FY 2006/2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2005
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 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total PE	44,690	15,743	49,288	49,366	70,430	70,535	70,648	70,768
R2918	NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS							
	25,794	15,743	49,288	49,366	70,430	70,535	70,648	70,768
R9341	FORCENET LIMITED OBJECTIVE EXPERIMENTS							
	3,267	0	0	0	0	0	0	0
R9342	TRANSFER FROM OPN - MICROSAT							
	15,629	0	0	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this program is to distill 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 experiments such as FBEs and LOEs, is for the warfighter to explore and experiment with new Concepts of Operation (CONOPS) in the most realistic scenario possible. Frequently, a new CONOP is enabled by new technology applications. The investment described herein seeks to develop, demonstrate and deliver to the warfighter for experimentation the new technologies used during Sea Trial exercises, FBEs or LOEs. These technologies are fielded as robust prototypes in order to allow the warfighter to completely assess their capability in enabling the new CONOP being explored. 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 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

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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.

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). 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/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) will also invest in 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. 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 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 collect operational problems from the deckplate sailor via the website and distill scientific efforts into applications that can solve these operational problems, and give them back to the sailor for evaluation and use. Current Tech Solutions projects are 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

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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 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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PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
FY 2005 President's Budget Submission	39,490	16,006	37,279	44,257
Cong Rescissions/Adjustments/Undist. Reductions	0	-260	0	0
Execution Adjustments	5,507	0	0	0
Non-Pay Inflation Adjustments	-37	0	0	0
Program Adjustments	0	-3	-47	-40
Program Realignment	0	0	12,054	5,076
Rate Adjustments	0	0	2	73
SBIR Assessment	-270	0	0	0
FY 2006/2007 President's Budget Submission	44,690	15,743	49,288	49,366

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.

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PROJECT NUMBER: R2918 PROJECT TITLE: NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS

COST: (Dollars in Thousands)

Project Number & Title	FY 2004 Actual	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
R2918 NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS	25,794	15,743	49,288	49,366	70,430	70,535	70,648	70,768

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this project is to distill 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. In order to maximize the yield of fieldable prototypes that are available for experimentation we use a two-pronged approach: 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 as 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, 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. 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 technologies that enable network-centric warfare.

This project supports the DON Transformation Roadmap and, in particular, the “Sea Trial: Process for Innovation” aspects. The project also funds operational analyses in support of select Future Naval Capabilities (FNCs) and discrete technologies being developed under the Navy's S&T portfolio.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2004	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - TECHNOLOGY-BASED	17,838	8,858	12,321	14,143

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. Investments under this activity were previously reported under the Naval Warfare Experimentation Articles – Expeditionary Sensing Elements. This new activity breakout provides improved clarification of the overall investment scope.

FY 2004 Accomplishments:

- Developed, integrated and tested gun detection and locator (GDL) technology on 5 High Mobility Multi-purpose Wheeled Vehicles (HMMWV). Four units were delivered to Yuma for testing prior to providing to the 1-Marine Expeditionary Force (1MEF) for experimentation.
- Developed a portable, reconfigurable surveillance system (a modified Advanced Technology Coastal Area Protection System (ATCAPS)) for the Marines to use during an experimentation exercise at 1 MEF. This system is presently installed and operational in Camp Fallujah. A different prototype of the ATCAPS was developed under SwampWorks for the Navy for a port/pier application (see description under SwampWorks).
- Continued the development of an electromagnetic sensor for anti-submarine warfare cueing.

FY 2005 Plans:

- Continue experimentation with the integrated sensor suite installed on the HSV-X2.
- Continue the development of an electromagnetic sensor for anti-submarine warfare cueing.
- Develop and demonstrate an optical sensor for cueing of Katusha rockets (weapon used against the Marines in Iraq).
- Address issues with the GDL so that it is more robust in the operational environment.

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FY 2006 Plans:

• Complete the demonstration of the electromagnetic sensor; develop and demonstrate other promising technologies.

FY 2007 Plans:

• Identify other promising technology breakthroughs that can be prototyped and delivered to the warfighter for experimentation.

	FY 2004	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - CONCEPT-BASED FORCENET	2,870	4,426	4,496	5,203

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 was to use them 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. Investments under this activity were previously reported under the Science and Technology Analysis Assessment. This new activity breakout provides improved clarification of the overall investment scope.

FY 2004 Accomplishments:

• Developed intelligent agents to perform several tasks for the J2 at C2F and C3F. These tasks consisted of tracking high interest vessels, identifying Blue Force Vessel Port/Yard Visits and a chat scraping tool. LOEs were conducted in the operational environment in Jan 2004 and July 2004. After experimentation with the tools at C2F, some of the tools were installed on the USS Mt. Whitney and used during CJTFEX 04-02.

FY 2005 Plans:

• Experiment with the KM tools at C5F and C6F and to develop new agent-based KM tools for different operational areas at C2F and C3F.

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FY 2006 Plans:

• Continue to develop KM tools that are robust and the warfighter can use during Sea Trial exercises or LOEs.

FY 2007 Plans:

• Explore other operational areas that can be served with KM technologies. This plan will be developed jointly with N61F and CFFC.

	FY 2004	FY 2005	FY 2006	FY 2007
NAVAL WARFARE EXPERIMENTATION ARTICLES - CONCEPT-BASED ORGANIC MINE COUNTERMEASURES	5,086	2,459	2,498	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. Investments under this activity were previously reported under the U.S. Marine Corps Experimentation. This new activity breakout provides improved clarification of the overall investment scope.

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FY 2004 Accomplishments:

• Two types of UUVs were developed and delivered for integration in the mine warfare mission modules. The third and fourth Battlespace Preparation Autonomous Underwater Vehicles (BPAUV) and the first three Small Shallow Water UUV were completed and delivered. The Mine Warfare UUV mission modules, outfitted with mission planning, data processing and maintenance equipment were integrated into the High Speed Vessel (HSV-2) SWIFT early in the FY. Training of the Fleet operators was conducted at the Naval Surface Warfare Center-Panama City for the employment of the BPAUV and the mission modules systems. The mission module configuration and integration on the HSV was showcased in two static events in Norfolk and Alexandria, Virginia in the second quarter of the FY. This project was certified as a Sea Trial Initiative by the Navy Warfare Development Command. At-sea experimentation commenced in May during the NATO Exercise Blue Game conducted in the littoral waters of Norway. Experimentation continued during CJTFEX 04-2 off Camp Lejeune, North Carolina with the UUV mission modules operating from a shore-based pier facility, demonstrating their flexibility and versatility for support of mine warfare operations at sea or ashore. In July the BPAUV mission module participated in the bi-annual Rim of the Pacific (RIMPAC) exercise off the coast of Hawaii. For this experimentation opportunity, the BPAUV mission module was flown via commercial airlift to Hawaii and embarked aboard HSV-2 SWIFT upon its arrival in theater. Quick installation and readying for operational employment in a mine countermeasures mission further demonstrated the versatility of the mission module concept and design.

FY 2005 Plans:

• The UUV mission modules will participate in additional Fleet exercises and Sea Trial experimentation opportunities as they are identified by Fleet schedulers and the NWDC. In addition the mission modules will participate in both HSV and X-craft operations and experiments in which mine warfare and mine countermeasures events take place.
• Delivery, acceptance testing and certification of the second set of REMUS 100 UUVs will take place in the second quarter. Additional Fleet operator training in the use of Small Shallow Water UUVs is scheduled. Lessons learned from FY04 experimentation events will be incorporated into FY05 improvements to the mission modules.

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FY 2006 Plans:

• 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.

	FY 2004	FY 2005	FY 2006	FY 2007
TECH SOLUTIONS	*	*	9,991	10,007

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

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 2004 Accomplishments:

• Developed software to translate information from Korean and Thai to English. This product was demonstrated in 2 exercises (Cobra Gold and Foal Eagle) in C7F, both highly successful. (This technology reduces the time to translate power point presentations at least by 80 % with >90% accuracy.)
• Developed extremity protection for arms and legs since the current body armor used by the Marines did not provide limb protection.
• Developed and delivered a scheduler to the submarine community. (Previously, preparing and updating the schedule for all submarine assets was a time-intensive, complicated process. This product is a scheduling engine that generates the schedules more efficiently thereby saving time and manpower.)

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FY 2005 Plans:

- Develop a sensor package for the Swimmer Delivery Vehicle (SDV) used by the Navy SEALS.
- Develop, demonstrate and deliver to the Marines dust abatement technology that can be used to retain visibility during landings in the desert.
- Develop, demonstrate and deliver to the Marines a hand-held bi-directional Arabic to English/English to Arabic voice to voice and text.

FY 2006 Plans:

- Continue to obtain operational problems from the sailors via the web and develop, demonstrate and deliver technical solutions.

FY 2007 Plans:

- Continue to obtain operational problems from the sailors via the web and develop, demonstrate and deliver technical solutions.

	FY 2004	FY 2005	FY 2006	FY 2007
SWAMPWORKS	*	*	19,982	20,013

* SwampWorks was previously funded under other S&T program elements.

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 program of record. 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 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.

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FY 2004 Accomplishments:

- Completed the transition of the Electronic Support Measure (ESM) to the Surface Electronic Warfare Improvement Program (SEWIP).
- Completed the testing of Microjets for jet noise mitigation on a full-scale test engine at NAVAIR Lakehurst. Preliminary analysis of the data collected during the test indicates that a noise reduction (at the source) of 6dB was achieved.
- Completed and installed at C5F in Bahrain a wireless, reconfigurable, integrated system of sensors for port surveillance (this system is called Advanced Technology Coastal Area Protection System (ATCAPS)).
- Continued to identify and respond to enduring and emergent operational barriers identified by the naval leadership.
- Initiated the development and demonstration of a celestial navigation device to reduce the dependency of our platforms and weapons on Global Positioning System (GPS).
- Initiated the development and demonstration of autonomous navigation algorithms. These are needed to increase the autonomy of all unmanned platforms.
- Initiated the development of the advanced sonar for the new lightweight torpedo, Mk 54. Complete the final exercise of the SwampWorks Advanced Torpedo Sonar for the heavyweight torpedo, Mk 48 ADCAP.

FY 2005 Plans:

- Continue the development and demonstration of a celestial navigation device to reduce the dependency of our platforms and weapons on Global Positioning System (GPS).
- Continue the development and demonstration of autonomous navigation algorithms. These are needed to increase the autonomy of all unmanned platforms.
- Continue the development of the advanced sonar for the new lightweight torpedo, Mk 54. Complete the final exercise of the SwampWorks Advanced Torpedo Sonar for the heavyweight torpedo, Mk 48 ADCAP.
- Continue to identify and respond to enduring and emergent operational barriers identified by the naval leadership.

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FY 2006 Plans:

- Complete the development of the advanced sonar for the Mk54 torpedo and characterize its performance in a submarine exercise.
- Continue to identify enduring and emergent operational barriers identified by the naval leadership and respond with relevant technology developments and demonstrations.

FY 2007 Plans:

- Continue to identify enduring and emergent operational barriers identified by the naval leadership and respond with relevant technology developments and demonstrations.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

BUDGET ACTIVITY: 03
PROGRAM ELEMENT: 0603758N PROGRAM ELEMENT TITLE: NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS
PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

CONGRESSIONAL PLUS-UPS:

R9341	FY 2004	FY 2005
FORCENET LIMITED OBJECTIVE EXPERIMENTS	3,267	0

ForceNet provided the architecture to increase substantially combat capabilities through aligned and integrated systems, functions, and missions. It transformed situational awareness, accelerated speed of decision, and allowed us to greatly distribute combat power. ForceNet harnessed information for knowledge-based combat operations and increased force survivability. It provided real-time enhanced collaborative planning among joint and coalition partners.

R9342	FY 2004	FY 2005
TRANSFER FROM OPN - MICROSAT	15,629	0

This reflected a congressionally directed transfer of Other Procurement, Navy funding from Naval Tactical Command Support Systems and Common Imagery Ground Surface Systems to the Naval Warfighting Experiments and Demonstration program in support of developing OEAs that support the advanced warfighting concepts. This OEA is a space platform which will enable new missions of strategic importance. The OEAs represent prototype technologies that supported the ForceNet concept and were used in support of warfighter demonstrations.