FY 2005 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2004
Exhibit R-2

BA: 03 PROGRAM ELEMENT: 0603758N
PROGRAM ELEMENT TITLE: Navy Warfighting Experiments and Demonstrations

COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2918 Navy Warfighting Experiments and Demonstrations	42,138	20,306	16,006	37,279	44,257	45,145	46,085
R9341 FORCENET LIMITED OBJECTIVE EXPERIMENTS	0	3,362	0	0	0	0	0
R9342 TRANSFER FROM OPN	0	15,822	0	0	0	0	0
Totals	42,138	39,490	16,006	37,279	44,257	45,145	46,085

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this program is to mature select technologies to facilitate advanced operational demonstration and experimentation.

The co-evolution of concepts and technologies requires that potentially revolutionary developments be investigated in Naval service operational environments such as Fleet Battle Experiments (FBEs), Advanced Warfighting Experiments (AWEs) and Limited Objective Experiments (LOEs). Concept driven operational experimentation has been historically constrained because the technology employed was from currently mature systems, or those about to complete the acquisition process, as opposed to cutting edge concepts still in the Science and Technology (S&T) pipeline. This program, in collaboration with the concept development activities for the Navy and Marine Corps, identifies high leverage and potentially revolutionary technology/concept pairings and focuses developmental efforts on preparation of Operational Experimentation Articles (OEAs). The OEAs (fieldable technology prototypes) tailored for operational demonstration or experimentation provide the ability to operate/experiment with technologies and concepts that would otherwise be too advanced or high risk to be employed in normal operational environments.

Initial efforts will distill technologies for unmanned vehicles, high speed vessels, miniaturized, expeditionary sensing elements, rapid target geo-location, combat identification, advanced countermeasures and knowledge management systems, which are tailored for littoral environments and expeditionary operations. These technologies are key enablers for evolving Network Centric access concepts for Naval first-on-scene

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operations in conflict and operations-other-than-war. Through maturation of key enabling technologies, the program will provide surrogate capabilities, which would be otherwise unavailable, and allow leading edge operational demonstration and experimentation. The iterative technology/concept collaboration will enable innovation and dramatically shorten the time to understand and capitalize on the ramifications of new technologies. This project supports the DON Transformation Roadmap and, in particular, the "Sea Trial: Process for Innovation" aspects.

Through FY 2004, this program also funds operational analyses in support of select Future Naval Capabilities (FNCs) and discrete technologies being developed under the Navy's S&T portfolio.

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

PROGRAM CHANGE SUMMARY:

	FY 2003	FY 2004	FY 2005
FY 2004-2005 President's Budget Submission	42,501	20,584	17,992
Cong. Rescissions/Adjustments/Undist. Reductions	-516	-456	0
Congressional Actions	0	19,400	0
Execution Adjustments	153	0	0
Inflation Savings	0	0	-57
Rate Adjustments	0	-38	-70
Technical Adjustments	0	0	-1,859
FY 2005 President's Budget Submission	42,138	39,490	16,006

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable.

Schedule: Not applicable.

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COST: (Dollars in Thousands)

Project Number & Title	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
R2918 Navy Warfighting Experiments and Demonstrations	42,138	20,306	16,006	37,279	44,257	45,145	46,085

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of this project is to mature select technologies to facilitate advanced operational demonstration and experimentation. The co-evolution of concepts and technologies requires that potentially revolutionary developments be investigated in Naval service operational environments: FBEs, AWEs and LOEs. Concept driven operational experimentation has been historically constrained because the technology employed was from currently mature systems, or those about to complete the acquisition process. This program, in collaboration with the concept development activities for the Navy and Marine Corps, identifies high leverage and potentially revolutionary technology/concept pairings and focuses developmental efforts on preparation of OEAs. The OEAs (fieldable technology prototypes) tailored for operational demonstration or experimentation will provide the ability to operate/experiment with technologies and concepts that would otherwise be too advanced or high risk to be employed in the operational environment. Initial efforts will distill technologies for unmanned vehicles, high speed vessels, miniaturized, expeditionary sensing elements, rapid target geo-location, combat identification, advanced countermeasures and knowledge management systems, which are tailored for littoral environments and expeditionary operations. These technologies are key enablers for evolving Network Centric access concepts for Naval first-on-scene operations in conflict and operations-other-than-war. Through maturation of key enabling technologies, the program will provide surrogate capabilities, which would be otherwise unavailable, and allow leading edge operational demonstration and experimentation. The iterative technology/concept collaboration will enable innovation and dramatically shorten the time to understand and capitalize on the ramifications of new technologies.

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 FNCs and discrete technologies being developed under the Navy's S&T portfolio.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2003	FY 2004	FY 2005
Naval Warfare Experimentation Articles – Expeditionary Sensing Elements	17,171	12,919	16,006

This project matures technology and produces OEAs which enable investigation of the feasibility and contribution of distributed sensors and affectors in littoral operations. The United States has some of the most sophisticated sensor systems in the world that have the ability to provide standoff sensing of militarily significant targets. However, potential adversaries have developed capabilities to cover, conceal, and deny information from these sensors. The Expeditionary Sensor Grid (ESG) concept envisions thousands of additional sensors that can be distributed across the battlespace and placed in close proximity to the targets of interest. Congruently, Network-Centric Operations envisions bringing the data and information from all sensor sources into one common picture that can be tailored to meet the specific requirements of each warfighter. This is in stark contrast to current sensor systems which are not integrated thus making it extremely difficult to provide timely quality information to each decision-maker. The traditional technique of standardization among systems cannot achieve the Network-Centric Operations vision in the dynamic information environment of the future. The ESG concept offers a solution with a "plug and play" of new sensors as well as legacy sensors, databases, and processes. The new sensors provide for exploitation of previously unexploited phenomenology associated with targets of interest and can be widely distributed across the domains of space, air, sea, land, and information and carried by unmanned vehicles or traditional manned platforms. ESG provides sensing, data archiving, processing, fusion, course of action assessment, and information presentation and thus the means to transform data to decision quality information having high utility to the appropriate tactical and operational warfighter. ESG provides "plug and play" interoperability between heterogeneous elements, the capability to dynamically reconfigure the grid as systems enter and leave, and information assurance. Such highly distributed simple sensors and affectors have not been fully investigated previously in the context of platform centric acquisition programs.

FY 2003 Accomplishments:

The project continued to mature technologies and produce OEAs which enabled investigation of the feasibility and contribution of distributed sensors and affectors in littoral operations. Exploration continued on new sensors that use previously unexploited phenomenology associated with targets of interest and which are distributed across the domains of space, air, sea, land, and information. Examination included innovative and advanced technologies to reduce cost and risk and enable new operational concepts. Efforts completed

included: Unmanned Aerial Vehicle-Borne Distributed Electro-Optical/Infrared Sensors; and Shallow Water Acoustics in a Random Medium Distributed Micro-Affectors. These completed efforts demonstrated the capability to geo-locate mortar fire and the capability to defeat mobile Anti-Ship Missiles targeting radars in a distributed fashion with ESG-ready OEAs. Continued efforts included: Distributed Undersea Warfare Pyramid Electromagnetic Sensors; and Unattended Sea-Based Cruise Missile Sensors. New OEA development efforts were initiated included: Deployable Remote Sensor; Tactical Specific Emitter Identification (SEI) Algorithms, Tactical Coherent Stand-in Jammer; and Distributed Mine Countermeasures.

FY 2004 Plans:

The project will continue to mature technologies and produce OEAs which enable investigation of the feasibility and contribution of distributed sensors and affectors in littoral operations, including continued investigations of new sensors that take advantage of previously unexploited target signature phenomenology. Examination will continue on innovative and advanced technologies to reduce cost and risk, while enabling new operational concepts. Efforts that will be completed include: Distributed Undersea Warfare Pyramid Electromagnetic Sensors and its demonstration; and Unattended Sea-Based Cruise Missile Sensors effort and its demonstration. Efforts that will be continued include: Deployable Remote Sensor; Tactical SEI Algorithms; Tactical Coherent Stand-in Jammer, and Distributed Mine Countermeasures. Other new OEA efforts will be initiated as opportunities are identified to support future fleet battle experimentation.

FY 2005 Plans:

The project will continue to mature technologies and produce OEAs which enable investigation of the feasibility and contribution of distributed sensors and affectors in littoral operations, with continued exploitation of new sensor phenomenology and examinations of innovative and advanced technologies to reduce cost and risk, while expanding mission capabilities. Efforts that will be completed include: Deployable Remote Sensor; Tactical SEI Algorithms; Tactical Coherent Stand-in Jammer; and Distributed Mine Countermeasures. These completed efforts will demonstrate new capabilities to: extend the sensor reach of netted platforms; distribute fused SEI information across the Fleet; defeat sophisticated enemy air suppression radars; and counter the effectiveness of sea mines or reduce the probability of damage to surface ships or submarines. Other new OEA efforts will be initiated as opportunities are identified to support future fleet battle experimentation.

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	FY 2003	FY 2004	FY 2005
U.S. Marine Corps Experimentation	3,911	3,500	0

This project provides support to experimental pathway events including Marine Corps service contribution to Joint Forces Command (JFCOM) federated modeling and simulation efforts in support of experimentation.

FY 2003 Accomplishments:

The project continued support to JFCOM's spiral concept development and distributed modeling and simulation experimentation. Support was provided to expand the Marine Corps involvement in JFCOM's experimental pathways Olympic Vision and Pinnacle Impact to include developing courses of action and procedures for Service component interaction with the Standing Joint Force Headquarters (SJFHQ) that serve as the centerpiece of JFCOM Joint Concept Development and Experimentation (JCDE) exploration. Development of Service-specific modeling and simulation support to JFCOM's developing Joint Global War Game concept and expansion of the Marine Corps JCDE collaboration with JFCOM through JCDE coordination and implementation offices was also supported.

FY 2004 Plans:

The program will continue supporting JFCOM experimental pathways, including Pinnacle Vision and experimentation with the SJFHQ during both spiral development leading to Olympic Challenge-04 and in support of the modeling and simulation federation in preparation for the Pinnacle Challenge-05 integrated experiment in FY05. The program will support Marine Corps spiral development of Naval sea-basing operational capabilities for modeling and simulation as part of the JFCOM Joint Global War Game and continue support to the Marine Corps JCDE coordination and implementation effort.

FY 2005 Plans:

Efforts terminated due to fiscal constraints.

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	FY 2003	FY 2004	FY 2005
Science and Technology Analysis and Assessments	2,003	3,887	0

Independent S&T reviews will be conducted to assure that experimentation is executed and operational analyses performed which address relevant issues and allow the iterative improvement of concepts and technologies (in the form of OEAs). Specific year-to-year efforts will focus on net-centric concepts under development by the Naval Warfare Development Command (NWDC) in the areas of Littoral Warfare. Analyses and assessments will be directed toward ensuring that S&T resources are focused in a context of relevance centered on unique Naval needs, transformational concepts and opportunities.

FY 2003 Accomplishments:

Independent S&T reviews were conducted to ensure that experimentation is executed and operational analyses performed that address relevant issues and allow the iterative improvement of concepts and technologies in the form of OEAs. Efforts focused on anti-access concepts under development by the NWDC in the areas of Antisubmarine Warfare and Mine Warfare. Analyses and assessments were directed toward ensuring that S&T resources are focused in a context of relevance centered on unique Naval needs, transformational concepts and opportunities.

FY 2004 Plans:

Independent S&T reviews will be continued to ensure that experimentation is executed and operational analyses conducted that address relevant issues and allow the iterative improvement of concepts and technologies in the form of OEAs as well as to ensure that S&T resources are focused in a context of relevance centered on unique Naval needs, transformational concepts and opportunities.

FY 2005 Plans:

Efforts terminated due to fiscal constraints.

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	FY 2003	FY 2004	FY 2005
High Speed Vessel (HSV) Experimentation and Demo	2,528	0	0

The NWDC, U.S. Army Combined Arms Support Command, Office of Naval Research, the Marine Corps Plans, Policies, and Operations Department, Navy Special Warfare Command and the U.S. Coast Guard Deep Water Project Program, agreed to cooperate in a joint experimentation effort to explore and develop advanced watercraft technologies. Members of the experimentation team expect to conclude this joint experimentation effort with an understanding of where these technologies can best be applied across their respective mission spectrums. This is to enable each partner to much more accurately define and articulate the capabilities they need to include in the future ships that will optimize the advantages of these technologies.

FY 2003 Accomplishments:

Continued experimentation efforts under coordination of the NWDC. The existing test plan was refined in order to incorporate Naval Surface Warfare Center-Carderock's recommendation to undertake sea trials under test conditions that included: high sea state, low speed test runs to assess the platform's global structural loads, and moderate sea state, high speed test runs in longer period seaways to assess motion and slamming limits. The program completed the data base of test runs needed to fully quantify the operational profile of the HSV-X1.

FY 2004 Plans: Not applicable.

FY 2005 Plans: Not applicable.

	FY 2003	FY 2004	FY 2005
ForceNet - Expeditionary Sensor Grid (ESG) / Enabling Experimentation (EEE) / Knowledge Superiority and Assurance (KSA) Future Naval Capability (FNC)	16,525	0	0

This project takes products emerging from the ESG Enabling Experimentation (EEE) program and merges them with the Knowledge Superiority and Assurance (KSA) FNC efforts to develop an integrated approach for ForceNet experimentation. The objective of the EEE is to deliver software to operational experiments that allows for easy connection of heterogeneous elements that comprise an ESG, that allow for dynamic configuration and reconfiguration of an ESG, and that deliver the power of the next generation Internet (Semantic Web) to

provide the necessary information for dynamic command and control. Development efforts are based on the hypothesis that an ESG will improve the ease and availability of data and information to the warfighter, make available data that is not available today, improve the ability to fuse data and information from disparate sources, and decrease the decision makers' workload by providing actionable information. Contributions from the KSA FNC efforts will include enabling capabilities for Common Picture, Time Sensitive Decision Making and Distributive Collaborative Planning and Execution. Planned demonstrations include support for dynamic strike and fires management as well as replanning and rehearsal of operational and tactical forces. A common methodology and connectivity will be established to facilitate a capability for Distributed Laboratory Experimentation allowing scoping analysis using each laboratory's contributions in their areas of excellence. Deliverables from this program will provide the ability to conduct operational experiments to co-evolve network-centric warfare concepts and technologies that will feed into ForceNet.

FY 2003 Accomplishments:

Products emerging from earlier EEE efforts were combined with ongoing KSA FNC efforts to develop an integrated approach for ForceNet experimentation. Demonstrations for dynamic strike and fires management were undertaken based on contributions from KSA FNC efforts including enabling capabilities for Common Picture, Time Sensitive Decision Making, and Distributive Collaborative Planning and Execution. EEE completed the common methodology/connectivity technologies that facilitated a capability for Distributed Laboratory Experimentation, increased the number of sensor types on the grid and completed developmental work on an end-to-end capability enabled by the Defense Advanced Research Agency developed CoABS grid and agent-based computing (ABC) technologies. To assist information retrieval, sensor processing and data fusion were initiated using technologies from KSA FNC efforts and Air Force Rome Laboratory's publish-and-subscribe developments. Design of the next iteration of operational experiments that co-evolve network-centric warfare concepts, technologies, and tactics, techniques and procedures was completed and testing of new capabilities continued in distributed laboratory experiments and during FBEs. With evaluation by Fleet operational personnel, and a clear connection to ForceNet, software implementations were completed that demonstrated how ABC can facilitate the control and management of vast numbers of sensors in the future operational Naval environment leading to decision-quality information for the warfighter without regard for the specific source sensors. KSA demonstrations were initiated and completed specifically in the areas of: Time-Sensitive Decision Making Air Operations Decision Support; Time-Sensitive Decision Making Joint Mission Planning System for Expeditionary Forces Surface Assault Planning; and Common Consistent Knowledge Integrated Marine Multi-Agent Command and Control System. These completed demonstrations established new capabilities that included: improved interoperability and enhanced situation awareness to individual warfighters; enhanced E-2C ability to reduce the probability of blue-on-blue engagements; and significant reduction in planning time for

expeditionary maneuver warfare and tactical surface assault. In addition, new KSA demonstrations initiated for time-sensitive decision making in the areas of: Course of Action Analysis Tool for Identifying Mobile Time-Sensitive Targets; Image Processing and Exploitation Architecture; Real-Time Execution Decision System, Tomahawk Land Attack Naval Fire Support Workstation Decision Support Capability; and Comprehensive Analytic Real-Time Execution in Joint Air Operations. Starting in FY 2004 KSA efforts were realigned into program elements 0602235N, 0602271N, 0603235N and 0603271N.

FY 2004 Plans: Not applicable.

FY 2005 Plans: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. ACQUISITION STRATEGY: Not applicable.

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PROJECT NUMBER: Various PROJECT TITLE: Congressional Plus-Ups

CONGRESSIONAL PLUS-UPS:

R9341	FY 2003	FY 2004
FORCENET LIMITED OBJECTIVE EXPERIMENTS	0	3,362

ForceNet serves as the "glue" binding together the Department of the Navy's concept for 21st century warfare (aka Seapower 21). It is the operational construct and architectural framework for Naval warfare in the information age, integrating warriors, sensors, command and control, platforms, and weapons into a networked, distributed combat force.

ForceNet will provide the architecture to increase substantially combat capabilities through aligned and integrated systems, functions, and missions. It will transform situational awareness, accelerate speed of decision, and allow us to greatly distribute combat power. ForceNet will harness information for knowledge-based combat operations and increase force survivability. It will also provide real-time enhanced collaborative planning among joint and coalition partners.

Against this backdrop, these funds will be used to develop OEAs that support the ForceNet concept. The OEAs represent prototype technologies that support the ForceNet concept and will be used in support of warfighter demonstrations.

R9342	FY 2003	FY 2004
TRANSFER FROM OPN	0	15,822

This reflects a Congressionally directed transfer of Other Procurement, Navy funding from Naval Tactical Command Support Systems (5,822) and Common Imagery Ground Surface Systems (10,000) to the Naval Warfighting Experiments and Demonstration program in support of developing OEAs that support the ForceNet concept. The OEAs represent prototype technologies that support the ForceNet concept and will be used in support of warighter demonstrations.