig 1 on page C-3) documents the number and type of materiel solutions allocated to the NECC forces. The Allowance Change Request (ACR) process provides the mechanism to either add new, modernize, or replace materiel solutions to the TOA. In order for the warfighter to benefit from successful Science and Technology projects, those technologies must transition to acquisition programs based on approved capability needs. The numbers and types of approved items provided to the forces must be vetted by NECC/USFFC, approved by OPNAV, and documented/managed by NAVFAC. The following paragraphs provide an overview of the TOA, its relationship to the S&T and capability needs, and the processes used to manage it.

TOA Overview. NECC utilizes the TOA to manage the CNO approved equipment and materiel for each specific established unit under its command provided by the acquisition community. It contains a standardized listing used to identify all required equipment to support the unit's mission. Specifically, the TOA includes material, equipment, and supplies tailored for each unit based on their unit's mission statement and Required Operational Capability/Projected Operational Environment (ROC/POE). S&T efforts approved for transition must become part of the unit's TOA in order to provide the materiel solution to a specific unit in order to fulfill the associated approved capability need. The S&T to acquisition transition plans should include the efforts necessary to incorporate the new materiel solutions into the TOA as an integral part of their planning.

TOA Management. OPNAV, NECC, and the acquisition community that supplies NECC materiel solutions utilize three primary processes to manage the TOA. The Development/Review Flow Chart (TOA of Records) process contained in Figure 1 provides for the overall management of the TOA. The other two processes govern the allowance change process for the items contained in existing TOAs managed directly by NAVFAC and those governed by other SYSCOMs in Figures 1 and 2 respectively. Together, these three processes provide for the central management of the TOA.

Central management of NECC's TOA provides for commonality of the TOAs within NECC. Managing the TOAs to maximize commonality:

- Ensures interoperability of similar units
- Increases interoperability across NECC units
- Increases interoperability with other Navy, USMC and Joint Forces
- Enhances ability to meet theater specific requirements
- Supports cost efficiencies

- Improves Type Unit Characteristics Data (TUCHA) data and transportation planning
- Reduces overall number of line items resulting in a smaller footprint
- Maximizes critical S&T resources based on shared priorities across the forces
- Provides force wide capability needs into the STO development process

TOA Development/Review. The TOA development and review process addresses operational capability improvements for NECC forces. The process documents major additions or new TOAs for forces from proposal through approval. The operational capability improvements requested must be derived from OPNAV approved documents for this community.

ACR Development/Review. The ACR development and review process addresses modifications to the approved TOA for NECC forces. The process documents changes made to the TOA to replace capabilities no longer sustainable, integrate new capabilities, or to modify approved quantities of an item provided to the forces. The operational capability improvements requested must be derived from OPNAV approved documents for this community.

TOA and S&T Requirements. Requirements to drive S&T for NECC flow from a variety of sources including the TOA management processes. The TOA processes provide for utilizing the S&T process to meet requested needs based on approved documents. The TOA process triggers S&T efforts when either the TOA Development/Review process identifies a need or when forces submit an ACR that can not be met by existing or near term technology. The derived S&T requirements will then be integrated into the appropriate NECE S&T planning processes described within this document.

S&T Development and TOA Integration. The S&T community, OPNAV, the SYSCOMs, and the NECC utilize Technology Transition Agreements to document interest in emerging technologies. The TTAs document technologies that show the potential to dramatically improve the forces' ability to meet their missions or address unmet capability needs. As the documented technologies mature to the point of transition, TTAs that cover the continued interest will be used to drive the integration of the materiel solutions into the PPB&E, Capability Acquisition, and ultimately into the TOA process. When the technologies receive approval for transition to a unit, the unit's TOA must be updated either through an ACR or the TOA Development/Review Process. Without completing the TOA update, the unit will not be able to integrate the new capability.

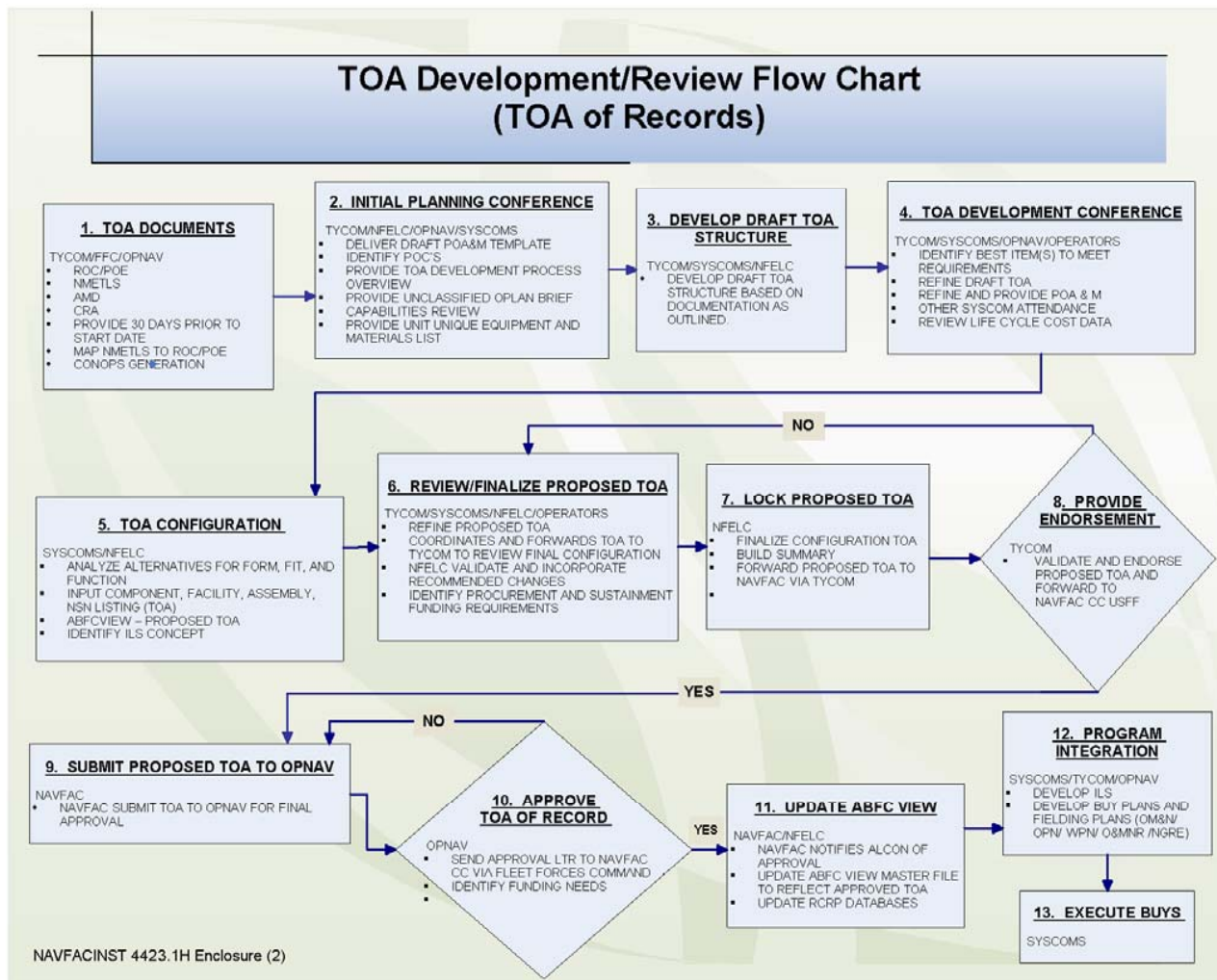


Figure 1: TOA Development/Review Flow Chart (TOA of Records)

Allowance Change Request (ACR) Process Flow Diagram for NAVFAC-Managed TOAs

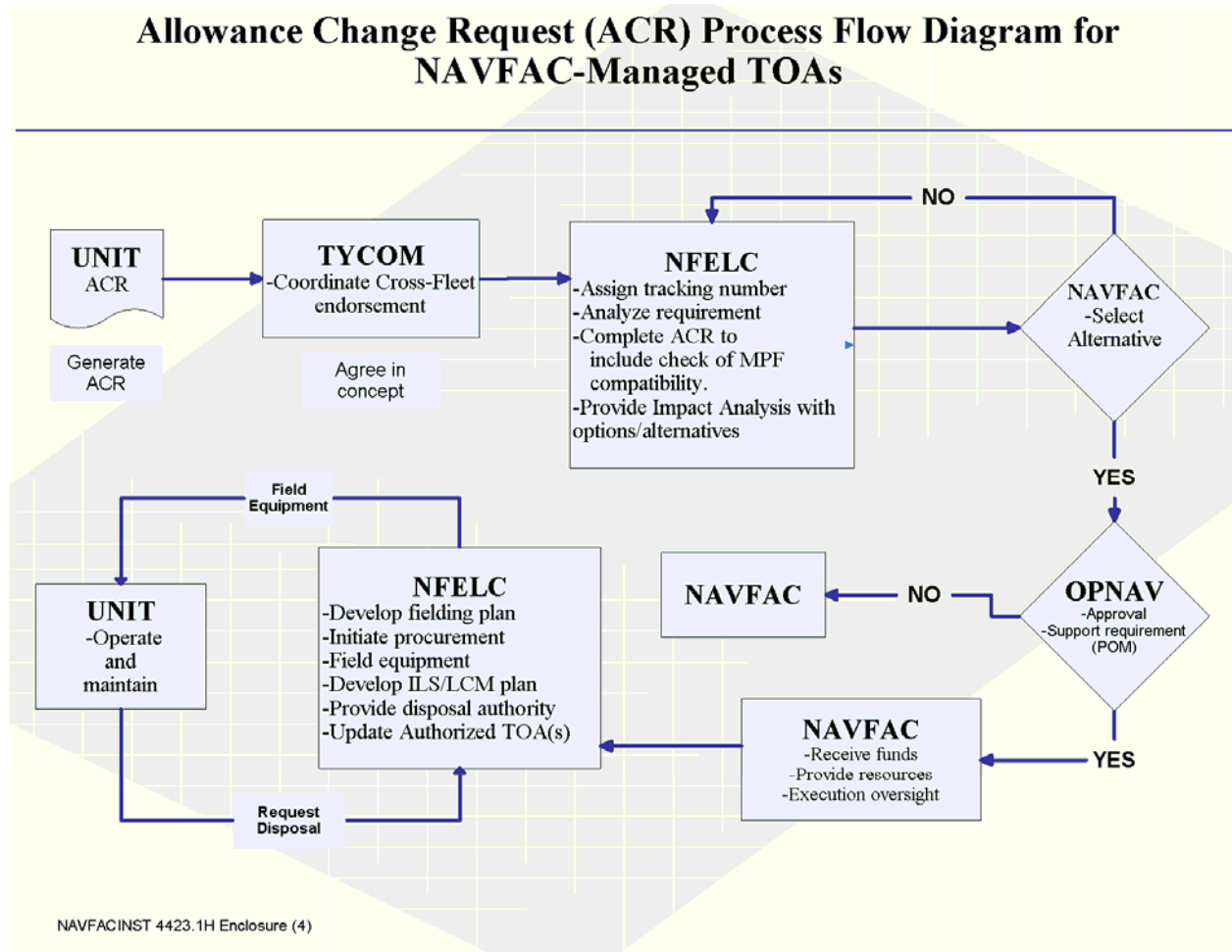



Figure 2: TOA Allowance Change Request (ACR) Process

Classification:

<p style="text-align: center;">NECC S&T STRATEGIC PLAN</p> <div style="text-align: center;">  <h2 style="margin: 0;">Warfighter Suggestion Form</h2> </div>	<p>Please read the other side carefully before completing this form.</p> <p>Type or print clearly in blue or black ink and answer all the questions as best you can.</p>	<p style="text-align: center;">DO NOT WRITE IN THIS BLOCK</p> <p>SUGGESTION NUMBER:</p> <hr/> <p>DEPARTMENT(S) CHARGED:</p> <hr/> <p>ACKNOWLEDGED:</p> <hr/> <p>SUBJECT AND CODE:</p> <hr/>
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COMMAND	COMMAND MAILING ADDRESS	DATE
		OFFICE TELEPHONE
LAST, FIRST MI	RATE/RANK	DSN TELEPHONE
JOB TITLE	WORK EMAIL ADDRESS (NIPR and/or SIPR)	SIGNATURE

Please describe your suggestion completely with as much detail as possible. Explain what the present practice is, and the change that you suggest. Additional pages can be added for more explanation. Feel free to attach other explanatory material, if needed, such as sample forms, diagrams, or sketches.

This suggestion will affect:

The present practice, method, or condition is:

The following suggestion is offered as a solution:

The implementation of this suggestion will result in:

The information contained herein relates to the internal practices of the Department of the Navy and is an internal communication within the Navy Department. This report is not releasable without the specific approval of Commander, Navy Expeditionary Combat Command. Its contents may not be disclosed outside original distribution, nor it be reproduced in whole or in part. All requests for this report, extracts there from, or correspondence related thereto shall be referred to Commander, Navy Expeditionary Combat Command.

NECC WARFIGHTER SUGGESTION FORM INSTRUCTIONS

WHAT IS THE PURPOSE OF THIS FORM?

Your input about both the S&T Strategic Plan as well as specific technologies is greatly appreciated. Though the majority of NECC's staff are past warfighters, there is no substitute for input from current operators and end users. Your evaluation of today's current situation and suggestions for tomorrow's capability needs is highly sought after. This form is meant to facilitate and standardize input in order to receive relevant information and to provide a means for follow up.

WHAT IS A SUGGESTION?

A suggestion is only limited by your imagination. The N9 focuses on future developmental technologies. If you suggest a specific item, we will consider the capabilities that this technology demonstrates, not the specific item. Perceived current and future capability gaps are appreciated but your ideas for technology solutions to these gaps are of the most importance. All suggestions will be considered and will receive a response.

HOW TO SUBMIT A SUGGESTION

Complete this form by offering a suggestion and your expectation of what it will accomplish. If more space is needed, continue on additional sheets or attach additional sheets as appropriate:

OPTION 1 – Email your suggestion (from an email address ending with “.mil”) using this form to NECCFutureTechnologySolutions@portal.navy.mil. Your suggestion will be acknowledged by email and recorded. A copy will then be sent to the appropriate departments for evaluation and recommendation and you will be advised of the status within 30 days of the initial submission date.

OPTION 2 – Mail your suggestion in a sealed envelope and send it to the NECC S&T Directorate address below. Your suggestion will be acknowledged by email and recorded. A copy will then be sent to the appropriate Departments for evaluation and recommendation and you will be advised of the status within 30 days of the initial submission date. Please mail suggestions to:


COMNECC N9
1575 Gator Boulevard
Norfolk, VA 23521-2739

OPTION 3 - FAX your suggestion to the NECC S&T Directorate at **757-462-3163 (DSN 312-253-3163)**. Your suggestion will be acknowledged by email and recorded. A copy will then be sent to the appropriate Departments for evaluation and recommendation and you will be advised of the status within 30 days of the initial submission date.

It is not the intent of this form to circumvent your chain of command. Please keep in mind that your suggestion will receive the highest attention and in all likelihood will eventually be vetted by your Commodore. It may behoove you to keep your chain of command abreast of your submission.

The information contained herein relates to the internal practices of the Department of the Navy and is an internal communication within the Navy Department. This report is not releasable without the specific approval of Commander, Navy Expeditionary Combat Command. Its contents may not be disclosed outside original distribution, nor it be reproduced in whole or in part. All requests for this report, extracts there from, or correspondence related thereto shall be referred to Commander, Navy Expeditionary Combat Command.

Classification:

<p style="text-align: center;">NECC S&T STRATEGIC PLAN</p> <div style="text-align: center;">  <p style="font-size: 24pt; font-weight: bold; margin-top: 10px;">Industry Suggestion Form</p> </div>	<p>Please read the other side carefully before completing this form.</p> <p>Type or print clearly in blue or black ink and answer all the questions as best you can.</p>	<p style="text-align: center; font-weight: bold; font-size: 10pt;">DO NOT WRITE IN THIS BLOCK</p> <p>SUGGESTION NUMBER:</p> <hr/> <p>DEPARTMENT(S) CHARGED:</p> <hr/> <p>ACKNOWLEDGED:</p> <hr/> <p>SUBJECT AND CODE:</p> <hr/>
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COMPANY	COMPANY MAILING ADDRESS	DATE
		OFFICE TELEPHONE
LAST, FIRST MI	INDUSTRY YOUR COMPANY REPRESENTS	CELL TELEPHONE (IF DESIRED)
JOB TITLE	EMAIL ADDRESS	SIGNATURE

Please describe your suggestion completely with as much detail as possible. Describe the current practice, and the suggested change. Additional pages may be added for more explanation. Feel free to attach other explanatory material, if needed, such as sample forms, diagrams, or sketches.

This suggestion will affect:

The present practice, method, or condition is:

The following suggestion is offered as a solution:

The implementation of this suggestion will result in:

Will this affect existing equipment (TOA)?

Estimated savings for one year:

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NECC INDUSTRY SUGGESTION FORM INSTRUCTIONS

WHAT IS THE PURPOSE OF THIS FORM?

Your input about both the S&T Strategic Plan as well as specific technologies is greatly appreciated. Your evaluation of today's current situation and suggestions for tomorrow's capability needs offers the potential to be mutually beneficial. This form is meant to facilitate and standardize input in order to receive relevant information and to provide a means of requesting further information as needed.

WHAT IS A SUGGESTION?

A suggestion is only limited by your imagination. The N9 focuses on future developmental technologies. If you suggest a specific item, we will consider the capabilities this technology demonstrates, not the specific item. Perceived current and future capability gaps are appreciated but your ideas for technology solutions to these gaps are of the most importance. All suggestions will be considered and will receive a response.

HOW TO SUBMIT A SUGGESTION

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OPTION 1 – Email your suggestion (from an email address ending with “.mil”) using this form to NECCFutureTechnologySolutions@portal.navy.mil. Your input will be acknowledged by email and recorded. A copy will then be sent to the appropriate departments for evaluation and recommendation and you will be advised of the status within 30 days of the initial submission date. NOTE: The email address MUST end in “.mil”; if you do not have such an account, please see option two or three.

OPTION 2 – Mail your suggestion in a sealed envelope to the NECC S&T Directorate address below. Your input will be acknowledged by email and recorded. A copy will then be sent to the appropriate departments for evaluation and recommendation and you will be advised of the status within 30 days of the initial submission date. Please mail suggestions to:

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Annex F: Acronyms

ACR – Allowance Change Request	IR&D - Independent Research and Development
AI - Artificial Intelligence	ISR – Intelligence, Surveillance, and Reconnaissance
AIW – Asymmetric and Irregular Warfare	ITRA – International Threat Reduction Agency
ASN RDA – Assistant Secretary of the Navy for Research, Development and Acquisition	IW – Irregular Warfare
BA – Battlespace Awareness	JCA - Joint Capability Areas
BAS – Sea Base	JCD&E - Joint Concept Development and Experimentation
BP – Building Partnerships	JCIDS – Joint Capabilities Integrated Development System
C2 – Command and Control	JCTD – Joint Concept Technology Demonstration
CBA – Capabilities Based Assessment	JUONS – Joint Urgent Operational Needs Statement
CBRNE – Chemical, Biological, Radiological, Nuclear	LS – Logistics Services
CDD - Capability Development Document	MCAST - Maritime Civil Affairs and Security Training
CMO - Civil Military Operations	MCCDC – Marine Corps Combat and Development
CMP - Capable Manpower	MCO – Major Combat Operations
CNR – Chief of Naval Research	MESF - Maritime Expeditionary Security Forces
COCOMS – Combatant Commanders	MOUT – Military Operations in Urban Terrain
CONOPS – Concept of Operations	MUA – Military Utility Assessment
COP – Current Operating Picture	Multi-INT – Multi Intelligence
DACP - Defense Acquisition Challenge Program	MVR – Maneuver
DARPA – Defense Advanced Research Projects Agency	NAE - Naval Aviation Enterprise
DCOM – Deputy Commanding General	NC – Net Centric
DD – Deployment and Distribution	NECE – Navy Expeditionary Combat Enterprise
DoD – Department of Defense	NEMW - Naval Expeditionary Maneuver Warfare
DOE – Department of Energy	NGO – Non-Government Organization
DoN – Department of the Navy	NSW- Naval Special Warfare
DOTMLPF - Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities	NRE – Naval Research Enterprise
DTRA – Defense Threat Reduction Agency	ONR – Office of Naval Research
EC – Enabling Capability	OPNAV – Office of the Chief of Naval Operations
EPE - Enterprise and Platform Enablers	OSD - Office of Secretary of Defense
EXTECH - Expeditionary Warfare Technology	OTH – Over the Horizon
FA – Force Application	P – Protection
FCT – Foreign Comparative Testing	PEO – Program Executive Office
FHP - Force Health Protection	PM – Program Manager
FNC – Future Naval Capabilities	PMO – Program Management Office
FNT – FORCEnet	POA&M - Plan of Action and Milestones
FS – Force Support	POR - Program of Record
GCC - Geographic Combatant Commanders	PPB&E – Planning, Programming, and Budgeting and Execution Process
HAZMAT – Hazardous Materials	PVO – Private Volunteer Organization
HR – Health Readiness	
IA – Information Assurance	
ICD – Initial Capability Document	
IED – Improvised Explosive Device	
ILS – Integrated Logistics Support	
IPT – Integrated Product Teams	

RCS – Radar Cross Section
R&D – Research & Development
RDT&E – Research, Development, Test and
Evaluation
RTT – Rapid Technology Transition
SBIR – Small Business Innovation Research
SECDEF – Secretary of Defense
SECNAV – Secretary of the Navy
SHE - Sea Shield
STK - Sea Strike
STO – Science and Technology Objective
SWE -Surface Warfare Enterprise
SYSCOMS - Systems Commands
S&T – Science and Technology
T&E – Test and Evaluation

TOA- Table of Allowances
TOC – Tactical Operations Center
TOC – Total Ownership Cost
TOG – Technology Oversight Group
TRL – Technology Readiness Levels
TTA – Technology Transition Agreement
TTI – Technology Transition Initiative
USFFC - U.S. Fleet Forces Command
USJFCOM – U.S. Joint Forces Command
USMC – U.S. Marine Corps
VBSS - Visit Board Search and Seizure
WMD – Weapons of Mass Destruction

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NAVY EXPEDITIONARY COMBAT COMMAND