FY 2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2006
Exhibit R-2

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603758N
PROGRAM ELEMENT TITLE: NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS

COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total PE	25,847	48,549	41,308	37,416	66,460	73,407	73,997
2918 NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS	25,847	48,549	41,308	37,416	66,460	73,407	73,997

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this program is to develop technologies from a subscale proof-of-principle into a full-scale prototype and provide it to the warfighter to experiment with during Fleet Battle Experiments (FBE), Limited Objective Experiments (LOEs) and Sea Trial Exercises.

The purpose of Sea Trials, and other warfighter demonstrations such as FBEs and LOEs, is for the warfighter to explore and experiment with new technologies, modify existing technologies and or develop new Concepts of Operation (CONOPS) in the most realistic scenario possible. Frequently, new CONOPS are enabled by new technology applications. The investment described herein seeks to develop, demonstrate and deliver to the warfighter for experimentation new technologies used during Sea Trial exercises, FBEs or LOEs. These technologies are fielded as robust prototypes to allow the warfighter to completely assess a new capability. These fieldable prototypes are referred to as Operational Experimentation Articles (OEAs). Inasmuch as these OEAs are for warfighter experimentation, it is unlikely that documented requirements exist in the Acquisition Program of Record (POR). Nonetheless, after the technology capability has been successfully demonstrated, and the new CONOP has been integrated into military doctrine, then the technology can be inserted into the appropriate POR. An example of this is networked Specific Emitter Identification (SEI), for which no requirement existed in the surface platform community when the project started in FY02. After demonstration and experimentation during FBE-K, Sea Trials in Jun 04 and Combined Joint Task Force (CJTFEX) 04-02, the technology transitioned into the Surface Electronic Warfare Improvement Program (SEWIP). Similarly, the Forcenet project is intended to yield the tangible evidence needed for the Forcenet Resource/Requirements Sponsor (N61) to define requirements for the Knowledge Management part of Forcenet.

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In order to identify the technology areas with the highest relevance, ONR works in collaboration with the Commander, Fleet Forces Command (CFFC), Navy Warfare Development Command (NWDC), the numbered fleets and the Resource/Requirements sponsor in Naval Operations because these commands are responsible for generating, experimenting with, and implementing new CONOPS.

Current efforts support future operational concepts such as Forcenet and Organic Mine Countermeasures, and operational gaps that have been identified during Operation Iraqi Freedom (OIF) and other recent operations. For Organic Mine Countermeasures the investment is concentrated on autonomous undersea vehicles; and, for Forcenet, the investment is concentrated on the development of Knowledge Management tools. For OIF, the technologies being prototyped and experimented with are sniper detection, wireless/portable/scalable/reconfigurable surveillance systems, and optical/infrared sensors to detect rockets.

This project supports the DON Transformation Roadmap and, in particular, the “Sea Trial Process for Innovation” aspects.

In FY06 this program element (PE) invests in two separate programs, SwampWorks and Tech Solutions. The objectives of these projects share many common elements with the Navy Experimentation Program already described. SwampWorks seeks to develop and demonstrate technologies that address emergent and enduring operational problems in an accelerated timeframe. Some of these technologies may end up in the hands of the warfighter for experimentation or may culminate in a significant exercise that demonstrates capability then transitions into the Acquisition POR. Example successes are the half-length torpedo which led to the development of the SwampWorks Broadband Sonar that transitioning to the Mk 48 ADCAP Program. Efforts includes the development and demonstration of celestial navigation systems, jet noise mitigation technologies, blast resistant structures, undersea acoustic communications and a high resolution sonar for the new lightweight torpedo, Mk 54. Tech Solutions seeks to resolve operational problems submitted by the deckplate sailor via the website, apply scientific applications to solve these operational problems, and provide the solution to the sailor for evaluation and use. Tech Solutions projects includes a deck scrubber for the Aircraft Carriers, helmet-mounted communications for the Marines, extremity protection (body armor for limbs) for the Marines, and dust abatement to retain visibility during helicopter landings in the desert. For SwampWorks and Tech Solutions, some of these projects are ongoing and were previously described in the PEs dedicated to the appropriate mission area. Based on a review of the DON S&T program conducted in FY04, a recommendation was made to collect these efforts into one integrated program that is budgeted and funded from one program element. Due to the common goals of “getting applications into the hands of the warfighter” and developing

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technologies across the operational spectrum, SwampWorks and Tech Solutions will be reflected in this PE starting in FY06.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

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B. PROGRAM CHANGE SUMMARY:

	FY 2005	FY 2006	FY 2007
FY 2006 President's Budget Submission	15,743	49,288	49,366
Congressional Undistributed Reductions/Rescissions	-12	-739	0
Execution Adjustments	7,745	0	0
FY 2005 SBIR	-257	0	0
GWOT Counter IED Efforts	2,625	0	0
Program Adjustments	3	0	-8,599
Program Realignment	0	0	611
Rate Adjustments	0	0	-70
FY 2007 President's Budget Submission	25,847	48,549	41,308

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Increase from FY05 to FY06 is due to realigning SwampWorks and Tech Solutions previously funded under other S&T PEs.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

E. PERFORMANCE METRICS:
The performance of the work funded in this PE is reviewed at several levels to ensure that the investment is relevant and productive:

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At the macroscopic level, the investment is coordinated with NWDC and CFFC to address the goals and objectives identified for Sea Trials and LOEs. Review at this level occurs at least 4 times a year at the Science and Technology Executive Steering Committee (STESC).

At the microscopic level, the work funded in this PE is reviewed periodically by the ONR program manager to ensure the investment is meeting the goals defined for each project. This review includes feedback collected from the warfighter community on all Sea Trials and LOE to support the program manager's assessment of the value and relevance of each investment. Furthermore, the entire program is reviewed yearly by the Chief of Naval Research.

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BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603758N PROGRAM ELEMENT TITLE: NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS
PROJECT NUMBER: 2918 PROJECT TITLE: NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS

COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
2918 NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS	25,847	48,549	41,308	37,416	66,460	73,407	73,997

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this project is to develop technologies from a subscale proof-of-principle into a full-scale prototype and provide it to the warfighter to experiment with during FBE, LOEs and Sea Trial Exercises. In order to maximize the yield of fieldable prototypes that are available for experimentation, a two-pronged approach is used: 1) Concept-based: invest in technologies to fulfill future CONOPS being explored by CFFC, NWDC and the numbered fleets and, 2) Technology-based: capitalize on technology breakthroughs to demonstrate and provide OEAs (prototypes) that were not previously envisioned by the warfighter but are responsive to an operational need.

In order to identify the technology areas with the highest relevance, Office of Naval Research (ONR) works in collaboration with the CFFC, NWDC, the numbered fleets and the CNO Resource/Requirements sponsor responsible for generating, experimenting with and implementing new CONOPS. The highest priority CONOPS include Organic Mine Countermeasures and Forcenet, therefore the Concept-based fraction of the portfolio is invested in technologies to support these CONOPS. In the Technology-based fraction of the portfolio, ONR has invested in operational gaps identified during OIF and other recent operations as well as technologies that enable network-centric warfare and related technologies.

This project supports the DON Transformation Roadmap and, in particular, the “Sea Trial Process for Innovation” aspects.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - TECHNOLOGY-BASED	8,457	12,136	11,057

The objective of this project is to capitalize on recent technology breakthroughs to develop prototypes quickly and provide them to the warfighter for experimentation during Sea Trials or LOEs.

FY 2005 Accomplishments:

- Completed experimentation with the integrated sensor suite installed on the HSV-X2.
- Completed testing of electromagnetic sensors for anti-submarine warfare cueing. The sensors accurately detected and classified several platforms.
- Completed the improvements to the gun detection and location (GDL) units so that they are more robust in the operational environment. These units (5 High Mobility Multi-Wheeled Vehicles (HMMVWs) integrated with GDL technology) were delivered to Marine Corps Warfighting Laboratory (MCWL) for testing and evaluation. (Testing has been completed but analyzed results are not yet available).
- Completed personnel counter IED jamming and predetonation development and technology.

FY 2006 Plans:

- Initiate the development of an unmanned aerial vehicle (UAV) with jamming capability for Suppression of Enemy Air Defenses (SEAD) and IED initiatives.
- Complete the fabrication of several units of the electromagnetic sensor to support Limited Objective Test with Fleet ASW Command.
- Complete the development of an optical sensor for rocket detection, integrate with the Critical Area Protection System (CAPS) (previously developed in this program and presently deployed in Camp Fallujah) and provide to Marine Corps for experimentation.
- Support the Marine Corps in LOEs with the gun detection and location units and collect data on the performance of the units in an operational scenario.
- Identify other promising technology breakthroughs that can be prototyped and delivered to the warfighter for experimentation.

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FY 2007 Plans:

- Continue all efforts of FY06 less those noted as completed above.
- Complete the development, fabrication and assembly of standoff jamming for demonstation and technical assessment.
- Complete experimention with Fleet ASW Command to assess the effectiveness of the electromagnetic sensors in cueing in a real-time operational scenario.
- Initiate development and demonstration of real time situational awareness technologies.

	FY 2005	FY 2006	FY 2007
MICROSAT	7,880	0	0

CLASSIFIED PROGRAM

	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - CONCEPT-BASED FORCENET	4,426	4,429	3,772

This project seeks to develop Knowledge Management (KM) tools for the numbered fleets to use during experimentation exercises. The KM tools developed here are based on intelligent agents, and the application identified by the warfighter which was used to streamline the process of obtaining actionable knowledge. Agents operating in a distributed environment can help by autonomously filtering, retrieving, and processing information, and by matching situational context with established knowledge sources, freeing warfighters from laborious, time intensive, and menial information look up, retrieval, and formatting tasks.

FY 2005 Accomplishments:

- Developed the Battle Watch Captain (BWC) and Common Tactical Picture (CTP) Manager for C2F. These were two KM tools (so-called intelligent agents) developed to support the intelligence officers in the collection, integration and analysis of data. Held remote and on-site mini LOEs leading to LOE 23-24 Jun 05 and LOE 1-5 Aug 05.

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• Developed and activated for warfighter experimentation a Joint Worldwide Intelligence Communications System (JWICS) site for C5F and OPINTEL at C3F. Conducted LOE at C3F to present the new capability and to gather more requirements to further enhance its useability.

FY 2006 Plans:

• Continue to develop KM tools for Intel officers in C2F, C3F, C5F, C7F that are robust and the warfighter can use during Sea Trial exercises or LOEs.
• Develop KM tools for the operations officers (J3) in C2F and C5F. Plan and conduct LOEs to assess the effectiveness of these tools in reducing the time and complexity of data collection and analysis.

FY 2007 Plans:

• Continue all efforts of FY06 less those noted as completed above.
• Complete investigation of operational areas that can be served with KM technologies.

	FY 2005	FY 2006	FY 2007
SWAMPWORKS	2,625	19,682	19,003

The increase from FY 2005 to FY 2006 is due to SwampWorks being funded under other S&T PEs. FY 2005 represents Counter IED reprogramming for wearable jamming and detonation technology.

SwampWorks seeks to develop and demonstrate technologies that address emergent and enduring operational problems in an accelerated timeframe. Some of these technologies may end up in the hands of the warfighter for experimentation, or may culminate in a significant exercise that demonstrates capability then transitions into the Acquisition POR. Examples of past successes are the half-length torpedo which led to the development of the SwampWorks Broadband Sonar and is transitioning to the Mk 48 ADCAP program. Current efforts are the development and demonstration of jet noise mitigation technologies, blast resistant structures, undersea acoustic communications and a high resolution sonar for the new lightweight torpedo, Mk 54.

FY 2005 Accomplishments:

• Completed the fabrication of a prototype celestial navigation device for testing.
• Completed the integration of autonomous navigation software into an unmanned aerial vehicle.

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- Completed the final exercise of the SwampWorks Advanced Torpedo Sonar for the heavyweight torpedo, Mk 48 ADCAP in Nanoose.
- Completed personnel counter IED jamming and detonation development and technology.
- Completed stainless steel monohull design for survivability.
- Identified enduring and emergent operational barriers identified by Naval leadership and responded with relevant technology developments and demonstrations.

FY 2006 Plans:

- Characterize the performance of the celestial navigation device in relevant scenarios that simulate operational conditions.
- Complete the development of the advanced sonar for the Mk54 torpedo and characterize its performance in a submarine exercise.
- Initiate the development of new technologies that are responsive to Taskforce Antisubmarine Warfare (TF ASW), recently developed Concept of Operation.
- Complete the installation of the Aircraft Carrier Situational Awareness System (ACSAS) (provides 360-degree sensing, detection and tracking for Aircraft Carriers when transiting in ports and restricted waterways when high-powered radars must be turned off) on the USS Theodore Roosevelt.
- Continue to identify enduring and emergent operational barriers identified by naval leadership and respond with relevant technology developments and demonstrations.
- Initiate personnel self protection technologies.
- Initiate an investigation and development of technologies that reduce energy consumption losses during recent operations.

FY 2007 Plans:

- Continue all efforts of FY06 less those noted as completed above.
- Initiate studies of climate effects on operations and identify potential mitigating technologies.
- Initiate development of vehicle technologies to address survivability, fuel economies and blast mitigation.
- Initiate novel heavy fuel propulsion system development.
- Initiate development of new methods applying breakthrough cognitive technologies, in behavioral, computational, and mathematical sciences to relevant Naval systems.

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	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - CONCEPT-BASED ORGANIC MINE COUNTERMEASURES	2,459	2,461	0

The objective of this project is to develop and experiment with unmanned underwater vehicles (UUVs) modularized for mine warfare (MIW) and mine countermeasures (MCM) during fleet exercises and experiments. Targeted ships of opportunity include the High Speed Vessel (HSV-2) SWIFT, the X-Craft and other surface platforms engaged in MCM operations. With the development of the Littoral Combat Ship (LCS), the Navy has included the development of warfare mission module packages to support Fleet operations in MIW, anti-submarine warfare and anti-surface warfare. The HSV provides a means of effecting spiral development of both the LCS platform and the support mission modules. UUV technology developed within the Organic Mine Countermeasures Future Naval Capability (OMCM FNC) program has been designated for inclusion in LCS Flight 0 ships. Included within the objectives of this program is the development of additional capabilities for existing UUV technology, the development of prototypical UUV mission modules for MCM, and the integration of the modularized UUV system into experimentation platforms of opportunity.

FY 2005 Accomplishments:

- Completed delivery, acceptance testing and certification of the second set of REMUS 100 UUVs.
- Initiated FY 2005 experimentation, with HSV event 3-14 December 2004 (GOMEX 05-1 in Panama City OPAREA).
- Awarded new hybrid UUV module contract, with delivery in the 4th Quarter of FY 2005.

FY 2006 Plans:

- Provide UUV mission modules for the Sea Trial event in the Panama Canal Exercise, a mine warfare training and readiness exercise (which includes the HSV SWIFT).
- The UUV mission module program will continue with experimentation on craft of opportunity, in particular the HSV-2 SWIFT and X-Craft, and will support the Littoral Combat Ship mine warfare mission module development program.

FY 2007 Plans:

- Program ends in FY 2006.

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	FY 2005	FY 2006	FY 2007
TECH SOLUTIONS	0	9,841	7,476

*Tech Solutions was previously funded under other S&T PEs.

The objective of this program is to provide deckplate sailors with technical solutions to common operational problems. The sailors provide their operational issues to ONR via the web.

FY 2005 Accomplishments:

- Developed, demonstrated and delivered to the Marines dust abatement technology that can be used to retain visibility during landings in the desert. The product delivered reduces the complexity of the application process (from 12-steps to 1-step).
- Developed, demonstrated and delivered to the Marines extremity protection.
- Developed, demonstrated and delivered to the Navy an enhancement to their binoculars (Big Eyes) that increased the range of visibility and provided line-of-sight communications.

FY 2006 Plans:

- Initiate development of a portal for explosive detection that utilizes infrared detection.
- Initiate development of a marker for search and rescue that does not interfere with radio frequency communications called a Search and Rescue Low Probability of Interference Marker.
- Obtain feedback from extremity protection and dust palliatives that have been deployed and make enhancements as appropriate.
- Continue to obtain operational problems from the sailors via the web and develop, demonstrate and deliver technical solutions.

FY 2007 Plans:

- Continue all efforts in FY06 less those noted as completed above.
- Complete development of ballistic goggles that provide eye protection for ground troops and are adaptive to changing light conditions.
- Complete development and testing of ballistic net protection system.

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C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.