

UNCLASSIFIED

FY 2008/2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET  
Exhibit R-2

DATE: February 2007

BUDGET ACTIVITY: 04  
PROGRAM ELEMENT: 0604707N  
PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

COST: (Dollars in Thousands)

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
<b>Total PE</b>	35,590	43,676	42,295	39,021	49,642	59,479	66,191	67,325
0798 OTH TARGETING	1,589	1,998	2,113	2,024	2,112	2,331	2,369	2,409
2144 SPACE AND ELECTRONIC WARFARE ENGINEERING	10,821	10,988	6,344	4,330	4,808	6,784	12,505	12,617
2357 MARITIME BATTLE CENTER	23,180	30,690	33,838	32,667	42,722	50,364	51,317	52,299

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:** This Program Element (PE) contains three projects: Maritime Battle Center (MBC), Over-the-Horizon Targeting (OTH-T), and Space and Electronic Warfare (SEW) Engineering. The MBC project (2357) focuses on Fleet experimentation in order to eliminate warfighting gaps and validate Navy Concept of Operations (CONOPS) and Doctrine coordinated by the Navy Warfare Development Command (NWDC). The MBC also manages US Fleet Forces Command's (USFFC) SEA TRIAL program of Fleet experimentation that is administered by the SEA TRIAL Executive Steering Group (STESG). Both MBC and SEA TRIAL integrate emergent concepts and technologies through experiments/analysis/modeling and simulation to support warfighting capability development. SEA TRIAL experimentation is dedicated to providing solutions to near term (within the Fiscal Year Defense Plan) warfighting gaps through focused Operational Agent (Commander Second Fleet, Commander Third Fleet and Commander Naval Network Warfare Command) led experimentation. The USFFC chaired Flag level SEA TRIAL Executive Steering Group prioritizes proposed SEA TRIAL experiments annually. The MBC will also serve as the Navy representative to the Joint Battle Center and the Battle Labs of other services.

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The OTH-T and SEW Engineering projects (0798 and 2144 respectively) are systems engineering non-acquisition programs with the objectives of developing, testing, and validating Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architectures to support naval missions in the Joint and Coalition Theater. The mission of these projects are carried out by multiple tasks that are used to ensure Naval C4ISR Command and Control Warfare (C2W) components of SEW are effectively integrated into service-oriented architecture delivering net centric warfare capability. Additionally, these projects ensure that (1) the composite operational capabilities of SEW systems (not the individual component systems) conform to the Naval C4ISR architecture and enhance warfighting capability as related to the objectives of National Defense Strategy and evolving joint visions and direction, such as Joint Vision 2020 (JV 2020), "Sea Power 21" and "Net-Centric Capability" and are guided by warfighter requirements; and (2) that SEW systems and systems integration efforts involve leading-edge technology transfer of information processing technologies primarily through integration of government and commercial off-the-shelf (GOTS/COTS) products to enhance the Navy's operational capability, interoperability, warfighter effectiveness, flexible reconfiguration, as well as reduce costs; and (3) that SEW systems integration efforts promote the delivery of FORCENet and the Navy's contribution to the Global Information Grid (GIG).

**B. PROGRAM CHANGE SUMMARY:**

	FY 2006	FY 2007	FY 2008	FY 2009
FY 2007 President's Budget Submission	35,224	43,909	51,445	57,930
Congressional Undistributed Reductions/Rescissions	151	-233	0	0
Functional Realignment for OPNAV Program Support Costs	-258	0	0	0
Non-Pay Inflation Adjustments	0	0	-130	64
Program Adjustments	728	0	-9,168	-19,101
Rate Adjustments	0	0	148	128
SBIR Assessment	-255	0	0	0
FY 2008/FY 2009 President's Budget Submission	35,590	43,676	42,295	39,021

**PROGRAM CHANGE SUMMARY EXPLANATION:**

Technical: Not applicable

Schedule: Not applicable

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**C. OTHER PROGRAM FUNDING SUMMARY:**

Not applicable.

**D. ACQUISITION STRATEGY:**

Not applicable

**E. PERFORMANCE METRICS:**

OTH Targeting and Propulsion Technology Demonstration:

- Earned Value Management (EVM) is used for metrics reporting and risk management.

Maritime Battle Center:

- Refines concepts and identifies key performance levels necessary for implementation.
- Demonstrate feasibility and discriminate among competing concepts and implementation alternatives.
- Understand potential military effectiveness and risk.
- Evaluate how much of the new capability and attendant force structure is needed.
- Learn how to operate the new force and combine it with the legacy force.
- Develop recommended Doctrine, Organization, Training, Materiel, Leadership, and Personnel (DOTMLP) changes.
- Develop fleet warfighting requirements for submission to the OPNAV Navy Capabilities Development Process (NCDP) to inform Navy acquisition decisions.
- Integrate emergent concepts and technologies, leading to rapid introduction of needed warfighting capabilities in the fleet.
- Rapidly mature Sea Shield, Sea Strike, Sea Basing, and FORCEnet concepts, technologies, and doctrine.
- Focus on near, mid and long term warfighting challenges to realize increased warfighting effectiveness.

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PROGRAM ELEMENT: 0604707N  
PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT  
PROJECT NUMBER: 0798 PROJECT TITLE: OTH TARGETING

COST: (Dollars in Thousands)

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
0798 OTH TARGETING	1,589	1,998	2,113	2,024	2,112	2,331	2,369	2,409

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:** The OTH-T/Allied Interoperability program provides a virtual, global systems integration and test facility for C4ISR technology that supports the collection, transmission, correlation, and display of track data into Common Operational and Tactical Pictures (COTP) in support of warfighting requirements. The common view of the battle space applies across the spectrum of warfare missions. However, technology and doctrine has changed radically. The first objective of the OTH-T/Allied Interoperability program is to transition the Joint/Navy architectures and systems to state-of-the-art COTS and GOTS products that support Network Centric Warfare. The second objective is to support development, integration, and joint interoperability of all National Security System (NSS), Information Technology (IT), and C4I systems into warfighting capabilities. This support includes providing technical expertise afloat and ashore via a cadre of highly trained Fleet Systems Engineers in order to integrate, validate, and evaluate new OTH-T/Allied Interoperability capabilities during major Fleet exercises and demonstrations. The OTH-T/Allied Interoperability program integration and testing in support of warfighting capabilities includes joint and coalition interoperability testing for C4ISR equipment. Coalition and joint interoperability is an important issue for future naval operations, especially with the Navy initiative to expand Internet Protocol (IP) networking throughout the Fleet Navy Marine Corps Intranet/Base Level Information Infrastructure (NMCI/BLII) with the GIG. Currently, IP connectivity with Coalition forces is limited, requiring extensive backhaul through ashore infrastructure. Funding allows for development of solutions for emerging Coalition and joint interoperability requirements. Data throughput needs to be increased for the exchange of large size files within the limitations of high frequency (HF) medium in support of, for example, Collaboration at Sea (CAS). Funding allows for further development of potential solutions for merging improved transmission control protocol/internet protocol (TCP/IP) capability with advance digital network systems (ADNS) and existing international standards (e.g. Standardization Agreement 5066). Funding will also allow for development of Subnet Relay protocols and automatic link establishment standards, which provides for a significant improvement within, and between, battle groups.

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## B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
ADVANCED RELAY/WIRELESS/ANTENNA TECHNOLOGIES	389	728	771	739

### FY 2006 Accomplishments:

Developed and tested Generation 1 and Generation 2 Spatially Aware Wireless Network (SPAWN) prototype antennas in breadboard form. Developed semi-automated design tools to speed-up the prototyping process. Developed the high-level network architecture for SPAWN.

### FY 2007 Plans:

Design, fabricate, and test Generation 3 SPAWN prototype antennas in brassboard form. Field tests over both land paths and sea paths of point-to-point electronically-steerable wireless links to demonstrate tracking. The performance shown will confirm that our technology is ready for demonstration in Trident Warrior 2008.

### FY 2008 Plans:

Design, fabricate, and test Generation 4 SPAWN prototype antennas in seaworthy brassboard form with wireless network equipment. Perform a line-of-sight (LOS) field demonstration of SPAWN in Trident Warrior 2008.

### FY 2009 Plans:

Design, fabricate and test Generation 5 SPAWN antennas in integrated form with wireless network equipment. Perform an Over-the-Horizon (OTH) field demonstration of SPAWN in Trident Warrior 2009.

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	FY 2006	FY 2007	FY 2008	FY 2009
<b>SUBNET RELAY</b>	351	196	205	196

## **FY 2006 Accomplishments:**

Completed Subnet Relay interoperability lab testing with the participation of Australia, Canada, New Zealand, United Kingdom, United States (AUSCANNZUKUS) nations. Simulated four-ship Subnet Relay networks with international interoperability. Validated multi-bearer routing architecture that allows more efficiency in application traffic over multiple links. Received Interim Authority to Operate (IATO) and Space and Naval Warfare Systems Command (SPAWAR) approval for participation in Trident Warrior 2006 (TW06). Completed ship installs and conducted a successful participation in Trident Warrior 06, including post exercise evaluations and generation of findings.

## **FY 2007 Plans:**

Test and demonstrate Subnet Relay allied interoperability in Trident Warrior 07, with reuse of TW06 equipment and installation documentation as practicable. Investigate improvements to Subnet Relay protocol and pursue better integration with ARC-210 radios. Transition Subnet Relay to Program of Record by 2007.

## **FY 2008 Plans:**

Continue to refine Subnet Relay allied interoperability in concert with Chief of Naval Operations for Communication Networks (OPNAV N6). Venues of opportunity will be exploited to validate and evaluate developed portions of Subnet Relay configurations through testing, trials, and demonstrations. Investigate airborne deployment of Subnet Relay.

## **FY 2009 Plans:**

Continue to refine Subnet Relay allied interoperability in concert with OPNAV N6. Venues of opportunity will be exploited to validate and evaluate developed portions of Subnet Relay configurations through testing, trials, and demonstrations. Complete field demonstration of Subnet Relay airborne deployment.

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	FY 2006	FY 2007	FY 2008	FY 2009
<b>SYSTEMS INTEGRATION &amp; INTEROPERABILITY TESTING</b>	399	495	524	502

**FY 2006 Accomplishments:**

Conducted/participated in three overall Joint/Navy integration and interoperability tests; facilitated one planning review for Joint Test and Evaluations; participated in Joint Users Interoperability Communications Exercise (JUICE) and other joint test events. This included two tests with Joint Distributed Engineering Plant (JDEP) and one with Multi Service Development Exercise (MSDE).

**FY 2007 Plans:**

Conduct/participate in five overall Joint/Navy integration and interoperability tests as available; facilitate two planning reviews for Joint Test and Evaluations as available; participate in JUICE and other joint test events.

**FY 2008 Plans:**

Conduct/participate in five overall Joint/Navy integration and interoperability tests as available; facilitate two planning reviews for Joint Test and Evaluations as available; participate in JUICE, JDEP, and other joint test events.

**FY 2009 Plans:**

Conduct/participate in five overall Joint/Navy integration and interoperability tests as available; facilitate two planning reviews for Joint Test and Evaluations as available; participate in JUICE, JDEP, and other joint test events.

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	FY 2006	FY 2007	FY 2008	FY 2009
<b>INTEROPERABILITY VALIDATION</b>	135	173	182	175

## **FY 2006 Accomplishments:**

Used the Reconfigurable Land Based Test Sites (RLBTS) and OTH-T resources to validate GIG technologies prior to shipboard installation, supported eight Net Ready-Key Performance Parameters (NR-KPP) Migration Plan Developments and two joint interoperability C4ISR certifications to ensure interoperability requirements between sensors, weapon systems and information systems were met. These were accomplished in conjunction with Trident Warrior and Distributed Engineering Plant (DEP) experimentation and test events.

## **FY 2007 Plans:**

Use the RLBTS and OTH-T resources to validate GIG technologies prior to shipboard installation, support ten NR-KPP Migration Plan Developments and four joint interoperability C4ISR certifications to ensure interoperability requirements between sensors, weapon systems and information systems are met.

## **FY 2008 Plans:**

Use the RLBTS and OTH-T resources to validate GIG technologies prior to shipboard installation, support ten NR-KPP Migration Plan Developments and four joint interoperability C4ISR certifications to ensure interoperability requirements between sensors, weapon systems and information systems are met.

## **FY 2009 Plans:**

Use the RLBTS and OTH-T resources to validate GIG technologies prior to shipboard installation, support ten NR-KPP Migration Plan Developments and four joint interoperability C4ISR certifications to ensure interoperability requirements between sensors, weapon systems and information systems are met.

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PROJECT NUMBER: 0798 PROJECT TITLE: OTH TARGETING

	FY 2006	FY 2007	FY 2008	FY 2009
TESTING OTH-T SYSTEMS	315	406	431	412

## FY 2006 Accomplishments:

Conducted five developmental, integration, developmental, and certification tests, in accordance with OPNAVINST 9410.5, of Over-The-Horizon Targeting and Combat systems with tactical data exchanged over Common Operational Picture (COP) Common Synchronization Tools (CST) networks and other networks; two integration test events for GCCS-M and collaboration technologies within the GIG. These tests were done with GCCS-M4x/GCCS-M3x/AN-BYG-1/COE/COE-M/CAS/ATWCS/TTWCS. Testing also addressed issues of Fleet essential capabilities and emerging mission essential needs both for new, legacy, and technology refreshed systems.

GCCS-M: Global Command and Control System Maritime  
AN-BYG-1: Submarine Weapons Control System  
COE (M): Common Operation Environment (Maritime)  
CAS: Collaboration at Sea  
ATWCS/TTWCS: Advanced/Tactical Tomahawk Weapons Control System

## FY 2007 Plans:

Conduct five developmental, integration, and certification tests, in accordance with OPNAVINST 9410.5, of Over-The-Horizon Targeting and combat systems with tactical data exchanged over COP CST networks and other networks; three integration test events for Joint Command and Control, Combat Decision Systems, and Collaboration technologies within the GIG. Testing to also address issues of Fleet essential capabilities and emerging mission essential needs both for new, legacy, and technology refreshed systems.

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## **FY 2008 Plans:**

Conduct six developmental, integration, and certification tests, in accordance with OPNAVINST 9410.5, of Over-The-Horizon Targeting and combat systems with tactical data exchanged over COP CST networks and other networks; three integration test events for Joint Command and Control, Combat Decision Systems, and Collaboration technologies within the GIG. Testing to also address issues of Fleet essential capabilities and emerging mission essential needs both for new, legacy, and technology refreshed systems. This includes developmental testing between Joint C2 systems and combat systems.

## **FY 2009 Plans:**

Conduct six developmental, integration, and certification tests, in accordance with OPNAVINST 9410.5, of Over-The-Horizon Targeting and combat systems with tactical data exchanged over COP CST networks and other networks; three integration test events for Joint Command and Control, Combat Decision Systems, and Collaboration technologies within the GIG. Testing to also address issues of Fleet essential capabilities and emerging mission essential needs both for new, legacy, and technology refreshed systems. This includes developmental testing between Joint C2 systems and combat systems.

## **C. OTHER PROGRAM FUNDING SUMMARY:**

SEW Architecture/Engineering Support program element is related to all Naval C4I related efforts.

## **D. ACQUISITION STRATEGY:**

Not applicable.

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Exhibit R-3 Cost Analysis										Date: February 2007				
APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA 04										PROJECT NAME AND NUMBER: OTH Targeting 0798				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYS Cost	FY-06 Cost	FY-06 Award Date	FY-07 Cost	FY-07 Award Date	FY-08 Cost	FY-08 Award Date	FY-09 Cost	FY-09 Award Date	CostToComp	Total Cost	Target Value of Contract
System Test and Evaluation	Various	Various	3854	389	Various	728	Various	771	Various	739		CONT	CONT	
Interoperability Requirements	Various	Various	3266										3266	
T & E Tools Development	Various	Various	429										429	
Systems Int. & Interop. Testing (LBTN)	Various	Various	2176	399	Various	495	Various	524	Various	502	Various	CONT	CONT	
Interoperability Validation	Various	Various	2158	135	Various	173	Various	182	Various	175	Various	CONT	CONT	
Joint Interoperability	Various	Various	1174										1174	
Testing OTH-T Systems	Various	Various	1702	315	Various	406	Various	431	Various	412	Various	CONT	CONT	
Subtotal T&E			14759	1238		1802		1908		1828		0	CONT	
Remarks														
Contractor Engineering Support													0	
Government Engineering Support	Various	Various	3960	351	Various	196	Various	205	Various	196		CONT	CONT	
Program Management Support	Various	Various	1468										1468	
Travel													0	
Transportation													0	
Subtotal Management			5428	351		196		205		196		0	CONT	
Remarks														
Total Cost			20187	1589		1998		2113		2024		0	CONT	

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PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT  
PROJECT NUMBER: 2144 PROJECT TITLE: SPACE AND ELECTRONIC WARFARE ENGINEERING

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2144 SPACE AND ELECTRONIC WARFARE ENGINEERING	10,821	10,988	6,344	4,330	4,808	6,784	12,505	12,617

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:** OPNAVINST 3050.23 defines the policy to fuse validated/approved C4ISR architectures and interoperability requirements with Joint requirements, milestones and program decisions. C4ISR integrated architectures/requirements are the underpinnings for all C4ISR mission areas and capabilities and, as such, requirements and acquisition processes have been reengineered to use these Integrated Architectures for decisional purposes and strategic planning. Furthermore, Office of the Secretary of Defense (OSD) has defined key programs/efforts (GIG Baseline Extension (BE), Transformational Satellite (TSAT), Joint Tactical Radio System (JTRS), Network Centric Enterprise Services (NCES), and Information Assurance (IA) that will drive and change the Navy's C4ISR integrated architectures and associated business processes for requirements, budgets and acquisition. To that end, the SEW provides two main functions: 1) Development of C4ISR Integrated Architecture Products and 2) Supporting C4ISR Systems Engineering processes. The integrated architecture products are used to support the Navy's C4ISR budget process by providing the critical core architecture and enabling capabilities to the Warfighter. The C4ISR systems engineering processes provide the construct for assessments to identify capability shortfalls/gaps and for systems engineering to compare/test alternatives in a joint end-to-end environment while identifying associated Navy wide C4ISR implications. This includes Human Systems Integration (HSI) that provides a mission-centered orientation to ensure effective operational employment of fielded capability. As joint concepts and OSD driving efforts/programs are matured/defined the Navy's C4ISR integrated architectures are refined and the supporting C4ISR Systems Engineering processes work to engineer and enact C4ISR implementations Navy wide across all C4ISR mission areas.

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## Products provided:

### 1) C4ISR Integrated Architectures

- Integrated Architectures and Standards - Architecture Views (Operational Views, Service Views, Technical Views, System Views)
- Migration Roadmaps to the target Architectures
- Architecture technical studies, interpretation assistance, and white papers

### 2) Supporting C4ISR Systems Engineering processes

- C4ISR Requirements Assessments - Gaps Analysis, Overlap Analysis, System Priority Lists, C4ISR Metrics and Models, Analysis of Alternatives, Requirements Database, Assessment Repository, Resource Implications Studies, Baseline Performance Models, Mission Task Analysis, Human Systems Integration (HSI) assessments.
- End-to-End Systems Engineering and Integrated Design - Operational feasibility studies, technical feasibility studies, technical roadmap engineering validations, Architectures and Assessment traceability matrices.
- Joint and Coalition interoperability trials - Joint end-to-end prototyping trials, and Joint/Coalition interoperability demonstrations, Interoperability assessments and metrics, Interoperability studies via the Coalition Warrior Interoperability Demonstration (CWID) and the Joint Rapid Architecture Experimentation (JRAE) Process. Chairman of the Joint Chiefs of Staff Instruction 6260.01B (CJCSINST 6260.01B) directs the USN to provide \$1.7 million to the general CWID operating budget and to participate by operating a US Navy demonstration site.

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**B. ACCOMPLISHMENTS/PLANNED PROGRAM:**

	FY 2006	FY 2007	FY 2008	FY 2009
<b>COALITION WARRIOR INTEROPERABILITY DEMONSTRATION (CWID)</b>	2,489	2,778	2,534	2,004

**FY 2006 Accomplishments:**

Headquarters, US European Command (EUCOM) had been selected as the host COCOM for Coalition Warrior Interoperability Demonstration 2006 (CWID 06). The emphasis was placed on the advanced Coalition interoperability, with CWID continuing to focus on Defense Service to Civilian Authorities (DSCA) and Homeland Defense/Homeland Security (HLD/HLS) as well. The \$1.7 million exercise "buy-in" was required by Chairman of the Joint Chiefs of Staff (CJCS) instruction for CWID participation. In addition, \$548K supported the US Navy site in San Diego, which funded coalition and US trials based on the annually published Federal Business Opportunity letter posted on 03 May 2005. CWID trials provided the Fleet with three separate evaluations: 1) evaluation was provided by the National Security Agency (NSA) for proper security procedures; 2) evaluation was provided by Joint Integrated Test Command (JITC) for technical issues; and 3) evaluation was provided by the warfighter to verify usability. These evaluations were used to determine whether the projects became programs of record. Over seventy-five technologies were identified, investigated, and interviewed for participation in CWID. Thirty were selected and vetted through three planning conferences, along with having written scenario events to participate in CWID exercises. Twenty of these technologies were selected, demonstrated, and evaluated at the USN CWID site, SPAWARSSCOM.

**FY 2007 Plans:**

EUCOM will continue as the host COCOM for CWID 07, investigating Coalition interoperability. \$1.7 million exercise "buy-in" is required for CWID participation. \$565K supports the US Navy site in San Diego, which will fund coalition and US trials based on the CWID Federal Business Opportunity letter that will be published in/around May 2006. Remaining funding allows for additional US trials. CWID trials provide the Fleet with three separate evaluations: 1) evaluation provided by NSA for proper security procedures; 2) evaluation will be provided by JITC for technical issues; and 3) evaluation will be provided by warfighter to verify usability. These evaluations will then be used to determine whether these projects become programs of record.

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## **FY 2008 Plans:**

CWID will continue to investigate solutions for known capability gaps. While the COCOM executive agent for CWID 2008/2009 has not been identified, it is clear that both Allied Interoperability and HLD/HLS inter-governmental agency interoperability will remain cornerstones of the CWID charter. SPAWARSSYSCOM expects to remain the USN site and to continue to host both Coalition and HLD/HLS venues.

## **FY 2009 Plans:**

Host is not yet identified for CWID 09. Continue to investigate Coalition interoperability. A \$1.7 million CWID participation fee is required in order to participate in the exercise. An additional \$304K is required in order for SPAWARSSYSCOM to be an observer for Coalition and HLD/HLS venues.

**Comment [NLM1]:** Please explain the yellow highlighted text a little more- what does "buy in" mean. Is this the amount a potential participant contributes up front to participate in CWID? Also, the last sentence needs a little more amplifying info; is this the amount to be spent out of FY 2009's \$2M?

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	FY 2006	FY 2007	FY 2008	FY 2009
JRAE	1,071	4,207	304	304

## FY 2006 Accomplishments:

In 2006, the name "Joint RAPTOR" was changed to Joint Rapid Architecture Experimentation (JRAE). The JRAE efforts were driven by Joint Forces Command (JFCOM) interoperability risk areas at the horizontal (tactical) level as identified by the Joint Architecture efforts under the JFCOM Joint Battle Management Command and Control (JBMC2) effort. JRAE prototyped the "to be" joint integrated architectures and integrated / collaboratively tested with the Army and the Air Force to promote joint interoperability between the services' next generation tactical C4ISR architectures.

Conducted 1 Major JRAE interoperability event which delivered the following:

- JRAE Interoperability Trial Plans
- JRAE Interoperability Data Collection and Analysis
- JRAE Interoperability Metrics
- JRAE Final Reports

## FY 2007 Plans:

JRAE efforts will be driven by JFCOM interoperability risk areas at the horizontal (tactical) level as identified by the Joint Architecture efforts under the JFCOM JBMC2. The JRAE process will be used to prototype the "to be" joint integrated architectures and integrate and collaboratively test with the Army and the Air Force to promote joint interoperability between the services' next generation tactical C4ISR architectures.

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DATE: February 2007

BUDGET ACTIVITY: 04  
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PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT  
PROJECT NUMBER: 2144 PROJECT TITLE: SPACE AND ELECTRONIC WARFARE ENGINEERING

Conduct 2 Major JRAE interoperability events, and deliver the following:

- JRAE Interoperability Trial Plans
- JRAE Interoperability Data Collection and Analysis
- JRAE Interoperability Metrics
- JRAE Final Reports

## **FY 2008 Plans:**

JRAE will continue to leverage previous efforts and will collaborate with the Joint Community and Defense Agencies in identifying interoperability risk areas at the horizontal (tactical) level. JRAE will support the ForceNet Capability Development Process and JFCOM Joint Battle Management Command and Control Process. JRAE efforts will evaluate Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) "to be" architectures and services to support naval missions in the Joint and Coalition net centric environments and interoperability between the Services' next generation tactical C4ISR architectures.

## **FY 2009 Plans:**

JRAE will continue to leverage previous efforts and will collaborate with the Joint Community and Defense Agencies in identifying interoperability risk areas at the horizontal (tactical) level. JRAE will support the ForceNet Capability Development Process and JFCOM Joint Battle Management Command and Control Process. JRAE efforts will evaluate Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) "to be" architectures and services to support naval missions in the Joint and Coalition net centric environments and interoperability between the Services' next generation tactical C4ISR architectures.

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DATE: February 2007

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 PROJECT NUMBER: 2144 PROJECT TITLE: SPACE AND ELECTRONIC WARFARE ENGINEERING

	FY 2006	FY 2007	FY 2008	FY 2009
<b>C4ISR REQUIREMENTS ASSESSMENTS</b>	2,175	1,161	2,237	2,022

**FY 2006 Accomplishments:**

Used Modeling and Simulation tools to support the Naval Capabilities Development Process (NCDP) and Capability Based Assessments (CBAs), per various Joint and OPNAV instructions. Initiated CBA for Battle Space Networking. Performed requirements analysis, collected and developed model architectures for the Campaign Analysis Modeling and Simulation effort.

2014-2020 Model C4ISR architectures for 2 Major Combat Operations / Mission Areas to support specific assessments for 5 POM08 analytic issues in support of the Integrated Strategic Capabilities Plan (ISCP). Specific missions studied included Surface Warfare (SW) and Anti-Submarine Warfare (ASW) of SeaShield. Mission areas were translated into architectural products that were aligned to assessment modeling tools. This work was aligned/integrated with the FORCENet Implementation Process (FIP) to support the Sponsor Program Proposal (SPP).

Conducted FORCENet Maritime Headquarters (MHQ) with MOC CBA in support of Department of Defense (DoD) Joint Command and Control (JC2) and National Security Management System (NSMS) directives. Submitted Doctrine, Organization, Training, Materiel, Leadership, and Personnel (DOTMLP) change request package for FORCENet MHQ for POM 08. Three follow on CBA efforts are planned and detailed for FY 07 and they will expand MHQ with MOC and FORCENet CBA efforts to National Maritime Domain Awareness (MDA), interagency operations, JC2 and Joint Net centric operations supporting National MDA implementation team (IT) CBA on MDA interagency. Direct support was provided for JFCOM Command and Control (C2) / Net Centric Environment (NCE) CBA.

**FY 2007 Plans:**

2016-2022 Model C4ISR architectures for 3 Major Combat Operations / Mission areas in support of force level assessments for 5 Navy analytic issues / CBA. Support Network Centric Warfare (NCW) Level 2 block builds. FORCENet Capability List (FCL) efforts will continue to develop a web-based software system required to implement the FCL. It will provide the direct correlation of FORCENet Capabilities to activities, functions, and systems mapped to Mission Essential Tasks (METs). It will provide linkages to the metrics assessing value of systems relevance to FORCENet capability, functions, and associated tasks and activities.

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## FY 2008 Plans:

2016-2022 Model C4ISR architectures for 3 Major Combat Operations / Mission areas in support of force level assessments for 5 Navy analytic issues / CBA. Support NCW Level 2 block builds.

## FY 2009 Plans:

2020-2026 Model C4ISR architectures for 3 Major Combat Operations / Mission areas in support of force level assessments for 5 Navy analytic issues / CBA. Support NCW Level 3 block builds.

	FY 2006	FY 2007	FY 2008	FY 2009
<b>C4ISR ARCHITECTURE AND STANDARDS</b>	3,560	1,961	537	0

## FY 2006 Accomplishments:

Architecture efforts developed a system and technical architecture that supports a migration strategy moving Navy Programs of Record (PORs) from their current platform/stovepipe domain to a future joint net-centric domain. These products provide for the net-centric C4ISR transformation for the next generation of warfare platforms and systems.

- Produced initial systems architecture products for the war-fighting domain derived from the models used to support Naval Capabilities Development Process (NCDP) analysis.
- Completed technical analysis and produced initial Systems Interface Description (SV-1), Systems Communications Description (SV-2) for war fighting domain.
- Completed technical analysis and produced initial System Function Description (SV-4), made significant updates to Navy-wide Common Systems Function List.
- Completed technical analysis and produced initial matrix mapping Operational Activities to Systems Functions (SV-5).
- Published Services Definition Framework for describing the enterprise level service-oriented architecture.
- Completed initial pilot of technical standards profile to support individual program requirements.
- Produced system architecture products in support of specific NCDP analyses.
- Integrated architectural data from the non-warfighting domain; coordinated with Assistant Chief of Naval

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Operations (ACNO), DoN, and SEA WARRIOR.

FORCENet Enterprise Operational Architecture efforts for the non-warfighting domain include the development, coordination, integration, maintenance and governance of the Operational View for FORCENet and Marine Headquarters-Global Network (MHQ-GN) / Joint Force Marine Component Commander (JFMCC).

- 27 Operational Views (OV) products completed for Fn (11) and MHQ with MOC (16); all posted in Department of Defense Architecture Repository System (DARS).
- JFCOM Cross Service Architecture Integration Working Group support for JFCOM and other Services - Focused efforts on C2 architectures development in support of Quadrennial Defense Review (QDR), JC2, and Enterprise Roadmap (ERM).
- United States Army (USA), United States Air Force (USAF), United States Marine Corps (USMC) and JFCOM operational architecture coordination--initiatives to share and utilize Service architectures for GIG, Navy Expeditionary Combat Command (NECC) and Component Commander Headquarters (HQ).
- Integration of operational architecture development with Sea Shield, Sea Warrior and Sea Basing. Developed a framework for integration of all Naval Power 21 architecture products into a single architecture governance process.

## **FY 2007 Plans:**

- The FY07 efforts will build upon completed FY06 efforts and extend the structured data. The effort will develop structured data to define the roadmap for C4ISR capability and facilitate identification of gaps and overlaps in capabilities. The effort will engage with all the Naval Power 21 pillars to collect data required to complete the architectural data set. This effort will also include data integration of functions and activities with Joint capabilities. Services oriented architecture will be formally incorporated into the architectural data set. Technical authority will be established for the architecture and standards.
- Refine FORCENet Integrated Architecture governance structure to incorporate architecture products and policies from other Naval Power 21 domains including Systems Data Exchange (SV-6) information.
  - Refine Maritime Headquarters operational and systems architecture data.
  - Conduct technical analysis and produce initial service architecture products for the war-fighting domain.
  - Conduct technical analysis and produce Systems Evolution (SV-8) and Systems Technology Forecast (SV-9) data.
  - Produce system architecture products as required in support of the Naval Capabilities Development Process (NCDP) analyses.

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## FY 2008 Plans:

- Implement technical authority for architecture and standards across Program Executive Office C4I systems.
- Provide architecture data to support required analyses, testing, modeling and simulation.
- Update technical and system data.
- Produce system architecture products as required in support of programming decisions.
- Provide various white papers and studies as needed to develop architecture products.

	FY 2006	FY 2007	FY 2008	FY 2009
END-TO-END SYSTEM ENGINEERING AND INTEGRATED DESIGN	1,526	881	732	0

## FY 2006 Accomplishments:

- Provided systems engineering support for PEOs to integrate architecture and roadmap capabilities across warfare areas.
- Supported Team SPAWAR Program Managers in development of JCIDS documents, Integrated Support Plans (ISPs) and NR-KPPs.
- Provided training for Team SPAWAR personnel on how to meet interoperability certification requirements.
- Developed the Composeable Test Environment (CTE) effort with initial emphasis on linking Team SPAWAR labs and facilities.
- Worked with Assistant Secretary of the Navy for Research, Development and Acquisition (ASN RDA) on development and implementation of the Interoperability and Integration Management Plan (I&IMP).

## FY 2007 Plans:

- Provide systems engineering support to apply end-to-end integrated architectures across the Naval Enterprise.
- Continue support Team SPAWAR PMs in development of JCIDS documents, ISPs and NR-KPPs.
- Continue providing training for Team SPAWAR personnel on how to meet interoperability certification requirements.
- Continue development of the CTE effort with initial emphasis on linking Team SPAWAR labs and facilities.
- Continue working with ASN RDA on development and implementation of the I&IMP.

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## **FY 2008 Plans:**

- Provide systems engineering support to apply end-to-end integrated architectures across the Naval Enterprise.
- Support Team SPAWAR PMs in development of JCIDS documents, ISPs and NR-KPPs.
- Provide training for Team SPAWAR personnel on how to meet interoperability certification requirements.
- Continue development of the CTE effort with emphasis on linking Team SPAWAR labs and facilities to Naval Enterprise labs and facilities.
- Work with ASN RDA on implementation of the I&IMP.

## **C. OTHER PROGRAM FUNDING SUMMARY:**

Not applicable.

## **D. ACQUISITION STRATEGY:**

Not applicable.

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DATE: February 2007

BUDGET ACTIVITY: 04  
PROGRAM ELEMENT: 0604707N  
PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT  
PROJECT NUMBER: 2144 PROJECT TITLE: SPACE AND ELECTRONIC WARFARE ENGINEERING

Exhibit R-3 Cost Analysis (page 1)										Date: February 2007				
APPROPRIATION/BUDGET ACTIVITY RDT&E, N			PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER: SEW ENGINEERING 2144				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY-06 Cost	FY-06 Award Date	FY-07 Cost	FY-07 Award Date	FY-08 Cost	FY-08 Award Date	FY-09 Cost	FY-09 Award Date	Cost To Comp	Total Cost	Target Value of Contract
Primary Hardware Development													0	
Ancillary Hardware Development													0	
Systems Engineering													0	
Licenses													0	
Tooling													0	
GFE													0	
Award Fees													0	
Subtotal Product Development			0	0		0				0		0	0	
Remarks														
Development Support	Various	Various	4554										4554	
SEW/C4I Technology Integration	Various	Various	12985										12985	
Systems A&E and Validation	Various	Various	13188										13188	
C4ISR Requirements Assessments	Various	Various	8210	2175	Various	1161	Various	2237	Various	2022	Various	CONT	CONT	
C4ISR Architecture and Standards	Various	Various	7656	3560	Various	1961	Various	537	Various	0	Various	CONT	CONT	
End-to-End System Engineering and Integrated Design	Various	Various	7749	1526	Various	881	Various	732	Various	0	Various	CONT	CONT	
Info. Repository/Naval Architecture	Various	Various	4000										4000	
Navy Collaborative	Various	Various												
Subtotal Support			58342	7261		4003		3506		2022			CONT	
Remarks														

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DATE: February 2007

BUDGET ACTIVITY: 04  
PROGRAM ELEMENT: 0604707N  
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PROJECT NUMBER: 2144 PROJECT TITLE: SPACE AND ELECTRONIC WARFARE ENGINEERING

Exhibit R-3 Cost Analysis (page 2)										Date: February 2007				
APPROPRIATION/BUDGET ACTIVITY RDT&E,N			PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER: SEW ENGINEERING 2144				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYS Cost	FY-06 Cost	FY-06 Award Date	FY-07 Cost	FY-07 Award Date	FY-08 Cost	FY-08 Award Date	FY-09 Cost	FY-09 Award Date	Cost To Comp.	Total Cost	Target Value of Contract
SEW Eng/CWID	Various	Various	19194	2489	Various	2778	Various	2534		2004	Various	CONT	CONT	CONT
SEW Eng/JRAE	Various	Various	12492	1071	Various	4207	Various	304		304	Various	CONT	CONT	CONT
Subtotal T&E			31686	3560		6985		2838		2308			CONT	CONT
Remarks														
Contractor Engineering Support													0	
Government Engineering Support													0	
Program Management Support													0	
Travel													0	
Transportation													0	
Subtotal Management			0	0		0				0		0	0	
Remarks														
Total Cost			90028	10821		10988		6344		4330			CONT	

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Exhibit R-2a

DATE: February 2007

BUDGET ACTIVITY: 04  
PROGRAM ELEMENT: 0604707N  
PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT  
PROJECT NUMBER: 2357 PROJECT TITLE: MARITIME BATTLE CENTER

Project Number & Title	FY 2006 Actual	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2357 MARITIME BATTLE CENTER	23,180	30,690	33,838	32,667	42,722	50,364	51,317	52,299

**A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:** The mission of the Maritime Battle Center (MBC) is to execute the Naval Warfare Innovation Process. MBC and SEA TRIAL experimentation programs integrate and validate emerging Navy Concept of Operations (CONOPS), Doctrine and technologies through experiments/analysis/modeling and simulation to support warfighting capability development. SEA TRIAL experimentation is dedicated to providing solutions to near term (within the Fiscal Year Defense Plan) warfighting gaps through focused Operational Agent (Commander Second Fleet, Commander Third Fleet and Commander Naval Network Warfare Command) led experimentation. The US Fleet Forces Command (USFFC) chaired Flag level SEA TRIAL Executive Steering Group (STESG) prioritizes and approves proposed experiments annually using the long range Concept Development and Experimentation (CD&E) plan as an overall experimentation guide to resolve warfighting gaps. The approved, prioritized experiments are codified in the SEA TRIAL Execution Plan (ExPlan).

The Navy Warfare Development Command (NWDC) acts as the executive agent to conduct and coordinate preliminary experiments and technology demonstrations focused on the advanced engineering and operational system development of systems related to all warfare areas. The MBC uses a network centric environment that links to the existing "core" Naval facilities at the Marine Corps Warfighting Lab (MCWL), the Joint Battle Center/Federated Battle Lab, and technologists in industry and academia. The MBC is essential to the evolution of combat capabilities since it is the engine for validating the new warfare CONOPS through limited objective experimentation, analysis and modeling and simulations in conjunction with Sea Based Battle Laboratories (SBBL), Science & Technology (S&T) initiatives and other initiatives that originate with the operating forces. The MBC supports the early and sustained involvement of Joint Warfighters in refining the technology and the tactics, techniques, and procedures needed for 2010-2020 Littoral Battlespace. The MBC will have multiple roles since it is a crosscutting organization involved in several facets of concept, platform, weapons, weapon systems and Information Technologies (IT), Information System (IS) and Information Management (IM) systems development and integration. These include collaborative planning, operational experimentation planning and execution, technology transition/acquisition support, systems engineering and integration, technology assimilation and operational demonstrations.

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PROJECT NUMBER: 2357 PROJECT TITLE: MARITIME BATTLE CENTER

This program historically does not meet established execution benchmarks. MBC experimentation differs from other programs because it is based on Fleet operational availability vice independently scheduled through warfighting labs. Because Fleet experimentation frequently must occur during the spring/summer operational schedules, the overall RDT&E obligation/expenditure rates do not align with OSD practice.

## B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2006	FY 2007	FY 2008	FY 2009
<b>FBE ANALYSIS AND CORE SUPPORT</b>	23,180	30,690	33,838	32,667

In POM06, the Navy funded increases to SEA TRIAL and NWDC as a commitment to SEA POWER 21 transformation. NWDC, at the direction of Commander Fleet Forces Command (CFFC), will provide the SEA TRIAL Executive Steering Group (STESG) a cross pillar consolidated experimentation plan that recommends funding specific experiments that are keyed to Fleet priorities, the Concept Development and Experimentation Plan (CD&E Plan) and the N6/N7 Mission Capability Package (MCP) gaps.

## FY 2006 Accomplishments:

- Continued participation in JFCOM experimentation continuum
- Continued Limited Objective Experiments
- Continued CONOPS Development Experiments
- Initiated and executed Sea Trial Experiments, War Games, and Seminars
- Completed Maritime Dynamic Targeting Cell Experiment
- Completed Distributed Staff Capability Experiment
- Completed Undersea Warfare Decision Support System Experiment
- Completed Command and Control Maritime Domain Awareness Experiment
- Completed ISR-High Altitude/Long Endurance Experiment
- Completed Airborne IP Networks Experiment
- Completed Digital Time Sensitive Strike Experiment
- Completed Littoral Combat Ship ASW Multi-Static Experiment

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- Completed Unmanned Aerial Vehicle for Expeditionary Strike Group Experiment
- Completed Network/Comms Experiment
- Completed SSGN/SOF CONOPS & Full Range Connectivity Experiment
- Completed Intermediate Transfer Station Experiment
- Completed Automated Identification System Experiment
- Completed Tactical Tomohawk Experiment
- Completed MCM Modular Mission Packages Experiment
- Completed Distributed Imagery Processing Experiment
- Completed Coalition/Cross Domain Solution Experiment
- Completed Tactical UAV Maritime Employment Experiment
- Completed TAPA IO Anti Ship Missile Experiment
- Completed JEFX 06 Global Hawk Experiment
- Completed Valiant Shield 06 Experiment
- Completed Naval Obscurant Experiment
- Completed Next Generation Navy SATCOM Experiment

## **FY 2007 Plans:**

- Continue participation in JFCOM experimentation continuum
- Continue Limited Objective Experiments
- Continue CONOPS Development Experiments
- Initiate and execute Sea Trial Experiments, War Games, and Seminars
- Initiate and complete Receive While Transmit Experiment
- Initiate and complete Maritime Domain Awareness Experiment
- Initiate and complete Maritime and Joint Fires Experiment
- Initiate and complete Networking of Military Operations Center Experiment
- Initiate and complete METOPS, IO and Space Support Experiment
- Initiate and complete Coalition Networks Experiment
- Initiate and complete Surface Ship Periscope Detection Experiment
- Initiate and complete Fusion/Correlation Experiment
- Initiate and complete NCES/SOA Experiment
- Initiate and complete Sensor Integration Experiment
- Initiate and complete JFMCC Fires/MDT Experiment

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PROJECT NUMBER: 2357 PROJECT TITLE: MARITIME BATTLE CENTER

- Initiate and complete LAMP Experiment
- Initiate and complete Long Endurance Surveillance Experiment
- Initiate and complete Tactical IP Networks Experiment
- Initiate and complete C2/Collaboration Experiment
- Initiate and complete Cross Domain Solution Experiment
- Initiate and complete IA/Computer Network Defense Experiment
- Initiate and complete Comms at Speed and Depth Experiment
- Initiate and complete Hull Survey Remotely Operating Vehicle Experiment
- Initiate and complete LCS MIW Mission Modules Experiment
- Initiate and complete Tactical Tomahawk Experiment
- Initiate and complete Naval Obscurant Experiment
- Initiate and complete Deployable Airbeam Fendering System Experiment
- Initiate and complete Offensive IO Experiment
- Initiate and complete Counter Maritime IED Experiment
- Initiate and complete SSGN/SOF CONOPS
- Initiate and complete Enterprise Afloat WAN Experiment
- Initiate and complete Bandwidth Optimization Experiment

## **FY 2008 Plans:**

- Continue participation in JFCOM experimentation continuum
- Continue Limited Objective Experiments
- Continue CONOPS Development Experiments
- Initiate and execute Sea Trial Experiments, War Games, and Seminars

## **FY 2009 Plans:**

- Continue participation in JFCOM experimentation continuum
- Continue Limited Objective Experiments
- Continue CONOPS Development Experiments
- Initiate and execute Sea Trial Experiments, War Games, and Seminars

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PROJECT NUMBER: 2357 PROJECT TITLE: MARITIME BATTLE CENTER

**C. OTHER PROGRAM FUNDING SUMMARY:**

Not applicable.

**D. ACQUISITION STRATEGY:**

Not applicable.

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 PROJECT NUMBER: 2357 PROJECT TITLE: MARITIME BATTLE CENTER

Exhibit R-3 Cost Analysis										Date: February 2007				
APPROPRIATION/BUDGET ACTIVITY RDT&E, N			PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER: Maritime Battle Center 2357				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY-06 Cost	FY-06 Award Date	FY-07 Cost	FY-07 Award Date	FY-08 Cost	FY-08 Award Date	FY-09 Cost	FY-09 Award Date	Cost To Comp.	Total Cost	Target Value of Contract
System Test and Evaluation	Various	Various	126798	18776	Various	26087	Various	28763	Various	27767	Various	CONT	CONT	CONT
Subtotal T&E			126798	18776		26087		28763		27767		CONT	CONT	CONT
Remarks														
Program Management	Various	Various	27692	4404	Various	4603	Various	5075	Various	4900	Various	CONT	CONT	CONT
Subtotal Management			27692	4404		4603		5075		4900		CONT	CONT	CONT
Remarks														
Total Cost			154490	23180		30690		33838		32667		CONT	CONT	CONT