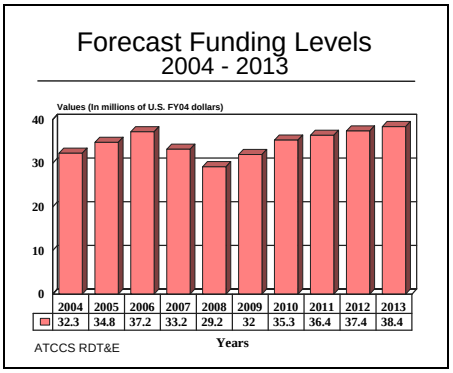
ATCCS - Archived 1/2005

Outlook

- Forecast International projects that the U.S. Army will spend some US$346.29 million over the next decade on researching and developing ATCCS hardware and software
- In 2004, Project 323 will continue in support of customer testing efforts with CHS equipment
- In 2005, Project 334 will continue to define, test, and implement software technologies used by the U.S. warfighter



Orientation

Description. The Army Tactical Command and Control System (ATCCS) program is a United States Army endeavor to develop automation technology for the conduct of U.S. Army combat operations. This report examines the common hardware and software systems funded under the ATCCS program.

Sponsor

U.S. Army – Communications Electronics Command
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Contractors

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Status. Ongoing research and development.

Total Produced. Not applicable.

Application. To improve the U.S. Army's tactical combat capabilities on the battlefield.

Price Range. There is no price range for the ATCCS system, since it is an integrator program.

Technical Data

This section discusses Versions 1 and 2 common hardware and software derived from the ATCCS program. It must be stressed that these items are not procured for ATCCS *per se*, but rather for the individual programs that make up ATCCS.

Design Features. The ATCCS consists of three types of microprocessor-based computers, two types of electronic display devices, three types of mass storage devices, one type of printer, a local area network, and cases and cables. The basic computer is the Miltope 32-bit Bobcat, which is based on the Hewlett-Packard 9000 series 300 and forms the basis for the PCU (portable computer unit), the TCU (transportable computer unit), and the SDU (stand-alone display unit). All are provided in V1 commercial and V2 ruggedized versions. Both the PCU and the TCU share a common reconfigurable chassis. The common operating system for the ATCCS is based on the Hewlett-Packard HP-UX, a superset of the SVID2 version of UNIX.

System Software. This software is a non-developmental item (NDI) consisting of a Solaris operating system, Informix database management system, Microsoft Office business package (word processing and spreadsheet, etc), MOTIF windowing system, and Windows Application Binary Interface (WABI). The software is provided to Battlefield Functional Area Command Systems and consists of the ATCCS communications support, inter-BFA database and files, and inter-BFA applications. The ATCCS common software includes the Common Operating Environment (COE) and the common picture capability provided by the Maneuver Control System (MCS).

The COE is a collection of software modules that permit the integration and implementation of the unique BFA software within ATCCS. COE is implemented through a common architecture, standards, and methodology. The COE is based on a layered structure, with each software layer providing a specific set of functions and interfaces derived from and compliant with the Global Command and Control System (GCCS) COE. The common hardware and software make up layers 1 and 2, the common support makes up layer 3, and the common applications make up layer 4.

For CSSCS (Combat Service Support Computer/Control System) applications, an additional layer provides the CSS-unique functionality as well as the ability to use functions from the ABCS (Army Battle Command System) and GCCS that satisfy system functional requirements. The CSSCS is structured as a decentralized processing and database system, with each mode having sufficient processing capability and information to permit autonomous operations. Modular components and software are used to enhance the survivability of the C^2 system.

HTU. The handheld terminal unit (CP-1995(V)/U) is a computer terminal in a shoulder sling case that can be operated on the move. The HTU is capable of being loaded with programs and data. The unit has an interactive display (backlit liquid crystal, 640 x 200 pixels, 225 lines by 40 characters), and is capable of swiftly processing and displaying formatted, free-text, and graphics messages exchanged over standard Army communications links. The 64-key tactile keyboard is used to set up baud rates (75 to 3,200 bps) and modem type (and other communications parameters), and to enter message texts. The contents of the HTU RAM (512 KB, with 1, 2, and 4 MB optional) are capable of surviving battery changes. The HTU is IBM-PC/AT compatible and uses 80286 16-bit processing. The HTU weighs less than 6 pounds without batteries, 8 pounds with batteries. Miltope has also developed an enhanced version of the HTU, the GPS-SHTU, with embedded GPS capability.

PCU. This portable computer unit (CP-1992(V)/U; CP-1993(V)/U) is a processor capable of interfacing with the HTU, the TCU, or another PCU, and with a full range of peripherals by means of IEEE 488 parallel, IEEE 802.3 LAN, RS232 Async serial interfaces (SCSI [small computer system interface] and Centronics parallel optional), and modems. The PCU is capable of transmitting and receiving information by means of Army communications. The PCU's built-in electroluminescent flat-panel display (512 x 400 pixels) can display monochrome graphics or 25 lines of text (with 80 characters on each line). It can also interface with any color monitor device. Dimensions are 20 x 19 x 8.72 inches. Weight is 45 pounds. A fold-down keyboard, internal floppy disk drive, and removable internal hard disk drive (40 or 100 MB) are also included. The PCU is one-man transportable.

TCU. The transportable computer unit (CP-2053(V)/U; CP-2059(V)/U) has much the same general capabilities as the PCU, although with characteristics that reflect its higher requirements. The TCU needs to be moved by two people and it cannot be operated in transit. With a fold-down, full-size keyboard and a built-in 9-inch electroluminescent display, the TCU also has the capability to drive an external color display (after the insertion of a color video circuit board). Dimensions and weight are the same as those of the PCU. The TCU also comes with an internal floppy disk drive and a removable hard disk drive.

CMD. The color monitor device (IP-1620(V)/U, IP-1621(V)/U, IP-1654(V)/U, IP-1655(V)/U) is a four-color monitor that comes in three screen sizes. The 12-inch display has a resolution of 512 x 400 pixels and a dot pitch of 0.31 mm. The 16-inch screen comes in two variants, one with a resolution of 1,024 x 768 and a dot pitch of 0.29 mm, and the other with a resolution of 1,280 x 1,024 pixels and dot pitch of 0.23 mm. The 19-inch version has a resolution of 1,280 x 1,024, with a dot pitch of 0.27 mm. The CMDs are used with the PCU, TCU, and SDU (stand-alone display unit).

MSEU. The mass storage expansion unit (MU-1039(V)/U, MU-1039(V)1/U, MU-1040(V)/U), provides a hull in which to plug in the various peripheral storage devices now available for ATCCS. MSEUs come in two configurations: one can accept either two full-height, or one full-height and two half-height, storage devices; the other can accept two half-height devices.

Hard Disk Drives. There are two different removable hard disk drives available, both using 5.25-inch Winchester disk drives. One is capable of storing 380 MB of unformatted data, with an average access time of 14 milliseconds. The other has basically the same

features, but has a storage capacity of 760 MB, with an average access time of 16 milliseconds.

Optical Disk Drive. This drive uses American National Standards Institute (ANSI)-standard 5.25-inch re-writable magneto-optical disk cassettes, with a capacity of up to 500 MB of data on each side. The average seek time is 35 milliseconds. Each side is separately write-protected.

Archive Tape Drive. This system element uses standard 4 mm digital audio tape (DAT) cassettes that can store up to 1.3 GB of data. The drive transfer rate is 183 kilobytes/second. This fast access capability means that typical access time is no more than 20 seconds on a standard DAT tape.

CD-ROM Drive. This new addition is a random access, read-only device that uses removable 4.7-inch CD-ROM disks. Although only one side can be used, it has a capacity of 599 MB. The average random access time is 400 milliseconds.

Flexible Disk Drive. This uses standard 3.5 inch flexible disks that are formatted for 710 kilobytes/1.4 MB (DOS format).

LAN. The local area network allows the PCU and TCU to communicate with other PCUs and TCUs or with other peripheral devices. Network components that will be used outside shelters will be hardened to withstand the environmental conditions the HTU will be exposed to. The LAN can support up to five arbitrarily connected devices in communication with one another over an area up to 1 kilometer in length. The LAN information throughput rate is 10 MB per second. The architecture, protocols, and media of the LAN conform to the IEEE 802.3 series Ethernet standard. The LAN is moveable and flexibly reconfigurable to respond to tactical mobility requirements. Fiber-optic cable is used for distances from 555 feet to 3,000 feet, while coaxial cable is used for distances less than 555 feet.

APIU. The adaptive programmable interface unit, developed by GTE (now General Dynamics), originated as a four-channel stand-alone interface device for supplying the host computer with a data gateway to tactical communications networks. The APIU has the capability to provide automatic routing/relay of messages that are not intended for the host computer. The APIU family has since been expanded to include a lightweight single- or dual-channel stand-alone device and a single-channel single-card APIU for installation within the PCU/TCU.

ATCCS PSE. The ATCCS programming support environment consists of hardware that replicates all the target configurations in the common hardware system (CHS) environment, as well as the software. PSE hardware includes four HP Series 9000 Model 350 workstations (each with 16 MB of memory), a 16-inch bit-mapped color monitor, a 132-MB fast-access disk drive, and three additional terminals. The PSE also provides for the development and maintenance of fielded applications software.

LCU. The LCU V1 is a commercial, 25-MHz, 486 laptop computer that provides five standard AT slots in support of operational requirements of the U.S. Army CHS program. The V1 comes equipped with a 120-MB internal hard drive, a high-density 3.5-inch floppy disk drive, a detachable keyboard, a 2,400 bps modem, a VGA-compatible 1-inch LCD screen, and up to 16 MB RAM. It is powered either from a 110/220 VAC supply or by a two-hour rechargeable battery. The unit provides over 10 MIPS computational performance and full functional compatibility with its V2 counterpart.

The LCU V2 is a ruggedized version of the V1, configured with a detachable keyboard that also serves as a case cover when configured for transit.

UPS. This uninterruptible power supply is a ruggedized, 800-watt power system that consists of a power converter, backup battery power pack, and control circuitry. The backup battery pack provides 5-1/2 minutes of 115 VAC and 60 Hz power for emergency shutdown of the equipment in case of loss of all ATCCS system power.

Standardized Integrated Command Post Systems (SICPS) Program. The SICPS program consists of five command post (CP) variants that are provided to the Battlefield Functional Areas (BFA) of the ATCCS:

- Tent Configuration. The Modular Command Post System tent is an 11-foot x 11-foot tent with a lightweight aluminum frame, interchangeable fabric walls, a roof, a floor, work tables, map boards, and a light set. It can be configured with up to two ATCCS CHS workstations based on requirements. The tent can also be connected to other SICPS tents and the SICPS RWS, M1068.
- Rigid Wall Shelter (RWS) Truck Configuration. The lightweight and transportable RWS system is mounted on the M1097 Heavy High-Mobility Multipurpose Wheeled Vehicle (HMMWV), which provides the basic means for housing and transporting the equipment, as well as providing a sheltered operational facility.
- Tracked Vehicle Configuration. The SICPS Program will use a track vehicle that provides equipment racks and workspace for two workstations and operators. The tracked vehicle will consist of an onboard generator, an intercom system, a Quick Erect Antenna Mast (QEAM), six antenna mounts, internal lighting and wiring, a

signal panel, a power distribution panel, a Surface Wire Grounding System (SWGS), and stowage provisions.

- Five Ton Expandable Van Configuration. The Five Ton is an installation kit mounted in an M934A2 expandable van. It provides four moveable workstation racks and workspace for four operators, and consists of a power entrance box, a signal entrance box, AC and DC power distribution boxes, DC power supply, two map boards, a QEAM, four antenna mounts, internal lighting and wiring, blackout provisions, two communications racks, a patch panel rack, cable ducts, a LAN group, a fiber-optic group, SWGS, two vehicle boarding ladders, and a storage container. The Five Ton is sealed against chemical and biological hazards and hardened to withstand electromagnetic and environmental effects.
- M4 Command and Control Vehicle (C^2V). The C^2V is a tracked, armored vehicle with a capacity for four ATCCS workstations. It has the capability to send data to and receive it from the Battle Command Vehicle and can link up with the ATCCS. The C^2V is mounted on a modified M993 Multiple Rocket Launcher System (MLRS) chassis, powered by a 600-horsepower drive train, and is survivable against chemical and biological hazards and electromagnetic environmental effects. It has a requirement for protection against 7.62 mm ball ammunition at 200 meters, and against a 155 mm high-explosive artillery burst at 30 meters.

Variants/Upgrades

ATCCIS. The Army Tactical Command and Control Information System (ATCCIS), an Advanced Concept Technology Demonstrator (ACTD), is a version of ATCCS that was used to demonstrate compatibility with a number of foreign systems. This system could eventually become a cornerstone for the Joint Vision 2010 concept that has been endorsed by the U.S. Joint Chiefs of Staff.

CHS-I. Existing CHS-I equipment is being upgraded to cope with changing requirements. The APIU has been expanded to a family that includes a lightweight single- or dual-channel stand-alone configuration and a single-channel, single-card, internal configuration for the PCU/TCU. The peripheral memory device selection has been expanded to include a CD-ROM, as well as higher capacity equipment.

CHS-II. The follow-on CHS-II program is based on next-generation equipment that features expanded capacity and capability to provide larger storage and data throughput capabilities. The design of the CHS-II requires that compatibility with the existing CHS-I be maximized to protect the Army's previous investment in the CHS-I program while exploiting advances in computer technology. User requirements could include enhanced graphics capability, increased portability (smaller and lighter), digital maps, overlay-producing and conference-viewing capability, increased processing speed, and increased program support environment performance.

LCU Product Improvements. Science Applications International Corp (SAIC) is working on several improvements to the LCU family. For the V1, it is proposing an engineering change to make it a detachable platform. The current V1 laptop is bolted to the five-slot expansion chassis. Making the laptop portable would allow off-site usage. An active matrix, color LCD screen is being considered for the V2. In addition, both 33-MHz and 50-MHz 486 processors are being investigated. A 200-MB hard drive is already available for the V2, and SAIC plans to have a 500-MB hard drive available by the third year of its contract. GPS cards for both the V1 and V2 are expected to be part of the CHS II hardware.

OPORD. General Electric developed an automated operation order (OPORD) system for the ATCCS under a rapid-prototyping program. The OPORD is used to plan, coordinate, control, and direct all tactical operations. The OPORD was automated in order to demonstrate the benefits of automated C^3 to commanders at all levels. The automated OPORD consists of an Intelligence Annex, Combat Service Support Annex, Fire Support Annex, and Air Defense Annex. Plans call for the development of a common software module and the incorporation of map graphics and overlays.

Program Review

Background. The Army Tactical Command and Control System (ATCCS) is a United States Army program to develop automation technology for the conduct of U.S. Army combat operations. The ATCCS program is funded under PE#0604818A. This report examines Project 323, Common Hardware Systems, and Project 334, Common Software.

PE#0604818A, Project 323. Project 323, Common Hardware Systems (CHS), is the program the U.S. Army uses to tie together the Army Battle Command Systems (ABCS). The project provides contracts for the development of state-of-the-art common hardware and associated peripherals. Project 323 also provides software technology support.

In 1999, Project 323 explored state-of-the-art technology insertion in support of ABCS. In 2000, the project upgraded ABCS systems and other U.S. Army systems. In 2001, it acted to support customers' testing efforts with CHS equipment – an effort that is still in progress. In 2002, CHS-2 equipment was being purchased and delivered, and a follow-on contract for CHS-3 equipment was initiated. ABCS system engineering and integration efforts were under way in 2003.

System-engineering support is being provided in 2004, and technology insertion work will be done in 2005, along with Integrated Product Team testing.

PE#0604818A, Project 334. Project 334, Common Software (CS), enables the U.S. Army to procure, develop, integrate, and test common software products for both the Army and Joint Services through the Defense Information Infrastructure Common Operating Environment (DII COE). The CS project provides state-of-the-art software technologies.

In 1999, Project 334 conducted functional analysis in support of ABCS. In 2000, system configuration development and operational demonstrations were conducted. In 2001, CS and commercial off-the-shelf (COTS) products were delivered in support of Army and Joint Service customer requirements. In 2002, the CS technology and reuse program was under way.

In 2003, new software technologies were evaluated in support of the overall CS program, and efforts were made in the area of ABCS system engineering and integration.

In 2004, DII COE products will continue to be developed, and then upgraded and integrated into U.S. Army and Joint Services systems. In 2005, software technologies used by the U.S. warfighter will continue to be defined, tested, and implemented in order to enhance interoperability.

Funding

U.S. FUNDING

	FY03		FY04(Req)		FY05(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (U.S. Army)						
PE#0604818A						
Project 323	-	18.44	-	6.52	-	6.41
Project 334	-	14.21	-	25.80	-	28.41

	FY06(Req)		FY07(Req)		FY08(Req)		FY09(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
RDT&E (U.S. Army)								
PE#0604818A								
Project 323	-	6.58	-	6.85	-	7.15	-	7.43
Project 334	-	30.59	-	26.36	-	22.08	-	24.58

All amounts are in US$ millions.

Source: U.S. Department of the Army FY 2004 RDT&E Descriptive Summary

Recent Contracts

Contractor	Award ($ millions)	Date/Description
General Dynamics	8.3	May 2001 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)

Contractor	Award ($ millions)	Date/Description
General Dynamics	5.8	Jun 2001 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. (DAAB07-94-C-N853)
General Dynamics	19.4	Aug 2001 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	16.1	Sep 2001 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. (he U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	9.8	Jan 2002 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	12.0	Mar 2002 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	7.3	Apr 2002 – Contract modification to exercise options for hardware/ software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	11.1	May 2002 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. (he U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	6.3	Jun 2002 – Contract modification to exercise options for hardware/software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	10.7	Jun 2002 – Contract modification to exercise options for hardware/ software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	8.3	Jul 2002 – Contract modification to exercise options for hardware/ software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)

Contractor	Award ($ millions)	Date/Description
General Dynamics	7.5	Sep 2002 – Contract modification to exercise options for hardware/ software items for ATCCS computers and peripherals for battlefield commanders; work to be completed by April 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-94-C-N853)
General Dynamics	9.0	Nov 2002 – General Dynamics Government Systems received a modification to a contract for common hardware and software items for ATCCS computers and peripherals for battlefield commanders. Work is to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command Acquisition Center, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)
General Dynamics	11.4	Jan 2003 – General Dynamics Government Systems received a modification to a contract for common hardware and software items for ATCCS computers and peripherals for battlefield commanders. Work is to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)
General Dynamics	9.8	Feb 2003 – General Dynamics Government Systems received a modification to a contract for common hardware and software items for ATCCS computers and peripherals for battlefield commanders. Work is to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)
General Dynamics	14.6	Apr 2003 – General Dynamics Government Systems received a modification to a contract for common hardware/software items for ATCCS computers and peripherals for battlefield commanders. Work is expected to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)
General Dynamics	10.7	Apr 2003 – General Dynamics Government Systems received a modification to a contract for common hardware/software items for ATCCS computers and peripherals for battlefield commanders. Work is expected to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)
General Dynamics	5.3	May 2003 – General Dynamics Government Systems received a modification to a contract for Common Hardware/Software items for the ATCCS computers and peripherals for battlefield commanders. Work is expected to be completed by April 10, 2005. The U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, is the contracting agency. (DAAB07-02-C-E801)

Timetable

Year	Major Development
FY 1976	Genesis of ATCCS concept
FY 1988	Miltope awarded preliminary ATCCS hardware/software contract
FY 1994	ATCCS System Confidence demonstration
FY 1996	Client server technology integrated with ATCCS

Year	Major Development
FY 1999	Project 323 explores technology insertion in support of ABCS programs
FY 2000	Project 334 conducts system configuration development/operational demonstrations
FY 2001	Project 323 supports customers testing efforts with CHS equipment
FY 2002	Project 334 continues administering the CS technology and reuse program
FY 2003	Project 323 continues ABCS system engineering and integration efforts
FY 2004	Project 334 to continue developing, upgrading, and integrating DII COE products into U.S. Army and Joint Services systems
FY 2005	Project 323 to continue CHS technology insertion work

Worldwide Distribution

The Army Tactical Command and Control System (ATCCS) is a **United States Army** program.

Forecast Rationale

The Army Tactical Command and Control System (ATCCS) program develops automation technology for the conduct of U.S. Army combat operations. As indicated by the **Ten-Year Outlook** chart, Forecast International projects that the U.S. Army will spend some US$346.29 million over the next decade on researching and developing ATCCS hardware and software. This funding is being driven by the U.S. Army's desire to enhance its tactical combat capabilities.

The Army Tactical Command and Control System is the U.S. Army umbrella program to exploit automation technology for the conduct of combat operations. The common hardware and software projects funded under the ATCCS program develop common products to meet customers' developmental and fielding needs. With automation technology being a key component of "battlefield digitization," Forecast International expects funding for the hardware and software elements of the ATCCS program to be robust over the next 10 years.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR FUNDING ($ in millions)

			High Confidence Level				Good Confidence Level				Speculative			
Designation	System	Thru 03	04	05	06	07	08	09	10	11	12	13	Total 04-13
ATCCS	HARDWARE (U.S. ARMY)	177.11	6.52	6.41	6.58	6.85	7.15	7.43	7.67	7.93	8.19	8.45	73.18
ATCCS	SOFTWARE (U.S. ARMY)	156.25	25.80	28.41	30.59	26.36	22.08	24.58	27.66	28.44	29.21	29.98	273.11
Total Funding		333.36	32.32	34.82	37.17	33.21	29.23	32.01	35.33	36.37	37.40	38.43	346.29