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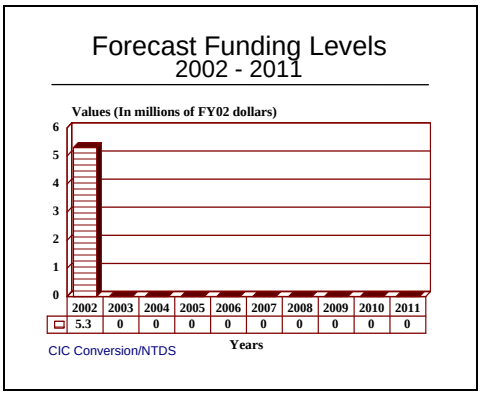
Combat Information Center (CIC) Conversion/ Naval Tactical Data System (NTDS) Improvement - Archived 7/2003

Outlook

- NTDS conversion completed in 2001
- Remaining work transferred to PE#0604307 Aegis Combat System Engineering, Project K1147
- Barring a surge of activity, this report will be archived in the near future



Orientation

Description. The US Navy's Combat Information Center Conversion (CIC) Conversion/Naval Tactical Data System (NTDS) Improvement program replaced vintage operating systems and applications with more advanced systems for use aboard surface warships.

Sponsor

US Navy
Naval Command, Control & Ocean Surveillance Center
RDT&E Division
San Diego, California (CA)
USA
(Lead Laboratory)

Naval Surface Warfare Center
Integrated Combat System Test Facility
San Diego, California (CA)
USA

Naval Surface Warfare Center
Dahlgren, Virginia (VA)
USA

Puget Sound Naval Shipyard
Bremerton, Washington (WA)
USA

Contractors

Johns Hopkins University
Applied Physics Laboratory
Johns Hopkins Road
Laurel, Maryland (MD) 20723-6099
USA
Tel: +1 443 778 5000 (Washington Area)
Fax: +1 240 228 5000 (Baltimore Area)
Web site: http://www.jhuapl.edu

Lockheed Martin Corp
Advanced Technology Laboratories
Communications Systems
A&E Building, 2 West
One Federal Street
Camden, New Jersey (NJ) 08102

USA
Tel: +1 856 338 4012
Fax: +1 856 338 4748
Web site: http://www.atl.external.lmco.com

CAIC Technologies Inc
(formerly Ques Tech Inc)
1100 North Glebe Road
Arlington, Virginia (VA) 22201
USA
Tel: +1 703 841 7801
Web site: http://www.questech.com

Raytheon Sensors & Electronic Systems
(formerly Hughes Electronics Corp, Hughes Aircraft Co, Telecommunications & Space Division)
2000 East El Segundo Boulevard
PO Box 902
El Segundo, California (CA) 90245
USA
Tel: +1 310 647 1000
Web site: http://www.raytheon.com

Unisys Corp
Marketing & Customer Services
3199 Pilot Knob Road
Eagan, Minnesota (MN) 55121
USA
Tel: +1 612 687 2200
Fax: +1 612 687 2985
Web site: http://www.unisys.com

Status. Main NTDS conversion efforts completed by the end of 2001. Remaining work transferred to Aegis Combat Systems Engineering, Project K1447.

Total Produced. Not applicable, as this was a software development and system upgrade program.

Application. US Navy surface warship tactical data systems need upgrades on a continual basis. The CIC Conversion effort supports these tactical data systems by providing upgrades, enhancements, and modifications as needed.

Price Range. This was a developmental support program, thus unit cost, in the usual context, was not applicable.

Technical Data

Design Features. CIC Conversion/NTDS Improvement, a US Navy program, Program Element (PE) Number 0604518N, developed software that replaced the existing 1960s Naval Tactical Data System (NTDS). CIC Conversion replaces operating systems and applications and algorithms, as well as implementing advanced concepts for Tactical Data System upgrades for surface ships in response to future threats, operational deficiencies, and new and existing operational requirements. The objective of this program was to develop integrated and coherent ship command and control systems that will increase operational capabilities, promote standardization, and introduce new shipboard tactical displays and support equipment for the evaluation of surveillance data and for the control of aircraft and weapon systems. It also provided integration between sensor/weapon systems that are organic to the battle force.

The Advanced Combat Direction System (ACDS) is a centralized, automated command and control system, collecting and correlating combat information. It upgrades the Naval Tactical Data System (NTDS) for aircraft carriers and large-deck amphibious ships. A core component of non-AEGIS combat systems, ACDS provides the capability to identify and classify targets, prioritize and conduct engagements, vector interceptor aircraft to targets, and exchange targeting information

Source: US Navy

Variants/Upgrades

Included in this program were improvements of the following: CV/CVN class aircraft carriers; CG/CGN class cruisers; DDG-993 class destroyers; and LHD, LCC, and LHA class amphibious assault support vessels. This effort also upgraded the Atlantic Fleet Weapons Training Facility and the Pacific Missile Range Facility with an ACDS Block 1 derivative. This program included significant Combat Direction System (CDS) improvements, including the implementation of the AEGIS Tactical Executive System (ATES), JTIDS/TADILJ message standard, and the Command and Control Processor (C^2P). It also included integration and interface with the New Threat Upgrade (NTU).

Program Review

Background. Prior to FY89, several projects were associated with Program Element (PE) 0604518N. Subsequently, only Project U1604 (previously S1604) has been retained.

Project S1559. Block 0 Combat Direction System (CDS) hardware and software upgrades and baseline hardware definition were completed in FY82. The contract for Block 1 engineering development was awarded in FY83. The FY84 program included design, coding, and debugging of Carrier Block 0 CDS computer programs, along with work on operator manuals, and further efforts on the Carrier Advanced CDS (ACDS) Block 1 system. In FY85, efforts included the completion of Block 0 code, debugging, and the Block 0 operator's manual. Efforts during FY86 concentrated on developing Block 0 and Block 1 programs.

Project S1602. In FY84, project efforts included the completion of system specifications and interface design specifications for the CG-16 and CG-26 class Block 0 upgrades. The FY85 program included the completion of system specifications and interface design specifications for the CGN-38 and DDG-993 Block 0 upgrades. FY86 efforts included coding and debugging Block 0 computer programs for CG-27 class ships and CG-26 New Threat Upgrade ships.

Project S1603. First funded in FY83, this project was completed in FY84. It modified FFG-7 class ships' computer programs to interface with the Low Cost Link 11 and SLQ-32 Electronic Warfare System.

Project K1604 (formerly U1604). Efforts on the specification and detailed design of the Restructured Navy Tactical Data System computer program continued in FY84, along with shore site integration testing of CGN-38 (SM-2) CDS operational program

modifications. These efforts were completed in FY85. The FY86 program concentrated on completing the coding and debugging of this computer program for CG, CGN, and DDG class ships.

Acceptance testing and shore/shipboard testing of CDS computer programs for Block 0 proceeded through FY87. Operational testing of Block 0 CDSs continued in the lead ships. Advanced CDS Block 1 computer program performance specs were completed. ACDS Block 1 software preliminary design review was completed and final design was started. ACDS Block 1 system acceptance test plans were completed. Upgrades to existing equipment continued.

ACDS Block 1 computer program top level design was completed by the end of FY88. Other accomplishments included installation and adoption of ATES software development tools; code/debug following system core program functional development (Data Base Manager, Picture Construction System, Display Processor, Doctrine Processor) commencement; and preparation of tests for evaluating the performance of the initial segments of the Block 1 program.

The following tasks were accomplished during FY89: the OT I to test the initial program coding/design to ensure performance goals of throughput and flexibility were met; coding and debugging of the remaining elements of the ACDS Block 1 computer program commenced; and CDS Standard Simulation System development in support of the ACDS Block 1 computer program continued.

At the start of the new decade in FY90, detailed design of the ACDS Block 1 computer program and the conduct of the Critical Design Review (CDR) were completed. Project efforts also focused on the continuation of the coding/testing of the ACDS Block 1 program, integration of the Command and Control Processor (C^2P) with the Advanced Combat Direction System, and completion of the design and specifications for the Atlantic Fleet Weapons Training Facility (AFWTP) and Pacific Missile Range Facility (PMRF) derivatives.

By the end of FY91, the following had been achieved: coding of the lead ship elements of ACDS Block 1; Test Requirements Review (TRR) for Contractors Acceptance Tests (CAT) and Systems Acceptance Tests (SAT); SAT for core elements of ACDS Block 1; initiation of the Combat System Integration Test (CSIT) Readiness Review for CSIT on ACDS Block 1; code/test began; completion of the Combat Direction System (CDS) Standard Simulation System in support of ACDS Block 1 operational shore test sites; and coding of the derivatives was completed. Combat System Integrated Testing (CSIT) of the ACDS Block 1 core program was conducted. Additional work was done with SAT on remaining lead ship elements during the FY92 time frame, including Formal Qualification Review (FQR) (CV) and coding of SAT. Coding of CGN-38/DDG-993 program was started and ACDS Block 1 (CV) operational program to lead ship was delivered.

Contractors tests on the core elements of ACDS Block 1 were completed by the end of FY93. Coding of the lead ship elements of ACDS Block 1 was also continued throughout the year. Other work included initiating the contractor test on the remaining lead ship elements and conducting Formal Qualification Review of the core elements. Contractors test on the remaining lead ship elements was finished in FY94. Work began on SAT for the lead ship program in July 1994 with the conducting of the Test Readiness Review for SAT.

During FY95, program work focused on conducting SAT and CSIT work on the lead ship program, plans/procedures for TECHEVAL, OPEVAL, and the USS *Constellation* (CV-64) installation preparations, and crew training development. Other work included initiating the modification of code for the USS *John C. Stennis* (CVN-74) and Cooperative Engagement Capability (CEC) integration.

In FY96, the completion of CSIT, the correction of priority trouble reports to the Level I computer program, and system integration testing (SIT) of Level I on the lead ship were reportedly accomplished. By the end of the year, curriculum and crew training for the lead ship were reportedly completed, as well as TECHEVAL and OPEVAL testing of the Level I computer. Completion of LHD-1 and CVN-69 installation preparations and participation in the cooperative Engagement Capability fleet introduction occurred.

Commencement of OPEVAL was delayed until FY97; however, by the end of FY97, work had been completed on PAT and CSIT for the ACDS Block 1 Level 2 computer program. Preparations began for the LHD-1 installation and for participation in the CEC IOC event. Complete crew training on the LHD-1 was scheduled to be completed. FY98 efforts focused on completing Level 2 delivery, conducting a successful OPEVAL, and achieving Milestone III. In addition, development reportedly began on the interactive courseware for ACDS Block training. Also reported were completion of required tests on the CVN-69, completion of Milestone III requirements, participation in formal CEC testing and OPEVAL testing, and completion of system development for ACDS Block 1 Level 3.

Activity during FY99 centered on testing and implementing the interactive courseware capability at

the Naval Training facilities and continuing the program update in order to accommodate ACDS Block 1 program requirements. Additional work focused on completing CSIT program certification of ACDS Block 1 Level 3 (SSDS integration), preparing for installation, and participating in the ACDS Block 1 Level 3 Follow-on. Y2K compliance issues were also completed during this time period.

Efforts during FY00 focused on participating in the CEC Baseline 2 test events in support of CEC's TECHEVAL and OPEVAL. Other work included correcting software and hardware trouble reports associated with shipboard deliveries of ACDS Block 1 Level 2.1.x on board CVN 68 and LHD 7 ships. All program efforts were completed by the end of FY01, with the completion of TECHEVAL and OPEVAL with CEC and correction of any deficiencies discovered. The hardware and software corrections were made by Raytheon via sole-source contract number N00024-97-C-5466.

Beginning with FY03, the Common Command and Decision (CC&D) portion was transferred to PE#0604307 AEGIS Combat System Engineering, Project K1447. The CC&D capability is a pre-planned project improvement to the AEGIS Weapon System and the Ship Self-Defense System (SSDS) MK 2 that replaces the command and decision capability presently in these systems with a common computer. This effort will avoid future life-cycle costs by reducing the number of computer programs that must be maintained, and will enable the Navy to field new or modified warfighting capability by eliminating the redundant, conflicting processing present in existing systems. CC&D is considered a critical step toward developing systems that will resolve long-term interoperability problems and achieve improvements in the air picture.

Funding

US FUNDING

	FY01		FY02		FY03		FY04	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (US Navy)								
PE#0604518N								
CIC Conversion								
Project K1604								
NTDS	-	7.524	-	5.344	-	0	-	0

All US$ are in millions.

Source: US Department of Defense FY2003 RDT&E Budget Item Justification R-2

Beginning in FY2003, the CC&D portion will be under PE#0604307 AEGIS Combat System Engineering, Project K1447.

Recent Contracts

No recent contract information with a value of over US$5 million has been identified.

Contractor	Award ($ millions)	Date/Description
Raytheon (at the time, Hughes)	10.6	Aug 1997 — CPAF contract to provide technical and production engineering services in support of the Program Executive Office, Theater Air Defense (PEO TAD) in Arlington, Virginia. Contract completed April 1999. (N00024-97-C-5466)
Cable and Computer Technology Inc	9.9	Apr 2002 — An indefinite-delivery and indefinite-quantity contract for Data Transfer System components, integration, and installation. This effort will provide switching capability for Naval Tactical Data System (NTDS) electrical interfaces. Work will be performed in Anaheim, California, and is expected to be completed by April 2007. Contract funds will not expire at the end of the current fiscal year. This contract was awarded on a sole-source basis. The US Naval Surface Warfare Center, Dahlgren Division, Dahlgren, Virginia, is the

Contractor	Award ($ millions)	Date/Description
		contracting authority. (N00178-02-D-2014)

Timetable

Month	Year	Major Development
Mar	1989	Completed OT I on initial program coding
Apr	1989	Milestone II
Sep	1991	Milestone IIB
Jan	1993	TECHEVAL
Sep	1993	Test Readiness Review for SAT
Feb	1994	Milestone IIC
Jul	1994	Initial Operational Capability System Acceptance Test
Jan	1995	Combat System Integration Test
Jul	1996	TECHEVAL
Jul	1997	OPEVAL
Apr	1998	Milestone III
	1999	Complete system engineering, minimal software coding of Akcita Control Element, and begin software unit testing
	2000	Final correction of ACDS Block 1 software and hardware trouble reports
Feb-Mar	2001	CEC TECHEVAL
Apr-May	2001	CEC OPEVAL, program completion
	2003	CC&D portion transferred to AEGIS Combat System Engineering, Project K1447

Worldwide Distribution

This is a **US Navy** program only.

Forecast Rationale

Believed to be one of the oldest systems still in operational use by the US Navy, the Naval Tactical Data System (NTDS) is considerably outdated, and has many inherent antiquated deficiencies that are not worth trying to overcome – it would be better to scrap the system altogether and begin anew with more modern and advanced technology now available. However, the US Navy has thought highly enough of NTDS to have initiated the Combat Information Center (CIC) Conversion/Naval Tactical Data System (NTDS) Improvement effort, which replaced the ancient NTDS operating systems with the Advanced Combat Direction System (ACDS) Block 1 program, composed of more advanced concepts for tactical data system upgrades for surface combatants in response to future threats, operational deficiencies, and new and existing operational requirements.

Increased emphasis on joint operations and littoral warfare has enhanced the importance of ACDS Block 1's joint operability and improved littoral warfare capabilities. The program's objective is to develop integrated real-time command and control systems that will increase ships' operational capabilities; promote standardization and introduce new shipboard tactical displays and support equipment; and provide integration between sensor/weapons systems that are organic to and outside of the battle force.

Additionally, this program provided for significant Combat Direction System (CDS) improvements, including implementation of the Joint Tactical Information Data Systems (JTIDS) Tactical Data Information Link Joint (TADILJ) (Link 16) message standard to support interoperability/joint operations with all US Armed Forces, as well as NATO forces; implementation of the AEGIS Tactical Executive System (ATES); and integration and interface with the Command and Control Processor, the Cooperative Engagement Capability (CDC), and Ship's Self-Defense System (SSDS).

The CIC Conversion/NTDS Improvement program was for all practical purposes finished by the end of 2001 upon the completion of the Cooperative Engagement Capability (CEC) Baseline 2 TECHEVAL and OPEVALS. Barring any technical problems, development funding will end, and operation and maintenance funding will be redirected into core tactical data system programs.

Keeping in line with the end of the CIC Conversion effort, work on the remaining project, Common Command and Decision (CC&D), has been transferred to PE#0604307N AEGIS Combat System Engineering, Project K1147, which is a pre-planned project improvement to the AEGIS Weapon System and the Ship Self-Defense System (SSDS) MK 2 that replaces the command and decision capability presently in these systems with a common computer. This effort will avoid future life-cycle costs by reducing the number of computer programs that must be maintained, and will enable the Navy to field new or modified warfighting capability by eliminating the redundant, conflicting processing present in existing systems.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR FUNDING ($ in millions)

			High Confidence Level				Good Confidence Level				Speculative			
Designation	**Application**	**Thru 01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**Total 02-11**
CIC CONVERSION/ NTDS	TACTICAL DATA SYSTEMS (US NAVY)	350.938	5.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.300