

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
Total PE	45,355	41,592	47,518	51,231	59,916	64,894	66,835
0798 OTH TARGETING							
1,998	2,070	1,901	1,924	2,114	2,151	2,190	
2144 SPACE AND ELECTRONIC WARFARE ENGINEERING							
13,319	6,217	14,650	8,562	9,445	11,580	12,472	
2357 MARITIME BATTLE CENTER							
30,038	33,305	30,967	40,745	48,357	51,163	52,173	

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.

The OTH-T and SEW Engineering projects (0798 and 2144 respectively) are systems engineering non-acquisition programs with the objectives of developing, testing, implementing Technical Authority, and validating Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)

UNCLASSIFIED

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

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BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

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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).

The SEW Engineering project (2144) also includes efforts supporting the Maritime Domain Awareness (MDA) program. MDA is "the effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy, or environment of the United States." MDA can only be achieved through the combined efforts of federal, state, and local government agencies, international governments, and commercial and private enterprise. MDA is a key enabler for maritime security; as well as counter-piracy, counter-drug, freedom of navigation, counter-terrorism, humanitarian assistance and disaster relief, stability, and major combat operations.

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

UNCLASSIFIED

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

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B. PROGRAM CHANGE SUMMARY:

	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>
FY 2008/FY 2009 President's Budget Submission	43,676	42,295	39,021
Congressional Undistributed Reductions/Rescissions	0	-323	0
Execution Adjustments	2,500	0	0
Program Adjustments	0	0	8,395
Rate Adjustments	0	0	102
SBIR Assessment	-821	-380	0
FY 2009 President's Budget Submission	45,355	41,592	47,518

PROGRAM CHANGE SUMMARY EXPLANATION:

Technical: Not applicable

Schedule: Not applicable

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable

E. PERFORMANCE METRICS:

Maritime Battle Center:

- Refine concepts and identify 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

UNCLASSIFIED

UNCLASSIFIED

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

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BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

(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.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

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COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
0798 OTH TARGETING	1,998	2,070	1,901	1,924	2,114	2,151	2,190

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) and ultra-high frequency (UHF) mediums in support of, for example, Collaboration at Sea (CAS) and Maritime Domain Awareness (MDA). 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 and other tactical networking technologies and protocols as well as automatic link establishment standards, which provides for a significant improvement within, and between, battle groups.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
ADVANCED RELAY/WIRELESS/ANTENNA TECHNOLOGIES	730	731	778

FY 2007 Accomplishments:

Designed, fabricated, and tested Generation 3 Spatially Aware Wireless Network (SPAWN) prototype antennas in brassboard form. Field tested over both land paths and sea paths of point-to-point electronically-steerable wireless links and demonstrated tracking. The performance shown confirmed that the 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.

	FY 2007	FY 2008	FY 2009
SUBNET RELAY	197	194	209

FY 2007 Accomplishments:

Tested and demonstrated Subnet Relay allied interoperability in Trident Warrior 07, with reuse of TW06 equipment and installation documentation. Investigated improvements to Subnet Relay protocols and demonstrated better integration with ARC-210 radios. Transitioned Subnet Relay to Program of Record in 2007.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

FY 2008 Plans:

Continue to refine Subnet Relay allied interoperability in concert with Chief of Naval Operations for Communication Networks. 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 the Office of the Chief of Naval Operations. 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.

	FY 2007	FY 2008	FY 2009
SYSTEMS INTEGRATION & INTEROPERABILITY TESTING	494	528	419

FY 2007 Accomplishments:

Conducted/participated in five overall Joint/Navy integration and interoperability tests; facilitated two planning reviews for Joint Test and Evaluations; participated in Joint Users Interoperability Communications Exercise (JUICE) and other joint test events.

FY 2008 Plans:

Continue to 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, Joint Distributed Engineering Plant (JDEP), and other joint test events.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

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FY 2009 Plans:

Continue to 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 2007	FY 2008	FY 2009
INTEROPERABILITY VALIDATION	172	184	152

FY 2007 Accomplishments:

Used the Reconfigurable Land Based Test Sites (RLBTS) and OTH-T resources to validate Global Information Grid (GIG) technologies prior to shipboard installation, supported ten Net Ready-Key Performance Parameters (NR-KPP) Migration Plan Developments and four joint interoperability C4ISR certifications to ensure interoperability requirements between sensors, weapon systems and information systems were met.

FY 2008 Plans:

Continue to 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:

Continue to 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.

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

	FY 2007	FY 2008	FY 2009
TESTING OTH-T SYSTEMS	405	433	343

FY 2007 Accomplishments:

Conducted five developmental, integration, and certification tests of Over-The-Horizon Targeting (OTH-T) and combat systems with tactical data exchanged over Common Operational Picture (COP) Common Synchronization Tools (CST) networks and other networks; three integration test events for Joint Command and Control, Combat Decision Systems, and Collaboration technologies within the Global Information Grid (GIG). Testing was also done to address issues of Fleet essential capabilities and emerging mission essential needs both for new, legacy, and technology refreshed systems.

FY 2008 Plans:

Continue to conduct six developmental, integration, and certification tests of OTH-T 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:

Continue to conduct six developmental, integration, and certification tests of OTH-T 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.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:

Not applicable.

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E::

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

UNCLASSIFIED

UNCLASSIFIED

FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-3

DATE: February 2008

BUDGET ACTIVITY: 04

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Exhibit R-3 Cost Analysis										Date: February 2008				
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-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
Advanced Relay/Wireless / Antenna Technologies	Various	Various	4243	730	Various	731	Various	778	Various			CONT	CONT	
Interoperability Requirements	Various	Various	3266										3266	
T & E Tools Development	Various	Various	429										429	
Systems Int. & Interop. Testing (LBTN)	Various	Various	2575	494	Various	528	Various	419	Various			CONT	CONT	
Interoperability Validation	Various	Various	2293	172	Various	184	Various	152	Various			CONT	CONT	
Joint Interoperability	Various	Various	1174										1174	
Testing OTH-T Systems	Various	Various	2017	405	Various	433	Various	343	Various			CONT	CONT	
Subtotal T&E			15997	1801		1876		1692				CONT	CONT	
Remarks														
Contractor Engineering Support													0	
Subnet Relay	Various	Various	4311	197	Various	194	Various	209	Various			CONT	CONT	
Program Management Support	Various	Various	1468										1468	
Travel													0	
Transportation													0	
Subtotal Management			5779	197		194		209				CONT	CONT	
Remarks														
Total Cost			21776	1998		2070		1901				CONT	CONT	

R1 Line Item 79

Page 11 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

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Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2144 SPACE AND ELECTRONIC WARFARE ENGINEERING	13,319	6,217	14,650	8,562	9,445	11,580	12,472

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: OPNAVINST 3050.23 defines the policy to fuse validated/approved Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (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 Global Information Grid (GIG) Baseline Extension (BE), Transformational Satellite (TSAT), Joint Tactical Radio System (JTRS), Network Centric Enterprise Services (NCES), Information Assurance (IA) and standards 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 and standards. 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 and standards provide the construct for distributed C2 interoperability requirements analyses 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 and standards work to engineer and enact C4ISR implementations Navy wide across all C4ISR mission areas.

The SEW Engineering project supports the Maritime Domain Awareness (MDA) program. MDA is "the effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy, or environment of the United States." MDA can only be achieved through the combined efforts of federal, state, and local government agencies, international governments, and commercial and private enterprise. MDA is a key enabler for maritime security; as well as for counter-piracy, counter-drug, freedom

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

of navigation, counter-terrorism, humanitarian assistance and disaster relief, stability, and major combat operations.

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 authority, studies, interpretation assistance, and white papers

2) Supporting C4ISR Systems Engineering processes

- Distributed C2 Interoperability Requirement Analysis - 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.

UNCLASSIFIED

UNCLASSIFIED

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

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
MARITIME DOMAIN AWARENESS (MDA)	2,500	0	7,059

FY 2007 Accomplishments:

- Defined MDA project including scope, risks, mitigations and strategy.
- Supported MDA Spiral One prototype technology down selection and fielding.
- Performed site surveys to determine availability of infrastructure and connectivity to support the Spiral One candidate technologies.

FY 2009 Plans:

Provide systems engineering support for the MDA acceleration initiative to include:

- Architecture Development
- Risk reduction, data collection and analysis
- Requirements generation and validation
- Capability demonstrations (CWID, JRAE, JCTD, ACTD)
- Fleet experimentation
- Fielding of prototypes and transition of successful prototypes to programs.

	FY 2007	FY 2008	FY 2009
SYSTEMS ENGINEERING STANDARDS AND PROCESSES	0	0	2,886

FY 2009 Plans:

- Develop prototypes and excursions of emerging C4ISR systems for use in potential product enhancements.
- Integrate existing technologies in novel ways to substantially increase systems capabilities at low risk.
- Combine existing stovepiped data systems into integrated operational pictures across programs of record.
- Enable excursions from existing ISR systems to use existing sensors to solve non-traditional problems.
- Reduce network bandwidth overhead and inefficiencies.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

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	FY 2007	FY 2008	FY 2009
SYSTEMS ENGINEERING AND INTEGRATION REVITALIZATION	0	0	1,114

FY 2009 Plans:

- Develop and improve systems engineering models, tools, and databases to improve the quality of C4ISR products.
- Develop the Systems Engineering Technical Review database.
- Initiate the systems engineering plan e-Builder.
- Initiate the measurement repository and analysis database.

	FY 2007	FY 2008	FY 2009
COALITION WARRIOR INTEROPERABILITY DEMONSTRATION (CWID)	2,778	2,504	2,000

FY 2007 Accomplishments:

European Command (EUCOM) was the host Combatant Commander (COCOM) for CWID 07, investigating technologies for Coalition/Homeland Security/Interagency Interoperability. Funding supported the US Navy site in San Diego, which funded coalition and US trials based on the CWID Federal Business Opportunity letter published in May 2006. CWID trials provided the Fleet with three separate evaluations: 1) evaluation provided by National Security Agency (NSA) for proper security procedures; 2) evaluation provided by Joint Interoperability Test Command (JITC) for technical issues; and 3) evaluation provided by warfighters to verify usability. These evaluations were provided to OPNAV and the Systems Commands for acquisition consideration.

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 Homeland Defense (HLD)/Homeland Security (HLS) inter-governmental agency interoperability will remain cornerstones of the CWID charter. SPAWARSSCOM expects to remain the USN site and to continue to host both Coalition and HLD/HLS venues.

UNCLASSIFIED

UNCLASSIFIED

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FY 2009 Plans:

CWID will continue to investigate solutions for known capability gaps. While the COCOM executive agent for CWID 2009 has not been identified, it is clear that both Allied Interoperability and Homeland Defense (HLD)/Homeland Security (HLS) inter-governmental agency interoperability will remain cornerstones of the CWID charter. Chairman of the Joint Chiefs of Staff Instruction 6260.01B requires each Service to provide \$1.7 million for CWID participation. The remaining \$300K is required for SPAWARSSYSCOM representation to the Coalition portion of the CWID 09 venue.

	FY 2007	FY 2008	FY 2009
JOINT RAPID ARCHITECTURE EXPERIMENTATION (JRAE)	1,825	300	300

FY 2007 Accomplishments:

Joint Rapid Architecture Experimentation (JRAE) efforts examined Joint Forces Command (JFCOM) interoperability risk areas at the horizontal (tactical) level as identified by JFCOM Joint Architecture efforts. The JRAE process was used to prototype the "to be" joint integrated Service Oriented Architectures (SOA). This was integrated and collaboratively tested with the Marine Corps, Army and Air Force to promote joint interoperability between the services' next generation tactical Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architectures.

FY 2008 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.

UNCLASSIFIED

UNCLASSIFIED

FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
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FY 2009 Plans:

Navy will continue to provide representation to JRAE activities and will collaborate with the Joint Community and Defense Agencies in identifying interoperability risk areas for Service Oriented Architectures.

	FY 2007	FY 2008	FY 2009
DISTRIBUTED C2 INTEROPERABILITY REQUIREMENTS ANALYSIS	2,980	2,178	995

FY 2007 Accomplishments:

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

2016-2022 Modeled C4ISR architectures for 3 Major Combat Operations / Mission Areas to support force level 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). Supported Network Centric Warfare (NCW) Level 2 block builds. It provided linkages to the metrics assessing value of systems relevance to joint interoperable capability, functions, and associated tasks and activities.

Conducted three joint interoperability Maritime Headquarters (MHQ) with Maritime Operations Center (MOC) across Joint Operations CBAs in support of Department of Defense (DoD) Joint Command and Control (JC2), Battlespace Awareness and Joint net-centric Operations Capability Portfolio Management directives and the National Security Maritime Strategy (NSMS). CBA results were used to prepare Doctrine, Organization, Training, Materiel, Leadership, and Personnel (DOTMLP) change request package for joint interoperability MHQ for PR09/POM 10. These follow on CBA efforts to FY07 assessments expanded MHQ with MOC and joint interoperability CBAs across the full range of joint operations, Maritime Domain Awareness (MDA), interagency

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

operations, JC2 and Joint Net centric operations supporting National MDA implementation team (IT) efforts. All of the CBAs supported Navy, Provider and Warfighter Enterprise initiatives for capability development in support of Joint Capability Areas (JCAs) for Battlespace Awareness, Net-Centric Operations and Joint Command and Control.

Continued development of the FORCEnet Capability List (FCL) which is a web-based software system required to implement the fielding of joint interoperable capabilities from concept to shipboard installation of systems. The FCL provided the direct correlation of joint interoperable capabilities to activities, functions, and systems mapped to Mission Essential Tasks (METs). It provided linkages to metrics and assessments of value of systems relevance to joint interoperable capability, functions, and associated tasks and activities.

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. 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 joint interoperable 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 joint interoperable capability, functions, and associated tasks and activities.

	FY 2007	FY 2008	FY 2009
C4ISR ARCHITECTURE AND STANDARDS	2,378	523	148

FY 2007 Accomplishments:

The FY07 efforts built upon completed FY06 efforts and extended the structured data. The effort developed structured data to define the roadmap for C4ISR capability and facilitated identification of gaps and overlaps in capabilities. The effort engaged with all the Naval Power 21 pillars to collect data required to complete the architectural data set. This effort also included data integration of functions and activities with Joint

R1 Line Item 79

Page 18 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

capabilities. Services oriented architecture was formally incorporated into the architectural data set. Technical authority was established for the architecture and standards.

- Refined FORCENet Integrated Architecture governance structure to incorporate architecture products and policies from other Naval Power 21 domains.
- Refined Maritime Headquarters operational and systems architecture data.
- Conducted spiral development of the FORCENet Operational Views to account for changes in the Net-Centric Operations and Warfare (NCOW) Reference Model and other authoritative references.
- Developed initial Operational Views and Systems Views for Maritime Domain Awareness
- Began development of Logical Data Model (OV-7)
- Conducted technical analysis and produced initial service architecture products for the warfighting domain.
- Conducted technical analysis and produced Systems Evolution (SV-8) and Systems Technology Forecast (SV-9) data.
- Produced system architecture products as required in support of the Naval Capabilities Development Process (NCDP) analyses.
- Conducted technical analysis and updated Integrated Dictionary (AV-2).
- Conducted technical analysis and updated Systems Interface Description (SV-1).
- Conducted technical analysis and updated Systems Communications Description (SV-2).
- Conducted technical analysis and updated Systems Functionality Description (SV-4).
- Conducted technical analysis and updated Operational Activities to Systems Function Traceability Matrix (SV-5).
- Conducted technical analysis and produced initial Systems Data Exchange Matrix (SV-6).
- Conducted technical analysis and updated Technical Standard Profile and Forecast (TV-1/2).
- Conducted technical reviews of Information Support Plans assessing compliance to approved FORCENet Integrated Architecture.
- Conducted technical analysis and provided updates to ASN RDA common architecture data elements including CSFLs, CSLs and CSNLs.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

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 2009 Plans:

- Implement technical authority for architecture and standards across Program Executive Office C4I, PEO Space and PEO-IT systems.
- Conduct spiral development of the FORCEnet Integration Architecture including Operational, System, Service and Technical Views.
- Conduct technical analysis to review JCIDS documentations.

	FY 2007	FY 2008	FY 2009
END-TO-END SYSTEM ENGINEERING AND INTEGRATED DESIGN	858	712	148

FY 2007 Accomplishments:

- Provided systems engineering support to apply end-to-end integrated architectures across the Naval Enterprise.
- Supported Team SPAWAR PMs in the development of Joint Capabilities Integration and Development System (JCIDS) documents, Integrated Support Plans (ISPs) and NR-KPPs.
- Provided information exchange 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).

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

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.

FY 2009 Plans:

- Continue to provide systems engineering support to apply end-to-end integrated architectures across the Naval Enterprise.
- Support Team SPAWAR PMs in development and implementation of JCIDS documents, ISPs and NR-KPPs through the Systems Engineering Technical Review (SETR) process.
- Continue to provide training for Team SPAWAR personnel on how to meet interoperability certification requirements.
- Begin implementation of the CTE CONOPS/effort with emphasis on linking Team SPAWAR labs and facilities to Naval Enterprise labs and facilities.
- Continue to work with ASN RDA on implementation of the I&IMP.

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E::

Not applicable.

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E::

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

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FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-3

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

Exhibit R-3 Cost Analysis (page 1 of 2)										Date: February 2008				
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-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	
Remarks														
Development Support	Various	Various	4554										4554	
SEW/C4I Technology Integration	Various	Various	12985										12985	
MDA Prototype SE Support	Various	Various		2500	Various			7059	Various			CONT	CONT	
Systems Engineering & Integration Revitalization	Various	Various						1114	Various			CONT	CONT	
Systems Engineering Standards & Processes	Various	Various						2886	Various			CONT	CONT	
Systems A&E and Validation	Various	Various	13188										13188	
Distributed C2 Interoperability Requirement Analysis	Various	Various	10385	2980	Various	2178	Various	995	Various			CONT	CONT	

R1 Line Item 79

Page 22 of 29

UNCLASSIFIED

UNCLASSIFIED

FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-3

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

Exhibit R-3 Cost Analysis (page 2 of 2)

Date: February 2008

APPROPRIATION/BUDGET ACTIVITY			RDT&E, N		PROGRAM ELEMENT 0604707N				PROJECT NAME AND NUMBER:			SEW ENGINEERING 2144			
Contract Method & Type			Performing Activity & Location		Total PYS Cost	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	
C4ISR Architecture and Standards			Various	Various	11216	2378	Various	523	Various	148	Various		CONT	CONT	
End-to-End System Engineering and Integrated Design			Various	Various	9275	858	Various	712	Various	148	Various		CONT	CONT	
Info. Repository/Naval Architecture			Various	Various	4000								4000		
Navy Collaborative			Various	Various											
Subtotal Support					65603	8716		3413		12350			CONT		
Remarks															
SEW Eng/CWID			Various	Various	21683	2778	Various	2504	Various	2000	Various		CONT	CONT	CONT
SEW Eng/JRAE			Various	Various	13563	1825	Various	300	Various	300	Various		CONT	CONT	CONT
Subtotal T&E					35246	4603		2804		2300			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					100849	13319		6217		14650			CONT		

R1 Line Item 79

Page 23 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
2357 MARITIME BATTLE CENTER	30,038	33,305	30,967	40,745	48,357	51,163	52,173

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 in order 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 annual 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 that are focused on the advanced engineering and operational system development of systems related to all warfare areas. The MBC is essential to the evolution of combat capabilities because it is the engine, in conjunction with the operating forces, for validating new warfare CONOPS through limited objective experimentation, analysis, and modeling and simulation. The MBC is involved in several facets of concept, platform, weapons, weapon systems, 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. The MBC supports the early and sustained involvement of Joint Warfighters in refining the technologies and the tactics, techniques, and procedures need in the joint fight.

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

This program historically does not meet established execution benchmarks. MBC experimentation differs from other Research, Development, Test and Evaluation (RDT&E) 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 2007	FY 2008	FY 2009
FBE ANALYSIS AND CORE SUPPORT	30,038	33,305	30,967

Generally, the Fleet does not have RDT&E funds appropriated specifically for it to conduct Sea Trial type experimentation. As a result, due to the synergistic relationship between NWDC's Maritime Battle Center experimentation efforts and the Fleet's Sea Trial experimentation efforts, funding for both endeavors have been combined under one project, the Maritime Battle Center. The Sea Trial aspect of this project's mission is driven by the priorities of the Fleet's Operational Commanders (such as Commander Second Fleet (C2F), Commander Third Fleet (C3F), and Commander Naval Network Warfare Command). The Navy's commitment to expand the scope of experimentation efforts beyond NWDC's experimentation efforts is demonstrated by the increase to the funding profile in FY 2008 which will result in enhanced Sea Trial experimentation efforts in FY 2008 as well.

FY 2007 Accomplishments:

- Continued participation in Joint Forces Command experimentation continuum
- Continued Limited Objective Experiments
- Continued CONOPS Development Experiments
- Continued Maritime and Joint Fires Experiment
- Continued Surface Ship Periscope Detection Experiment
- Continued Fusion/Correlation Experiment
- Continued Net-Centric Environment Services/Service Oriented Architecture Experiment
- Continued Sensor Integration Experiment
- Continued C2/Collaboration Experiment
- Continued Cross Domain Solution Experiment
- Continued Information Assurance/Computer Network Defense Experiment

R1 Line Item 79

Page 25 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

- Continued Communications at Speed and Depth Experiment
- Continued Receive While Transmit Experiment
- Continued Offensive Information Operations Experiment
- Continued Counter Maritime Improvised Explosive Device Experiment
- Continued Information Management/Knowledge Management Experiment
- Continued Battlespace Characterization w/Environmental Acoustic Recording System (EARS) Experiment
- Continued End to End Strategic Planning/Mission Execution Experiment
- Continued Electronic Warfare Improvements Experiment
- Continued Network Instrumentation/Visualization Experiment
- Continued Expeditionary Resuscitative Surgical System Experiment
- Initiated and executed Sea Trial Experiments, War Games, and Seminars
- Completed Maritime Headquarters with Maritime Operations Center Experiment
- Completed Command and Control Maritime Domain Awareness Experiment
- Completed Networking of the Maritime Operations Centers Experiment
- Completed Network Operations, Information Operations, and Space Support Experiment
- Completed Coalition Operations Experiment
- Completed Maritime Dynamic Targeting Experiment
- Completed Littoral Active Multistatic Program/Multi-static Experiment
- Completed Intelligence Surveillance Reconnaissance-High Altitude/Long Endurance Experiment
- Completed Airborne Tactical Internet Protocol Networks Experiment
- Completed Unmanned Surface Vessel Decoy and Deception Capability Experiment
- Completed Hull Survey Remotely Operating Vehicle Experiment
- Completed Littoral Combat Ship Mine Counter Measures Modular Mission Packages Experiment
- Completed Tactical Tomahawk Experiment
- Completed Naval Obscurant Experiment
- Completed High Value Unit (HVU) Masking and Augmentation Experiment
- Completed Sub-Surface Guided Missile Nuclear/Special Operations Forces CONOPS & Full Range Connectivity Experiment
- Completed Enterprise Afloat Wide Area Network Experiment
- Completed Bandwidth Optimization Experiment
- Completed Automated Identification System Experiment
- Completed Distributed Imagery Processing Experiment
- Completed Information Warfare Planning Capability 4.0/4.2 Experiment
- Completed TAPA Information Operations Anti Ship Missile Experiment

R1 Line Item 79

Page 26 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

- Completed Valiant Shield 06 Exercise and Experiment
- Completed Valiant Shield 07 Exercise and Experiment
- Completed Next Generation Navy Satellite Communications Experiment

FY 2008 Plans:

- Continue all FY 2007 efforts less those noted as completed
- 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 Maritime Domain Awareness Experiment
- Initiate and complete Networking of Military Operations Center Experiment
- Initiate and complete Network Operations, Information Operations and Space Support Experiment
- Initiate and complete Coalition Networks Experiment
- Initiate and complete Unclassified Common Operational Picture (COP) Experiment
- Initiate and complete TAPA Electronic Warfare Anti Ship Missile Experiment
- Initiate and complete Bandwidth Optimization Experiment
- Initiate and complete Littoral Active Multistatic Program Experiment
- Initiate and complete Reliable Acoustic Path/Vertical Line Array (RAP/VLA) Experiment
- Initiate and complete Tactical IP Networks Experiment
- Initiate and complete Riptide-Lite/Expendable Mobile Anti-Submarine Warfare Training Target Experiment
- Initiate and complete MCM in Support of HLD Experiment
- Initiate and complete Tactical Tomahawk 3rd Party Targeting Experiment
- Initiate and complete SSGN/SOF CONOPS Experiment
- Initiate and complete SPIKE Small Boat Defense Experiment
- Initiate and complete Close in Weapons System 20mm Ammo Lethality Experiment
- Initiate and complete Deployable Autonomous Distributed System Experiment
- Initiate and complete NATO Sea Sparrow Missile System Electro Optical /Infrared Improvement Experiment
- Initiate and complete LCS Mine Warfare Mission Modules Experiment
- Initiate and complete Maritime Domain Awareness Analyst Tools Experiment
- Initiate and complete SPY Anti-Ship Cruise Missile Detection/Tracking Over Land Experiment
- Initiate and complete M230 Rotary Wing Surface Warfare Capability Experiment
- Initiate and complete Low Slow Flyer Experiment

R1 Line Item 79

Page 27 of 29

UNCLASSIFIED

UNCLASSIFIED

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

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

- Initiate and complete Littoral Battle-Space Sensing, Fusion & Integration Experiment
- Initiate and complete Submarine Launched Unmanned Aerial System Experiment
- Initiate and complete Long Endurance Surveillance Experiment
- Initiate and complete Automated Weapon System/SM-2 Engagement Over Land Experiment
- Initiate and complete Non-Lethal Capabilities & Technologies Experiment
- Initiate and complete Naval Obscurant Experiment
- Initiate and complete Battlespace Characterization w/Satellite Telemetry Acoustic Recording System Experiment

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

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:

Not applicable.

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.

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FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-3

DATE: February 2008

BUDGET ACTIVITY: 04

PROGRAM ELEMENT: 0604707N

PROGRAM ELEMENT TITLE: SPACE & ELECTRONIC WARFARE (SEW) ARCHITECTURE/ENGINEERING SUPPORT

Exhibit R-3 Cost Analysis									Date: February 2008					
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-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	145574	25533	Various	28230	Various	26329	Various			CONT	CONT	CONT
Subtotal T&E			145574	25533		28230		26329				CONT	CONT	CONT
Remarks														
Program Management	Various	Various	32096	4505	Various	5075	Various	4638	Various			CONT	CONT	CONT
Subtotal Management			32096	4505		5075		4638				CONT	CONT	CONT
Remarks														
Total Cost			177670	30038		33305		30967				CONT	CONT	CONT

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