

# UNCLASSIFIED

## CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification					DATE: February 2004		
APPROPRIATION/BUDGET ACTIVITY <b>RESEARCH DEVELOPMENT TEST &amp; EVALUATI BA-4</b>				R-1 ITEM NOMENCLATURE PE 0603382N Advanced Combat System Technology/9348 Improved Combat Information Center			
COST (\$ in Millions)	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Total PE Cost	3.214	5.730	67.605	61.367	31.168	31.716	32.429
0324/Advanced Combat System Technology	3.214	3.394	67.605	61.367	31.168	31.716	32.429
9348/Improved Combat Information Center (CIC)		2.336					
RDT&e Articles Qty							
<p><b>A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:</b></p> <p>The Advanced Combat System Technology line (PU 0324) funds engineering studies, real time instrumentation and risk reduction experiments that are conducted in distributed computer architecture, radar technology, and Tactical Informational Management (TIM) Concepts in the Computing Testbed to mature them as transition candidates for introduction into programs of record. This program takes a disciplined systems engineering approach to find how these advances can be integrated into these IWS systems and subsequent combat systems, and to plan both system and combat system upgrade schedules. The Open Architecture Computing Initiative is the first advanced development effort which leverages the lessons learned from the FY91 01 joint AEGIS/Defense Advanced Research Projects Agency (DARPA) High Performance Distributive Computing (Hiper-D), Embedded Computing and Quorum Initiative technology efforts. It implements the results of system engineering experiments with currently emerging Commercial-off-the-Shelf (COTS) computer technologies and distributed processing advances to replace the current computing architectures of various IWS programs with an open, distributed architecture. A priority will be the design of the flow and display of tactical information through the "detect-control-engage" process to provide decision quality information. These advanced Human Systems Interface (HSI) technologies are system attributes required in combat systems designed to function in a system of systems net centric view.</p> <p>Commencing in FY05 funding is included to move all Naval systems to open systems architectures and highly integrated systems of systems that will function in FORCEnet. The Navy will migrate all Navy combat systems to a common OA approach. This development effort is being undertaken in three parallel phases: a. An Open Architecture Computing Environment (OACE) that provides a common computing architecture as a foundation. The OACE will be based on mainstream commercial-off-the-shelf (COTS) components and widely adopted open commercial standards. b. A single Navy-wide system architecture that is extensible and scaleable in function, capacity, and workload to meet Joint warfighting requirements. This also includes the identification and development of common software components and functions and a reuse methodology. c. A series of Engineering Development Models (EDM) that implements the OACE and the system architecture in iterative phases. In summary, this increase in funding supports system of systems engineering required across all Naval systems as they are migrated to function in a joint net centric warfare environment.</p> <p>PU 9438 is an FY04 Congressional Add for Improved Shipboard Combat Information Center.</p>							

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Exhibit R-2 RDTEN Budget Item Justification  
(Exhibit R-2, page 1 of 11)

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EXHIBIT R-2, RDT&E Project Justification			DATE: February 2004
APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, N / BA-4</b>	PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology	PROJECT NUMBER AND NAME 0324 Advanced Combat System Technology/9348 Improved Combat Information Center	
<b>B. Accomplishments/Planned Program</b>			
	FY 03	FY 04	FY 05
Accomplishments/Effort/Subtotal Cost	0.200		
RDT&E Articles Quantity			
<div style="border: 1px solid black; padding: 5px; min-height: 40px;">Continued development and integration of Distributed Tactical Computing Environment (DTCE) capability based on Commercial Off-The-Shelf (COTS) and Defense Advanced Research Project Agency) DARPA technologies. Continued development and integration of DTCE capability based on advanced hardware and software technologies emerging from computing industry providers.</div>			
	FY 03	FY 04	FY 05
Accomplishments/Effort/Subtotal Cost		2.336	
RDT&E Articles Quantity			
<div style="border: 1px solid black; padding: 5px; min-height: 80px;">Apply Human Systems Integration principles toward concept development and evaluation of specific concepts for an advanced CIC focused on CGX, but also providing specific recommendations for DDG Modernization. Specifically identify and design GUIs that can be used across programs/systems to provide improved performance, decreased workload and commonality in the interest of decreasing training time and overall system development and maintenance costs. Identify specific recommendations for manning reduction. Prototypes will be usability and performance tested with Sailors specifically qualified to perform the CIC functions being tested. Products will be implemented using Open Architecture standards. Initial demonstration scheduled June 04, with subsequent demonstrations scheduled Sep 04, and Sep 05. Tools to speed up the development and/or analysis may be created / modified as part of this effort with the overall goal of improving efficiency in the development of CIC applications.</div>			

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APPROPRIATION/BUDGET ACTIVITY <b>RDT&amp;E, N / BA-4</b>	PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology	PROJECT NUMBER AND NAME 0324 Advanced Combat System Technology/9348 Improved Combat Information Center												
<b>B. Accomplishments/Planned Program (Cont.)</b>														
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 30%;"></th><th style="width: 15%;">FY 03</th><th style="width: 15%;">FY 04</th><th style="width: 15%;">FY 05</th></tr></thead><tbody><tr><td>Accomplishments/Effort/Subtotal Cost</td><td></td><td>0.300</td><td></td></tr><tr><td>RDT&amp;E Articles Quantity</td><td></td><td></td><td></td></tr></tbody></table>				FY 03	FY 04	FY 05	Accomplishments/Effort/Subtotal Cost		0.300		RDT&E Articles Quantity			
	FY 03	FY 04	FY 05											
Accomplishments/Effort/Subtotal Cost		0.300												
RDT&E Articles Quantity														
<div style="border: 1px solid black; padding: 5px;"><p>Continue to conduct experiments focused on assessing advanced technologies for applicability to the AWS. Technologies to be assessed include emerging software technologies (including developmental tools, environments and design patterns), distributed data communications technologies, QoS middleware and architectures, operating system technologies and networking technologies. These experiments will be focused on support for Aegis Baseline 7 Phase II in order to provide guidance and implement lessons learned from the advanced computing testbed.</p></div>														
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 30%;"></th><th style="width: 15%;">FY 03</th><th style="width: 15%;">FY 04</th><th style="width: 15%;">FY 05</th></tr></thead><tbody><tr><td>Accomplishments/Effort/Subtotal Cost</td><td>1.664</td><td>1.988</td><td></td></tr><tr><td>RDT&amp;E Articles Quantity</td><td></td><td></td><td></td></tr></tbody></table>				FY 03	FY 04	FY 05	Accomplishments/Effort/Subtotal Cost	1.664	1.988		RDT&E Articles Quantity			
	FY 03	FY 04	FY 05											
Accomplishments/Effort/Subtotal Cost	1.664	1.988												
RDT&E Articles Quantity														
<div style="border: 1px solid black; padding: 5px;"><p>Continue development of the Dynamic Resource Management (DRM) technology in preparation for transitioning DRM to a production status. DRM provides vital capabilities for managing a system-wide configuration of computers and sustaining real-time performance objectives despite damage and mission priority changes. DRM can divert resources initially devoted to lower priority tasks so that the resources can be used for urgent warfighting tasks and missions or to replace damaged components. In addition, since DRM treats all computer resources as a pool of computers, any one of which may be used for important functions, DRM can also serve as a manning reduction enabler. Using this approach, the shipboard computing pool can be fully configured with a given level of sparing at the beginning of a deployment. Any equipment that breaks or is damaged during the deployment can then be "configured out" of the system by DRM until the ship returns from the deployment. At that point, repairs and replacement can be effected by land based personnel rather than repaired by maintenance technicians at sea. Tasks remaining to be performed prior to productization of DRM include: making DRM itself fault tolerant and scalable, adding a network Quality-of-Service (QoS) control mechanism and integrating it into DRM, integrating system failure management policies across DRM, communication middleware and network services, integrating instrumentation data correlation services with resource allocation processing, and providing amplified operator explanatory services. Continue to demonstrate and validate advanced technologies for applicability to the AWS. Technologies to be assessed include emerging software technologies (including developmental tools, environments and design patterns), distributed data communications technologies, QoS middleware and architectures, operating system technologies and networking technologies. These experiments will be focused on support for AEGIS Baseline 7 Phase II in order to provide guidance and implement lessons learned from the advanced computing testbed.</p></div>														

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<b>B. Accomplishments/Planned Program (Cont.)</b>			
	FY 03	FY 04	FY 05
Accomplishments/Effort/Subtotal Cost	0.300		
RDT&E Articles Quantity			
<div style="border: 1px solid black; padding: 5px; min-height: 60px;">Address the information security needs for the AWS. Based on the rapidly evolving COTS components, define and validate architectural approaches to providing information security. Identify candidate technologies and make assessments of maturity for adopting or adapting these into the AWS in future upgrades.</div>			
	FY 03	FY 04	FY 05
Accomplishments/Effort/Subtotal Cost	0.950	1.000	
RDT&E Articles Quantity			
<div style="border: 1px solid black; padding: 5px; min-height: 60px;">Explore techniques to enable enhanced weapons employment (in contrast to merely weapons coordination efforts at the command level) based on sensor netting of SPY-1 with other remote sensors. Explore techniques to enable C&amp;D and Weapons Control Systems (WCS) to perform distributed weapons employment using external links to support the information exchange between AWS's on other platforms and other weapon systems as well.</div>			
	FY 03	FY 04	FY 05
Accomplishments/Effort/Subtotal Cost	0.100	0.106	
RDT&E Articles Quantity			
<div style="border: 1px solid black; padding: 5px; min-height: 60px;">Work with Science &amp; Technology (S&amp;T) communities (e.g. DARPA and Office of Naval Research (ONR)) to provide domain specific (real time weapons control) problems on which to focus S&amp;T investment and validation of candidate technologies against these challenge domain specific performance requirements. Provide engineering quality lessons learned and benchmarking information back to S&amp;T sponsors and technology developers for enhancements.</div>			

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	FY 03	FY 04	FY 05												
Accomplishments/Effort/Subtotal Cost			0.211												
RDT&E Articles Quantity															
<div style="border: 1px solid black; padding: 5px; min-height: 50px;">Information transfer investigations will include the following areas: a) participation in IETF and IEEE standards forums, b) validation of common time services such as NTPv4, c) IPv6 technology evolution, d) QoS architecture features and assessment of emerging facilities in these areas, e) network management mechanisms, fault tolerance and survivability mechanisms.</div>															
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 30%;"></th><th style="width: 20%;">FY 03</th><th style="width: 20%;">FY 04</th><th style="width: 30%;">FY 05</th></tr></thead><tbody><tr><td>Accomplishments/Effort/Subtotal Cost</td><td></td><td></td><td>66.916</td></tr><tr><td>RDT&amp;E Articles Quantity</td><td></td><td></td><td></td></tr></tbody></table>					FY 03	FY 04	FY 05	Accomplishments/Effort/Subtotal Cost			66.916	RDT&E Articles Quantity			
	FY 03	FY 04	FY 05												
Accomplishments/Effort/Subtotal Cost			66.916												
RDT&E Articles Quantity															
<div style="border: 1px solid black; padding: 5px; min-height: 50px;">The PEO IWS OA program is being undertaken in three parallel phases: a. An Open Architecture Computing Environment (OACE) that provides a common computing architecture as a foundation. The OACE will be based on mainstream commercial-off-the-shelf (COTS) components and widely adopted open commercial standards. b. A single Navy-wide system architecture that is extensible and scaleable in function, capacity, and workload to meet Joint warfighting requirements. This also includes the identification and development of common software components and functions and a reuse methodology. c. A series of Engineering Development Models (EDM) that implements the OACE and the system architecture in iterative phases. Support for these will be included in this line of funding commencing in FY05.</div>															
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	FY 03	FY 04	FY 05												
Accomplishments/Effort/Subtotal Cost			0.478												
RDT&E Articles Quantity															
<div style="border: 1px solid black; padding: 5px; min-height: 50px;">Program Management Support to Open Architecture.</div>															

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<p><b>C. PROGRAM CHANGE SUMMARY:</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 40%;"></th> <th style="text-align: right; width: 15%;">FY 2003</th> <th style="text-align: right; width: 15%;">FY 2004</th> <th style="text-align: right; width: 15%;">FY 2005</th> </tr> </thead> <tbody> <tr> <td>Funding:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Previous President's Budget: (FY 04-05 Pres Controls)</td> <td style="text-align: right;">3.276</td> <td style="text-align: right;">3.394</td> <td style="text-align: right;">3.346</td> </tr> <tr> <td>Current BES: (FY05 OSD)</td> <td style="text-align: right; border-top: 1px solid black;">3.214</td> <td style="text-align: right; border-top: 1px solid black;">3.394</td> <td style="text-align: right; border-top: 1px solid black;">67.605</td> </tr> <tr> <td>Total Adjustments</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">-0.062</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">0.000</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">64.259</td> </tr> <tr> <td colspan="4" style="padding-top: 10px;">Summary of Adjustments</td> </tr> <tr> <td>Rate Adjustments</td> <td></td> <td></td> <td style="text-align: right;">-0.536</td> </tr> <tr> <td>Economic Adjustments</td> <td></td> <td></td> <td style="text-align: right;">-0.105</td> </tr> <tr> <td>Reprogramming</td> <td style="text-align: right;">-0.062</td> <td></td> <td></td> </tr> <tr> <td>Programmatic Adjustments</td> <td></td> <td></td> <td style="text-align: right;">64.900</td> </tr> <tr> <td>Reprogramming</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Subtotal</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">-0.062</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">0.000</td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 1px solid black;">64.259</td> </tr> </tbody> </table>  <p>Schedule:</p> <p>N/A</p> <p>Technical:</p> <p>N/A</p>				FY 2003	FY 2004	FY 2005	Funding:				Previous President's Budget: (FY 04-05 Pres Controls)	3.276	3.394	3.346	Current BES: (FY05 OSD)	3.214	3.394	67.605	Total Adjustments	-0.062	0.000	64.259	Summary of Adjustments				Rate Adjustments			-0.536	Economic Adjustments			-0.105	Reprogramming	-0.062			Programmatic Adjustments			64.900	Reprogramming				Subtotal	-0.062	0.000	64.259
	FY 2003	FY 2004	FY 2005																																															
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EXHIBIT R-2, RDT&E Project Justification								DATE: February 2004	
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT NUMBER AND NAME			PROJECT NUMBER AND NAME				
RDT&E, N / 1319 BA-4		0603382N Advanced Combat System Technology			0324 Adv Combat Sys Tech/9348 Impr Combat Info Center				
<b>D. OTHER PROGRAM FUNDING SUMMARY:</b>									
<u>Line Item No. &amp; Name</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>To Complete</u>	<u>Total Cost</u>
PE 0604307N/1447 Aegis Combat System Engin	331.213	213.47	146.463	178.365	206.955	250.170	256.759		
<b>E. ACQUISITION STRATEGY: *</b>									
Risk reduction efforts are lead by NSWC/Dahlgren, the OA Technical Authority for PEO IWS 1.0. Technical Guidance documentation is produced and disseminated to the various programs of record for their use in becoming OA compliant. Additionally, an OA Test Facility is provided at NSWCDD for hosting early validation efforts by various programs of record in evaluating their progress toward OA compliance.									
<b>F. MAJOR PERFORMERS: **</b>									
NSWC/ Dahlgren - Dahlgren, Virginia - Technical Authority for OA Program for PEO IWS									

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Exhibit R-3 Cost Analysis (page 1)										DATE: February 2004		
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NUMBER AND NAME						
RDT&E, N / BA-4			0603382N Advanced Combat System Technology			0324 Adv Combat Sys Tech/9348 Impr Combat Info Center						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development												
Ancillary Hardware Development												
Component Development												
Systems Engineering	SS/CPFF	APL / Baltimore, MD	10.155	0.697	11/02	0.816	11/03	0.000		0.000	11.668	
Systems Engineering	WR	NSWC / Dahlgren, VA	16.646	2.167	12/02	4.560	12/03	67.056	12/03	Continuing	Continuing	
Systems Engineering	WR	NAWCAD / St. Inigoes, MD	2.000							0.000	2.000	
Training Development												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			28.801	2.864		5.376		67.056		Continuing	Continuing	
Remarks:												
Development Support	WR	Miscellaneous	0.501	0.072	11/02	0.071	11/03	0.071	12/03	Continuing	Continuing	
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Award Fees												
Subtotal Support			0.501	0.072		0.071		0.071		Continuing	Continuing	
Remarks:												



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Exhibit R-3 Cost Analysis (page 2)										DATE: February 2004		
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NUMBER AND NAME						
RDT&E, N / BA-4			0603382N Advanced Combat System Technology			0324 Adv Combat Sys Tech/9348 Impr Combat Info Center						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 03 Cost	FY 03 Award Date	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	Miscellaneous	0.371							0.000	0.371	
Operational Test & Evaluation												
Live Fire Test & Evaluation												
Test Assets												
Tooling												
GFE												
Award Fees												
Subtotal T&E			0.371	0.000		0.000		0.000		0.000	0.371	
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support	WR	Miscellaneous	0.943	0.278	11/02	0.283	11/03	0.478	12/03	Continuing	Continuing	
Travel												
Labor (Research Personnel)												
SBIR Assessment												
Subtotal Management			0.943	0.278		0.283		0.478		Continuing	Continuing	
Remarks:												
Total Cost			30.616	3.214		5.730		67.605		Continuing	Continuing	
Remarks:												

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Exhibit R-3, Project Cost Analysis  
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EXHIBIT R4, Schedule Profile																							DATE: February 2004									
APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4										PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology										PROJECT NUMBER AND NAME 0324/Advanced Combat System Technology 9438/Improved Combat Information Center												
Fiscal Year	2002				2003				2004				2005				2006				2007				2008				2009			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Acquisition Milestones																																
OA Technical Stds & Design Guidance Design Reviews																9/1 Design Review △			9/30 Design Review △			9/30 Design Review △			9/30 Design Review △			9/30 Design Review △				
OA Functional Architecture Design Reviews																9/1 Design Review △			9/30 Design Review △			9/30 Design Review △			9/30 Design Review △			9/30 Design Review △				
Test & Evaluation Milestones																																
DDX Rel OA Validation Tests																7/15 REL 3 Validation Test △			7/15 REL 4 Validation Test △			7/15 REL 5 Validation Test △			7/15 REL 6 Validation Test △			7/15 REL 7 Validation Test △				
CG/DDG OA Validation Tests of Spirals																4/15 Spiral 1 Validation Test △			4/15 Spiral 2 Validation Test △					4/15 Spiral 3 Validation Test △			4/15 Spiral 4 Validation Test △					
LCS OA Validation Tests																					9/30 Rel 1 Val Test △			4/15 Rel 2 Val Test △				9/30 Rel 3 Val Test △				
CVN/L-CLASS EDM																					4/15 EDM Complete △											
Production Milestones																																
Deliveries																												Lot 24 (36)				

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\* Not required for Budget Activities 1, 2, 3, and 6

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Exhibit R-4, Schedule Profile  
(Exhibit R-4, Page 10 of 11)

**CLASSIFICATION:**

Exhibit R-4a, Schedule Detail

DATE: February 2004

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**Exhibit R-4a, Schedule Detail**  
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