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Exhibit R-2, RDT&E Budget Item Justification	Date: February 1999
RDT&E1319/Budget Activity 4	Advanced Combat System Technology, PE0603382N

COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total P.E. Cost	4.81	6.63	6.83	12.04	14.44	14.70	15.00	15.33	CONT.	CONT.
Advanced Combat System Technology/K0324	4.81	6.63	6.83	12.04	14.44	14.70	15.00	15.33	CONT.	CONT.
Quantity of RDT&E Articles & cost	Not Applicable									

A. Mission Description and Budget Item Justification
 This line item funds studies and experiments which will be conducted in distributed computer architecture, radar technology, and Tactical Informational Management Concepts to mature them to transition candidates for introduction into the AEGIS Weapon System. This program will take a disciplined systems engineering approach to find how these advances can be integrated into the AEGIS system and subsequent combat systems, and to plan combat system baseline upgrade schedules. Fully Distributed Computing Architecture is the first advanced development effort, leveraging the joint AEGIS/Defense Advanced Research Projects Agency (DARPA) High Performance Distributive Computing (Hiper-D) technology effort. It implements the results of distributed processing advances to replace the current AEGIS Combat System architecture with an open, distributed architecture. Radar studies are also being conducted to identify state-of-the-art technology options for the next generation radar. Complex Tactical Information Management of the flow and display of tactical information through the "detect-control-engage" process to better support the operator/decision maker will be a significant priority of this task. These advanced technologies are candidate systems for future baseline upgrades.

FY98 ACCOMPLISHMENTS:

- (\$0.56) Conducted system engineering experiments with COTS/DARPA computer technologies to assess their readiness and maturity for transitioning into AEGIS Combat System production baselines built on open system computing principles.
- (\$2.65) Completed prototyping and re-engineering activities of AEGIS Weapon System computer programs focusing on the Baseline 7 computer architecture issues associated with the FY98 integrated demonstration.
- (\$1.10) Conducted an integrated demonstration at the computing test bed that incorporated enhanced computing architecture technology with respect to information transfer, open system design, processing, support software, and related areas. Developed an early engineering design for ship information transfer capability.
- (\$0.50) Continued development of AEGIS Weapon System architecture and performance models using prototype modeling tools, multi-sensor coordination and advanced tactical information management.

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FY99 PLAN:

- (\$2.00) Conduct studies concerning the feasibility of applying Visualization Architecture and Technology (VAT) concepts to shipboard use.
- (\$1.00) Continue system engineering experiments with currently emerging COTS/DARPA computer technologies to assess improvements in upgrades against previously identified shortfalls. Feedback any existing shortfalls for future enhancements. Work within the commercial standards communities to address the shortfalls in computing capabilities for Navy applications.
- (\$1.36) Conduct an integrated demonstration in the computing testbed of selected AEGIS Weapon System capabilities focused on initial QoS (Quality of Service) functionality in the middleware domain. Demonstrate an initial integrated set of common engineering services for the information infrastructure, including the addition of another warfighting or other shipboard information/control system. Also demonstrate initial middleware capabilities within the Common CDS (Combat Direction System) functional areas that support object-oriented computer program architectures.
- (\$1.00) Initiate risk reduction experiments focused on middleware issues associated with object-oriented computer program architectures with an initial target of Common CDS capability for AEGIS combat systems. Assess maturity and transition potential of available or emerging technologies into AEGIS Baseline development efforts on Baseline 6 Phase III and 7 Phase I.
- (\$1.13) Enhance AEGIS Weapon System architecture and performance models using prototype modeling tools, multi-sensor coordination, and advanced tactical information management concepts. Develop and validate enhanced certification techniques that are applicable to the enhanced computing architecture prototyped in FY98.
- (\$0.14) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

FY00 PLAN:

- (\$1.13) Continue system engineering experiments with currently emerging COTS/DARPA computer technologies to assess improvements in upgrades against previously identified shortfalls. Feedback any existing shortfalls for future enhancements. Work within the commercial standards communities to address the shortfalls in computing capabilities for Navy applications.
- (\$3.50) Conduct an integrated demonstration in the computing testbed of selected AEGIS Weapon System capabilities focused on second phase QoS functionality in the middleware domain. Assess and validate the available certification techniques applicable within the Common CDS functional areas that support object-oriented computer program architectures.
- (\$1.20) Initiate transition efforts of lessons learned in the FY99 middleware risk reduction experiments targeted at the Common CDS capability for AEGIS combat systems. Work with the Baseline development teams to identify remaining or emerging issues associated with transition to Baseline 6 Phase III and Baseline 7 Phase I for middleware capabilities.
- (\$1.00) Validate the performance modeling tools against the existing prototype capabilities in the computing testbed.

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A. Program Change Summary:

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>
FY 1999 President's Budget:	5.08	8.65	8.15
Appropriated Value:	5.23	6.65	
Adjustment to FY 1998 Appropriated Value/ FY 1999 President's Budget:	-0.27	-2.02	-1.32
FY 2000 PRES Budget Submit:	4.81	6.63	6.83

Funding: FY 1998 change due to SBIR Reduction and minor pricing adjustments. FY1999 change due to Congressional reduction and minor pricing adjustments. FY 2000 changes due to shifting Navy priorities.

Schedule: FY1999-FY2000 funding reductions prevent completion of some risk reduction tasks. Failure to accomplish all risk reduction initiatives could impact Baseline 6 Phase III and Baseline 7 Phase I schedules.

Technical: Decrease in scope of critical risk reduction efforts required for Baseline 6 Phase III and Baseline 7 Phase I increases risk to development of these baselines.

B. Other Program Funding Summary

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>To Complete</u>	<u>Total Cost</u>
0604307N	110.14	182.48	204.48	192.27	178.69	142.84	114.45	95.83	CONT.	CONT.
R-1 No. 96										
Budget Activity 5										
Appropriation No. 1319										
AEGIS Combat System Engineering										

C. Acquisition Strategy: Risk reduction efforts are lead by NSWC, DD, the AEGIS Combat System ISEA. Results are transitioned to industry for cost and risk mitigation in the production of AEGIS Combat Systems.

D. Schedule Profile: Not Applicable

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Exhibit R-3 Cost Analysis		Date: February 1999
RDT&E 1319/Budget Activity 4	Advanced Combat System Technology, PE0603382N	Advanced Combat System Technology, K0324

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Ancillary Hardware Development Miscellaneous				0.32		0.38		CONT.	CONT.	CONT.
Systems Engineering	SC/CPFF	Applied Physics Lab, Baltimore, MD	5.85	1.00	11/98	1.13	11/99	CONT.	CONT.	CONT.
	SS/CPFF	Lockheed Martin, Moorestown, NJ	0.00	0.76	3/95	1.03	3/95	CONT.	CONT.	CONT.
	WR	Naval Surface Warfare Center, Dahlgren, VA	8.21	1.45	12/98	3.72	12/99	CONT.	CONT.	CONT.
	WR	Naval Air Warfare Center, Aircraft Division, St. Inigoes, MD.	0.00	2.00	3/99	0.00				
Subtotal Product Development			14.06	5.53		6.26		CONT.	CONT.	CONT.
Software Development Miscellaneous			0.07	0.34	VARIOUS	0.11	VARIOUS	CONT.	CONT.	CONT.
Configuration Management Miscellaneous			0.05	0.24	VARIOUS	0.26	VARIOUS	CONT.	CONT.	CONT.
Technical Data Miscellaneous			0.03	0.20	VARIOUS	0.20	VARIOUS	CONT.	CONT.	CONT.
Subtotal Support			0.15	0.78		0.57		CONT.	CONT.	CONT.

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Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation Miscellaneous			0.00	0.32		0.00		CONT.	CONT.	CONT.
Subtotal T&E			0.00	0.32		0.00		CONT.	CONT.	CONT.
Subtotal Management Support										
Total Cost			14.21	6.63		6.83		CONT.	CONT.	CONT.

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