

UNCLASSIFIED

CLASSIFICATION:

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|---|---------|---------|---------|---------|---|---------|-------------------------------|---------|
| EXHIBIT R-2, RDT&E Budget Item Justification | | | | | | | DATE: February 2003 | |
| APPROPRIATION/BUDGET ACTIVITY RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-4 | | | | | R-1 ITEM NOMENCLATURE 0603382N Advanced Combat System Technology | | | |
| COST (\$ in Millions) | FY 2002 | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
| Total PE Cost | 3.111 | 3.276 | 3.394 | 3.346 | 1.918 | 0.981 | 0.985 | 0.999 |
| K0324/Advanced Combat System Technology | 3.111 | 3.276 | 3.394 | 3.346 | 1.918 | 0.981 | 0.985 | 0.999 |
| | | | | | | | | |

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Advanced Combat System Technology line 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 the AEGIS Weapon System (AWS). This program takes 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 system engineering experiments with currently emerging Commercial-off-the-Shelf (COTS) computer technologies and distributed processing advances to replace the current AEGIS Combat System (ACS) computing architecture with an open, distributed architecture planned for introduction in Baseline 7 Phase II. A secondary 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 candidate systems for future baseline upgrades.

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| APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4 | PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology | PROJECT NUMBER AND NAME K0324/Advanced Combat System Technology |
|---|---|--|

B. Accomplishments/Planned Program

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | 0.390 | 0.200 | | |
| RDT&E Articles Quantity | | | | |

Continue 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. Continue development and integration of DTCE capability based on advanced hardware and software technologies emerging from computing industry providers.

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | 1.617 | | | |
| RDT&E Articles Quantity | | | | |

Conducted experiments focused on transition of selected Aegis Weapons System (AWS) elements to the DTCE and document lessons learned with respect to performance and open system attributes. Mature certification methodologies and develop trial certification procedures.

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | 0.104 | | | |
| RDT&E Articles Quantity | | | | |

Provided feedback to DARPA and to the AEGIS prime contractor for incorporation into baseline developments.

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| APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4 | PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology | PROJECT NUMBER AND NAME K0324/Advanced Combat System Technology |
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B. Accomplishments/Planned Program (Cont.)

| | | | | |
|--------------------------------------|-------|-------|-------|-------|
| | FY 02 | FY 03 | FY 04 | FY 05 |
| Accomplishments/Effort/Subtotal Cost | 1.000 | | | |
| RDT&E Articles Quantity | | | | |

Assessed capability of DTCE to meet projected requirements of future baseline upgrades and missions, e.g. Ship Based Midcourse (SBM).

| | | | | |
|--------------------------------------|-------|-------|-------|-------|
| | FY 02 | FY 03 | FY 04 | FY 05 |
| Accomplishments/Effort/Subtotal Cost | | | 0.300 | 0.300 |
| RDT&E Articles Quantity | | | | |

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.

| | | | | |
|--------------------------------------|-------|-------|-------|-------|
| | FY 02 | FY 03 | FY 04 | FY 05 |
| Accomplishments/Effort/Subtotal Cost | | 1.726 | 1.988 | 1.940 |
| RDT&E Articles Quantity | | | | |

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.

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| APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4 | PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology | PROJECT NUMBER AND NAME K0324/Advanced Combat System Technology |
|---|---|--|

B. Accomplishments/Planned Program (Cont.)

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | | 0.300 | | |
| RDT&E Articles Quantity | | | | |

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.

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | | 0.950 | 1.000 | 1.000 |
| RDT&E Articles Quantity | | | | |

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&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.

| | FY 02 | FY 03 | FY 04 | FY 05 |
|--------------------------------------|-------|-------|-------|-------|
| Accomplishments/Effort/Subtotal Cost | | 0.100 | 0.106 | 0.106 |
| RDT&E Articles Quantity | | | | |

Work with Science & Technology (S&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&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&T sponsors and technology developers for enhancements.

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|---|---|--|

C. PROGRAM CHANGE SUMMARY:

| Funding: | FY 2002 | FY 2003 | FY 2004 | FY 2005 |
|---|---------|---------|---------|---------|
| Previous President's Budget: (FY 03 Pres Controls) | 3.427 | 3.350 | 3.574 | 3.524 |
| Current BES/President's Budget: (FY04/05 Pres Controls) | 3.111 | 3.276 | 3.394 | 3.346 |
| Total Adjustments | -0.316 | -0.074 | -0.180 | -0.178 |
| Summary of Adjustments | | | | |
| SBIR/STTR Transfer | -0.058 | | | |
| Economic Assumptions | -0.191 | -0.074 | -0.180 | -0.178 |
| Reprogrammings | -0.067 | | | |
| Congressional increases | | | | |
| Subtotal | -0.316 | -0.074 | -0.180 | -0.178 |

Schedule:
N/A

Technical:
N/A

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| EXHIBIT R-2, RDT&E Project Justification | | | | | | | DATE: February 2003 | | | |
| APPROPRIATION/BUDGET ACTIVITY RDT&E, N / 1319 BA-4 | | | PROGRAM ELEMENT NUMBER AND NAME 0603382N Advanced Combat System Technology | | | PROJECT NUMBER AND NAME K0324/Advanced Combat System Technology | | | | |
| D. OTHER PROGRAM FUNDING SUMMARY: | | | | | | | | | | |
| <u>Line Item No. & Name</u> | <u>FY 2002</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 0604307 N Aegis Combat System Engin | 320.187 | 340.426 | 205.733 | 208.048 | 217.746 | 217.286 | 230.800 | 206.056 | Continuing | Continuing |
| E. ACQUISITION STRATEGY: * | | | | | | | | | | |
| Risk reduction efforts are lead by NSWC/Dahlgren, the ACS Lifetime Support Engineering Agent (LSEA). Results are transitioned to industry for cost and risk mitigation in the production of ACS. | | | | | | | | | | |
| F. MAJOR PERFORMERS: ** | | | | | | | | | | |
| NSWC/ Dahlgren - Dahlgren, Virginia - Lifecycle Support Engineering Agent 12/02 Johns Hopkins University / Applied Physics Lab (JHU/APL) - Baltimore, Maryland - Laboratory 11/02 | | | | | | | | | | |
| * Not required for Budget Activities 1,2,3, and 6 ** Required for DON and OSD submit only. | | | | | | | | | | |

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| Exhibit R-3 Cost Analysis (page 1) | | | | | | | | DATE: February 2003 | | | | |
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| APPROPRIATION/BUDGET ACTIVITY | | | PROGRAM ELEMENT | | | PROJECT NUMBER AND NAME | | | | | | |
| RDT&E, N / BA-4 | | | 0603382N Advanced Combat System Technology | | | K0324/Advanced Combat System Technology | | | | | | |
| 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 | | | | | | | | | | | 0.000 | |
| Ancillary Hardware Development | | | | | | | | | | | 0.000 | |
| Component Development | | | | | | | | | | | 0.000 | |
| Systems Engineering | SS/CPFF | APL / Baltimore, MD | 10.155 | 0.759 | 11/02 | 0.822 | 11/03 | 0.811 | | Continuing | Continuing | |
| Systems Engineering | WR | NSWC / Dahlgren, VA | 16.388 | 2.167 | 12/02 | 2.218 | 12/03 | 2.186 | | Continuing | Continuing | |
| Systems Engineering | WR | NAWCAD / St. Inigoes, MD | 2.000 | | | | | | | Continuing | Continuing | |
| Training Development | | | | | | | | | | | 0.000 | |
| Licenses | | | | | | | | | | | 0.000 | |
| Tooling | | | | | | | | | | | 0.000 | |
| GFE | | | | | | | | | | | 0.000 | |
| Award Fees | | | | | | | | | | | 0.000 | |
| Subtotal Product Development | | | 28.543 | 2.926 | | 3.040 | | 2.997 | | Continuing | Continuing | |
| Remarks: | | | | | | | | | | | | |
| Development Support | WR | Miscellaneous | 0.501 | 0.072 | 11/02 | 0.071 | 11/03 | 0.071 | | Continuing | Continuing | |
| Software Development | | | | | | | | | | | 0.000 | |
| Training Development | | | | | | | | | | | 0.000 | |
| Integrated Logistics Support | | | | | | | | | | | 0.000 | |
| Configuration Management | | | | | | | | | | | 0.000 | |
| Technical Data | | | | | | | | | | | 0.000 | |
| GFE | | | | | | | | | | | 0.000 | |
| Award Fees | | | | | | | | | | | 0.000 | |
| Subtotal Support | | | 0.501 | 0.072 | | 0.071 | | 0.071 | | Continuing | Continuing | |
| Remarks: | | | | | | | | | | | | |

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Exhibit R-3, Project Cost Analysis
(Exhibit R-3, Page 7 of 10)

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| Exhibit R-3 Cost Analysis (page 2) | | | | | | | | | DATE: February 2003 | | | |
|------------------------------------|------------------------|--------------------------------|--|------------|------------------|---|------------------|------------|----------------------------|------------------|------------|--------------------------|
| APPROPRIATION/BUDGET ACTIVITY | | | PROGRAM ELEMENT | | | PROJECT NUMBER AND NAME | | | | | | |
| RDT&E, N / BA-4 | | | 0603382N Advanced Combat System Technology | | | K0324/Advanced Combat System Technology | | | | | | |
| 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 | | 0.000 | | 0.000 | | Continuing | Continuing | |
| Operational Test & Evaluation | | | | | | | | | | | 0.000 | |
| Live Fire Test & Evaluation | | | | | | | | | | | 0.000 | |
| Test Assets | | | | | | | | | | | 0.000 | |
| Tooling | | | | | | | | | | | 0.000 | |
| GFE | | | | | | | | | | | 0.000 | |
| Award Fees | | | | | | | | | | | 0.000 | |
| Subtotal T&E | | | 0.371 | 0.000 | | 0.000 | | 0.000 | | Continuing | Continuing | |
| Remarks: | | | | | | | | | | | | |
| Contractor Engineering Support | | | | | | | | | | | 0.000 | |
| Government Engineering Support | | | | | | | | | | | 0.000 | |
| Program Management Support | WR | Miscellaneous | 0.943 | 0.278 | 11/02 | 0.283 | 11/03 | 0.278 | | Continuing | Continuing | |
| Travel | | | | | | | | | | | 0.000 | |
| Labor (Research Personnel) | | | | | | | | | | | 0.000 | |
| SBIR Assessment | | | | | | | | | | | 0.000 | |
| Subtotal Management | | | 0.943 | 0.278 | | 0.283 | | 0.278 | | Continuing | Continuing | |
| Remarks: | | | | | | | | | | | | |
| Total Cost | | | 30.358 | 3.276 | | 3.394 | | 3.346 | | Continuing | Continuing | |
| Remarks: | | | | | | | | | | | | |

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| Exhibit R-4a, Schedule Detail | | | | | | DATE: February 2003 | | |
|--|---|---------|---------|---------|--|-------------------------------|---------|---------|
| APPROPRIATION/BUDGET ACTIVITY RDT&BA-4 | PROGRAM ELEMENT 0603382N Advanced Combat System Technology | | | | PROJECT NUMBER AND NAME K0324/Advanced Combat System Technology | | | |
| Schedule Profile | FY 2002 | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
| Prototype Phase | | | | | | | | |
| System Design Review (SDR) | | | | | | | | |
| Milestone II (MSII) | | | | | | | | |
| Contract Preparation | | | | | | | | |
| Software Specification Review (SSR) | | | | | | | | |
| Preliminary Design Review (PDR) | | | | | | | | |
| System Development | | | | | | | | |
| Critical Design Review (CDR) | | | | | | | | |
| Quality Design and Build | | | | | | | | |
| Test Readiness Review (TRR) | | | | | | | | |
| Developmental Testing (DT-IIA) | | | | | | | | |
| Eng Dev Model (EDM) Radar Delivery - Lab | | | | | | | | |
| Software Delivery 1XXSW | | | | | | | | |
| Preproduction Readiness Review (PRR) | | | | | | | | |
| EDM Radar Delivery - Flt Related | | | | | | | | |
| Milestone C (MS C) | | | | | | | | |
| Operational Testing (OT-IIA) | | | | | | | | |
| Start Low-Rate Initial Production I (LRIP I) | | | | | | | | |
| Software Delivery 2XXSW | | | | | | | | |
| Developmental Testing (DT-IIB1) | | | | | | | | |
| Developmental Testing (DT-IIB2) | | | | | | | | |
| Start Low-Rate Initial Production II | | | | | | | | |
| Operational Testing (OT-IIB) | | | | | | | | |
| Developmental Testing (DT-IIC) | | | | | | | | |
| Functional Configuration Audit (FCA) | | | | | | | | |
| Low-Rate Initial Production I Delivery | | | | | | | | |
| Technical Evaluation (TECHEVAL) | | | | | | | | |
| Physical Configuration Audit | | | | | | | | |
| Operational Evaluation (OT-IIC) (OPEVAL) | | | | | | | | |
| Low-Rate Initial Production II Delivery | | | | | | | | |
| IOC | | | | | | | | |
| Full Rate Production (FRP) Decision | | | | | | | | |
| Full Rate Production Start | | | | | | | | |
| First Deployment | | | | | | | | |

Not Applicable: The Advanced Combat System Technology line is LOE and Scientific Research. See R-2 Page 1.

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