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October 2010

INFORMATION TECHNOLOGY

Opportunities Exist to Improve Management of DOD's Electronic Health Record Initiative

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Opportunities Exist to Improve Management of DOD's Electronic Health Record Initiative

Why GAO Did This Study

The Department of Defense (DOD) provides medical care to 9.6 million active duty service members, their families, and other eligible beneficiaries worldwide. DOD's Military Health System has long been engaged in efforts to acquire and deploy an electronic health record system. The latest version of this initiative—the Armed Forces Health Longitudinal Technology Application (AHLTA)—was expected to give health care providers real-time access to individual and military population health information and facilitate clinical support. However, the system's early performance was problematic, and DOD recently stated that it intended to acquire a new electronic health record system. GAO was asked to (1) determine the status of AHLTA, (2) determine DOD's plans for acquiring its new system, and (3) evaluate DOD's acquisition management of the initiative. To do this, GAO reviewed program plans, reports, and other documentation and interviewed DOD officials.

What GAO Recommends

GAO is recommending that DOD take six actions to help ensure that it has disciplined and effective processes in place to manage the acquisition of further electronic health record system capabilities. In written comments on a draft of this report, DOD concurred with GAO's recommendations and described actions planned to address them.

What GAO Found

After obligating approximately $2 billion over the 13-year life of its initiative to acquire an electronic health record system, as of September 2010, DOD had delivered various capabilities for outpatient care and dental care documentation. DOD had scaled back other capabilities it had originally planned to deliver, such as replacement of legacy systems and inpatient care management. In addition, users continued to experience significant problems with the performance (speed, usability, and availability) of the portions of the system that have been deployed. DOD has initiated efforts to improve system performance and enhance functionality and plans to continue its efforts to stabilize the AHLTA system through 2015, as a "bridge" to the new electronic health record system it intends to acquire.

According to DOD, the planned new electronic health record system—known as the EHR Way Ahead—is to be a comprehensive, real-time health record for service members and their families and beneficiaries. The system is expected to address performance problems, provide unaddressed capabilities such as comprehensive medical documentation, capture and share medical data electronically within DOD, and improve existing information sharing with the Department of Veterans Affairs. As of September 2010, the department had established a planning office, and this office had begun an analysis of alternatives for meeting the new system requirements. Completion of this analysis is currently scheduled for December 2010. Following its completion, DOD expects to select a technical solution for the system and release a delivery schedule. DOD's fiscal year 2011 budget request included $302 million for the EHR Way Ahead initiative.

Weaknesses in key acquisition management and planning processes contributed to AHLTA having fewer capabilities than originally expected, experiencing persistent performance problems, and not fully meeting the needs of users.

- A comprehensive project management plan was not established to guide the department's execution of the system acquisition.

- A tailored systems engineering plan did not exist to guide the technical development of the system, an effort that was characterized by significant complexity.

- Requirements were incomplete and did not sufficiently reflect user and operational needs.

- An effective plan was not used to improve users' satisfaction with the system.

DOD has initiated efforts to bring its processes into alignment with industry best practices. However, it has not carried out a planned independent evaluation to ensure it has made these improvements. Until it ensures that these weaknesses are addressed, DOD risks undermining the success of further efforts to acquire electronic health record system capabilities.

_____ **United States Government Accountability Office**

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Abbreviations

AHLTA	Armed Forces Health Longitudinal Technology Application
CHCS	Composite Health Care System
CIO	chief information officer
CITPO	Clinical Information Technology Program Office
CMMI	Capability Maturity Model Integration
DHIMS	Defense Health Information Management System
DOD	Department of Defense
EHR	Electronic Health Record
IEEE	Institute of Electrical and Electronics Engineers
MHS	Military Health System
SEI	Software Engineering Institute

United States Government Accountability Office
Washington, DC 20548

October 6, 2010

The Honorable Judd Gregg
Ranking Member
Committee on the Budget
United States Senate

Dear Senator Gregg:

This report responds to your request that we examine the Department of Defense's (DOD) efforts to implement its military electronic health record system known as the Armed Forces Health Longitudinal Technology Application (AHLTA). When fully deployed, AHLTA was envisioned to provide the department with a modernized health information system that would generate and maintain a comprehensive, lifelong, computer-based patient record for every soldier, sailor, airman, and marine; their family members; and others entitled to DOD military health care. The electronic health record was expected to give health care providers real-time access to individual and military population health care information, thus facilitating clinical decision support and rationale for care rendered to U.S. service members worldwide. However, after more than a decade of effort to deliver this system, the department has recently begun planning for a new electronic health record system.

At your request, we conducted a study of DOD's efforts to acquire and implement its electronic health record system. Specifically, our objectives were to (1) determine DOD's status in implementing AHLTA, (2) determine the department's plans for acquiring a new system, and (3) evaluate the department's acquisition management for its electronic health record system.

To accomplish the objectives, we reviewed relevant program documentation and interviewed appropriate DOD officials. Specifically, to determine the status of the AHLTA project, we reviewed project plans and status reports. To determine the department's plans for acquiring a new electronic health record system, we reviewed relevant planning documents, including an initial capabilities document. To evaluate the department's management of its electronic health record acquisition, we compared the department's activities for project management planning, systems engineering management, requirements development and management, user satisfaction feedback, and acquisition management with DOD guidelines and industry best practices.

We conducted this performance audit from September 2009 to October 2010 at DOD offices in Falls Church, Virginia, and Bethesda, Maryland, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. A more complete description of our objectives, scope, and methodology is provided in appendix I.

Background

DOD operates a worldwide health care program, through which it provides medical care and assistance to 9.6 million active duty service members, their families, and other eligible beneficiaries. Its health care operations are significant, involving approximately 135,000 personnel in approximately 700 Army, Navy, and Air Force medical facilities in 12 domestic regions, as well as European, Pacific, and Latin American regions. The department's fiscal year 2010 budget for providing health care services was about $49 billion.

DOD's health care program is a responsibility of the Office of the Undersecretary of Defense for Personnel and Readiness. Within the Office of the Undersecretary is the Office of the Assistant Secretary of Defense for Health Affairs, which is responsible for the department's Military Health System (MHS) program.

MHS has two missions: wartime readiness (maintaining the health of service members and treating wartime casualties) and peacetime care (providing for the health care needs of the families of active-duty members, retirees and their families, and survivors). The Assistant Secretary of Defense for Health Affairs establishes policy regarding health care for all DOD beneficiaries and also plans and budgets for health care operations and maintenance. At the same time, each military service has its own medical department that operates medical facilities (referred to as military treatment facilities) and recruits and funds military medical personnel. Currently, the military treatment facilities include 59 military hospitals and 650 medical and dental clinics. DOD provides about half of MHS services through these military facilities, supplementing this by contracting for health services with civilian contract providers. Active-duty members are required to obtain care at military treatment facilities if such care is available; in contrast, retirees and dependents may obtain care at either military facilities or through civilian contract providers.

History of DOD's Electronic Health Record System

To facilitate the delivery of medical services, in 1988, DOD initiated the acquisition of an electronic health record system to support all of its hospitals and clinics. This system, the Composite Health Care System (CHCS), was intended to be the primary medical information system deployed worldwide to support the department's hospitals and clinics. DOD envisioned that it would provide automated support for patient administrative functions (such as registrations, admission, and disposition); ordering and retrieving results of laboratory and radiology procedures; ordering and recording prescriptions; and patient appointment scheduling.

CHCS was deployed in 1993; however, it was supported by numerous stand-alone medical information systems, such as the department's Ambulatory Data System, Preventive Health Care Application, and Nutrition Management Information System,[1] and was not designed to facilitate the exchange of information from one system or military treatment facility to the next. Specifically, CHCS was facility-centric, in which each facility stored only its own medical information for patients using different data standards. Therefore, if a medical provider wanted to obtain complete information about a patient, a query would have to be made to each of the CHCS locations—a time- and resource-intensive activity. Additionally, when a patient moved to another region, the electronic records did not transfer across the CHCS locations because of the different data standards at each location. The lack of an integrated system perpetuated the reliance on paper-based records, leading DOD to pursue a comprehensive electronic health care record.

To this end, in 1997, the department initiated the CHCS II program to address the need for a comprehensive, lifelong, computer-based health care record for every service member and their beneficiaries. The vision for CHCS II was to provide access to a patient's health care information with a single query by providers in military treatment facilities. Specifically, with this system, DOD planned to provide worldwide access to outpatient, inpatient, dental, and vision records, and to make them available 24 hours a day, 7 days a week. This new system was to be accomplished with the use of a centralized repository of all health care

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[1]Each of these systems provided certain patient-related information. For example, the Ambulatory Data System captured certain outpatient information relating to diagnosis and treatment; the Preventive Health Care Application contained information on preventive health services; and the Nutrition Management Information System supported therapeutic nutrition therapy and medical food management.

information derived using common data standards. The system was to build on capabilities of existing systems, subsuming their functionality over time, while adding new functionality to meet mission needs.

CHCS II's architecture was to be an open system, client-server design of three levels: the user (client) workstation at various DOD locations, the DOD computers' (servers') operating system and storage hardware and software, and a clinical data repository at a remote computing center where the information would be stored.[2] The department had planned to connect all workstations at an installation's hospital or clinic to the servers through the installation's local or wide area network. It had planned to divide the system acquisition into seven software releases to be delivered incrementally by June 2006 at an estimated cost of $4.3 billion (in 1998 dollars).

The department's original plan had called for deploying a prototype system in October 1998 and beginning deployment of the initial version in about April 1999. However, the department did not meet its schedule to deliver initial CHCS II system capabilities and associated mission benefits by April 1999; it reported that the initial deployment was delayed by 6 months because of a failure to meet initial performance requirements and changes in system requirements.

In July 2000, the department redefined its plans for the system to include adopting a new technical architecture, establishing a means for controlling changes to requirements, and committing to the incremental release of system capabilities. It also delayed the decision date for deploying the initial system capabilities (for outpatient documentation) to January 2001—21 months later than its original commitment for the system.

However, the department did not meet this commitment, and subsequently established a new plan that called for incrementally deploying functionality to achieve the system's full operational capability. Delivery of the system was to commence in July 2003 and was to be completed by September 2007, yielding four blocks of capabilities that would incrementally populate the system's electronic health record at a revised estimated life-cycle cost of $3.8 billion through 2017.

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[2]Open systems conform to industry standards so that commercial products can easily be used and support costs can be minimized. A client is usually a desktop computing device or program that is "served" by one or more networked computing devices.

- Block 1 was to make outpatient information available worldwide on a continuous basis through the electronic health record system (as opposed to CHCS legacy functionality which only made records available at a single location), provide encounter documentation, aid in order entry/results retrieval, assist in encounter coding support, provide alerts and reminders (such as drug interaction alerts and special duty status), facilitate role-based security, and establish a health data dictionary and a master patient index.

- Block 2 was to provide automated clinical practice guidelines, optometric documentation, and dental documentation.

- Block 3 was to replace CHCS ancillary functionality for results retrieval and order entry for outpatient encounters such as laboratory and automatic pathology, pharmacy, and radiology.

- Block 4 was to provide for inpatient order entry and management, including inpatient clinical and critical care documentation.

  When delivered, the system was to allow users to create and store computer-based patient records using workstation- and computer-based software packages. Each facility's workstations and servers were to be connected via each installation's local or wide area networks. Further, each installation was to be connected through a wide area network to a defense computing center where the patient records would be stored in a database known as the clinical data repository. DOD intended that medical providers would ultimately be able to access a patient's computer-based record from any military treatment facility, no matter where the patient was being or had been treated.

  According to program documentation, the department began worldwide deployment of Block 1 in January 2004. It completed the deployment of this block in December 2006. However, program officials stated that users experienced numerous performance problems with the capabilities that were delivered, which impacted its usability, speed, and availability. Specifically, the department reported experiencing the following problems with the delivery of Block 1:

- **Usability.** The system did not support varied clinical workflow to meet the needs of various types of practitioners, had missing or incomplete clinical capabilities (e.g., consult and referrals management, ancillaries, specialty workflow support), did not support fully unified or user-customizable patient data, and did not have a user-friendly interface.

- **Speed.** The system did not have the speed or performance to efficiently support the clinicians' workflow in certain environments and was affected by problems such as coding and infrastructure which impacted its speed.

- **Availability.** The system was not reliable on a 24-hour-a-day, 7-day-a-week basis; it had no backup for disaster recovery; and the data repository experienced system shutdowns and functional interruptions.

As a result of the system problems associated with Block 1, DOD set a new date for system completion—September 2011—and increased the projected life-cycle cost of the system to approximately $5 billion, which it attributed primarily to the need for increased operations and maintenance for Block 1.

The department also took a number of other steps with regard to the initiative. Specifically, in May 2005, it terminated plans for deploying the Block 4 inpatient functionality with the intent of moving this functionality into Block 3.[3] However, due to continuing performance problems with the functionality that had been delivered, and because the Block 3 deployment had exceeded the department's 5-year limit for achieving initial operational capability by January 2008, DOD terminated Block 3 (laboratory, radiology, and pharmacy) as well. This action left only one of the four planned blocks—Block 2—for implementation. Although the department reduced the scope of the initiative to only two blocks, the estimated life-cycle costs were revised back to the original $3.8 billion (through 2021). However, the department encountered performance problems with the Block 2 dental module as well and, in December 2009, MHS senior leadership implemented a strategic pause in its further deployment.

Beyond these actions, the department took other steps over the course of the initiative. Specifically, in November 2005, the Assistant Secretary of Defense for Health Affairs announced a change in the name of the system from CHCS II to AHLTA, but did not give a specific reason for doing so. Further, as part of its attempt to improve the system, DOD awarded several contracts between fiscal year 2006 and fiscal year 2009 for a total

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[3]Military hospitals currently use Essentris, a commercial-off-the-shelf product, to document inpatient encounters that were originally planned for Block 4. As of March 2010, inpatient functionality was deployed at 29 sites, representing 62 percent of the Military Health System's inpatient beds.

of approximately $40 million to address performance problems and implement software enhancements. The contractors began deployment of these software enhancements (which DOD referred to as AHLTA 3.3) in December 2008.

DOD's Acquisition Process for Its Electronic Health Record

To acquire its electronic health record system, DOD used several contractors and types of contracts.[4] These included fixed-price, time-and-materials, and cost-plus-fixed-fee contracts, each of which involved a different level of cost or performance risk for the government.[5] The prime developer and lead integrator for CHCS II, Integic (acquired by Northrop Grumman in 2005), was awarded a time-and-materials contract for about $65.4 million in 1997 and was tasked to perform systems engineering, requirements analysis, architecture evaluation, software design and development, engineering and development testing, test and evaluation, maintenance, site installation and implementation, and training. Contracts for system development and integration continued through fiscal year 2009.

DOD also used noncompetitive contracts[6] for the development of the system. According to the program office, 11 noncompetitive contracts and task or delivery orders, totaling approximately $44.6 million,[7] were awarded for the system from fiscal year 2004 through fiscal year 2012. Program officials stated that the noncompetitive contracts were awarded on the basis that (1) DOD's need for the supplies or service was so urgent that providing each awardee under a multiple award contact a fair

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[4]We have identified DOD contracting in our high-risk list since 1992, and DOD business systems modernization as high risk since 1995; however, we did not explicitly identify DOD's health care information technology procurement processes as high-risk areas. See GAO, *High-Risk Series: An Update*, GAO-09-271 (Washington, D.C.: Jan. 22, 2009).

[5]A fixed-price contract provides for a firm price or, in appropriate cases, a ceiling or adjustable price. A time-and-materials contract provides for acquiring supplies or services on the basis of direct labor hours at specified fixed hourly rates that include wages, overhead, general and administrative expenses, and profit and actual cost of materials. A cost-reimbursement contract provides for payment of allowable incurred costs, to the extent prescribed in the contract.

[6]The Federal Acquisition Regulation allows for contracts awarded without full and open competition under certain circumstances and requires written justification that addresses these circumstances.

[7]The noncompetitive contracts' costs are about 2 percent of obligations of approximately $2 billion.

opportunity would have resulted in unacceptable delays; (2) only one awardee was capable of providing the supplies or services required at the level of quality required because the supplies or services ordered were unique or highly specialized; or (3) an order was a logical follow-on to an order already issued under the contract.[8]

According to AHLTA program documentation, the system acquisition was guided by the defense acquisition system, which is documented in the department's DOD 5000.02 Instructions. The defense acquisition system consists of five key program life-cycle phases and three related milestone decision points that major acquisitions must meet in order to proceed to the next phase of the acquisition.[9] At each milestone point, the program is reviewed by a milestone decision authority to determine whether it can move to the next life-cycle phase.

The five phases of the defense acquisition are as follows:

1. **Materiel solution analysis:** The purpose of this phase is to assess, through an analysis of alternatives, potential solutions to satisfy an approved capability need.

2. **Technology development:** The purpose of this phase is to determine and mature the appropriate set of technologies to be integrated into the investment solution by iteratively assessing the viability of the various technologies while simultaneously refining user requirements. To enter this phase, a program must have an approved analysis of alternatives and pass milestone A. To exit this phase, the acquisition must demonstrate affordable technology.

3. **Engineering and manufacturing development:** The purpose of this phase is to develop a system or an increment of capability, and demonstrate integrated system design through developer testing to show that the system can function in its target environment. To enter this phase, a program must have approved requirements and pass milestone B. To exit this phase, the acquisition must meet performance requirements in the intended environment.

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[8]Federal Acquisition Regulation, Part 16.505 (b) (2) i-iii.

[9]The defense acquisition system is a framework-based approach that is intended to translate mission needs and requirements into stable, affordable, and well-managed acquisition programs.

4. **Production and deployment:** The purpose of this phase is to achieve an operational capability that satisfies the mission needs, as verified through independent operational test and evaluation, and to implement the system at all applicable locations. To enter this phase, a program must have completed development testing and pass milestone C. To exit this phase, the system must be deployed and ready to operate for all users.

5. **Operations and support:** The purpose of this phase is to operationally sustain the system in the most cost-effective manner over its life cycle. DOD criteria do not require that the milestone decision authority conduct milestone reviews during the period after a system has been deployed and stabilized.

For the purpose of conducting milestone reviews, AHLTA was assigned the highest level of oversight for DOD information system acquisitions.[10] As such, oversight was provided within the Office of the Secretary of Defense.

Management Structure for AHLTA

Various DOD units were involved in acquiring and deploying AHLTA. As the principal advisor to the Assistant Secretary of Defense for Health Affairs and to the DOD medical leaders on all matters related to information management and information technology, the MHS chief information officer (CIO) has primary responsibility for overseeing the acquisition, development, testing, and deployment of AHLTA to the military treatment facilities. Key offices within the Office of the MHS CIO perform critical information management and information technology functions to support AHLTA, including the Joint Medical Information Systems Office, which is responsible for the testing, implementation, training, fielding of system components, operations, maintenance, and ultimate disposal of system components.

Also within MHS, the Composite Health Care System (CHCS) II Program Office was established in January 1997 to provide direct management of the project; it had operational responsibility for the acquisition and deployment of the electronic health record, as well as the migration of the

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[10]AHLTA is assigned acquisition category IAM, which is the highest information system acquisition category for IT Systems and is assigned to acquisitions with at least $126 million in fiscal year 2000 constant dollars in development and deployment costs or at least $378 million in fiscal year 2000 constant dollars for all system costs.

numerous standalone clinical information systems. In fiscal year 2000, the CHCS II program office was renamed the Clinical Information Technology Program Office (CITPO). In 2008, with the merger of CITPO and the MHS Theater Medical Information Program Office—Joint, the office is now called the Defense Health Information Management System (DHIMS).

To provide oversight in accordance with DOD's defense acquisition system, the Assistant Secretary of Defense for Networks and Information Integration, within the Office of the Secretary of Defense, was designated the milestone decision authority responsible for deciding at each acquisition cycle milestone whether the project could proceed to the next milestone. The project also received oversight from several other bodies, including the Human Resources Management Investment Review Board, headed by the MHS CIO, and the Overarching Integrated Project Team, which evaluated project performance in accordance with DOD 5000 and approved acquisition program baselines and acquisition decision memorandums.

Table 1 summarizes the assignment of responsibilities for AHLTA among the various DOD units.

Table 1: Organizations Responsible for Managing and Providing Oversight of AHLTA

Organization	Description
Management organizations	
Office of the Assistant Secretary for Health Affairs	Responsible for the department's military health system program. Establishes policy regarding health care operations and maintenance. Several units within this office, including MHS, are involved in acquiring and deploying AHLTA.
MHS CIO	Oversees the MHS information management and technology program.
Joint Requirements Oversight Council	Approves mission need and operational requirements for automated information systems with joint (i.e., multiservice) interest.
Joint Medical Information Systems Office—Deputy CIO	Supports health care operations through design, development, test, evaluation, and deployment of medical information systems. The Program Executive Office is responsible for each of the program management offices that oversee this activity.

Organization	Description
Defense Health Information Management System Program Office	Manages the acquisition, development, deployment, and maintenance of AHLTA and other related systems. The program office reports to the Joint Medical Information Systems Deputy CIO. Within the program office, the project officer is responsible for ensuring successful planning, technical development, and acquisition of specific information applications and elements of AHLTA. The office was established in June 2008 with the merger of CITPO—the original CHCS II program office—and the Theater Medical Information Program (the office responsible for acquiring the theater portion of the electronic health record).
Oversight organizations	
Office of the Assistant Secretary of Defense, Networks and Information Integration	Acts as the milestone decision authority that authorizes AHLTA's readiness to move into each phase of the acquisition life cycle, based on successful completion of the criteria for the preceding phase. Conducts milestone reviews and prepares decision memorandums.
Human Resources Management Investment Review Board	This board is responsible for annual certification to ensure AHLTA meets specified requirements and should be approved for funding.
AHLTA Overarching Integrated Product Team	Reviews program planning in support of the milestone decision authority, including oversight, review, and evaluation of project execution performance relative to DOD guidance.

Source: GAO analysis of DOD data.

Previous Reviews of DOD's Electronic Health Record Initiatives Highlighted Management Deficiencies and Risks

DOD's Inspector General and we have previously reported on the department's actions toward acquiring its new health care information system and have noted the need for improvement in key management areas, such as project management, contract management, and risk management.

In reporting on the department's efforts in January l999,[11] the Inspector General noted that the project management system for the acquisition (called CHCS II at the time of the report) was not complete. While finding that DOD had taken positive actions to manage the acquisition, the report noted that the department had not established a project management control system to evaluate and measure the program's performance. In addition, the report stated that the program's funding visibility was limited because DOD was combining funding for sustaining the system with modernization funding for CHCS and other clinical business area automated systems. The Inspector General made recommendations

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[11]DOD Office of the Inspector General, *Acquisition Management of the Composite Health Care II Automated Information System*, report number 99-068 (January 21, 1999).

related to designing and implementing a project management control system, the reporting of funding for the system, and providing milestone exit criteria that demonstrated the level of performance, accomplishments, and progression.

Further, in May 2006,[12] the Inspector General conducted an evaluation of the project's program requirements, the related acquisition strategy, and system testing to determine whether the system was being implemented to meet cost, schedule, and performance requirements. While the report found that the program management office was using risk mitigation techniques, such as risk management, lessons learned, and performance monitoring, the program remained at high risk because of the complexities of integrating commercial, off-the-shelf software into the existing program. In particular, the report noted that the program office had not identified any mitigation strategies to reduce and control program risk related to integration of commercial, off-the-shelf software for the third block of functionality. As a result, the Inspector General concluded that the program was vulnerable to continued increases in cost, extended schedules for implementation, and unrealized goals in performance from underestimating the difficulties of integrating commercial, off-the-shelf products. Subsequently, the program office developed mitigation strategies, but the Inspector General reported that they were inadequate and did not follow risk management guidance, including identifying significant activities and milestones. Accordingly, the Inspector General recommended that the program office develop more robust mitigation strategies in accordance with the program office's risk management plan.

We have also reported on DOD's management of the system acquisition, noting the need for improvements. For example, in 2002, we reported that, because the department had not estimated the cost of delivering the initial system capabilities, it had lacked a cost commitment against which to measure progress.[13] In addition, we noted that program benefits were in question since measurements had not yet begun and that costs were about two-and-a-half times the l998 estimate. Further, DOD had initially identified a single economic justification for the entire project, which had

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[12]DOD Office of the Inspector General, *Information Technology Management: Acquisition of the Armed Forces Health Longitudinal Technology Application*, report number D-2006-089 (May 18, 2006).

[13]GAO, *Information Technology: Greater Use of Best Practices Can Reduce Risks in Acquiring Defense Health Care System*, GAO-02-345 (Washington, D.C.: Sept. 26, 2002).

been used as the basis for its system releases, and had not treated the releases as separate investment decisions. Finally, DOD had not followed performance-based contracting practices, resulting in the risk that the system would take longer to acquire and cost more than necessary.

Accordingly, we recommended that DOD expand its use of best practices in managing the system by (1) modifying the project's investment strategy to justify investment in each system release before beginning development and measuring return on investment and (2) employing performance-based contracting practices where possible on all future delivery orders. The department agreed with these recommendations and took actions to update and validate its life-cycle cost estimate in September 2002. This was used by the department to approve the deployment of the system release. Also, the department employed performance-based contracting practices, such as using performance standards, quality assurance plans, and contractor incentives on CHCS II delivery orders.

AHLTA Has Limited Capabilities and Continues to Experience Performance Problems

Despite having obligated approximately $2 billion over the 13-year life of its initiatives to acquire and operate an electronic health record system, as of September 2010, DOD continued to experience performance problems with the one block of AHLTA functionality (Block 1) that it had fully deployed and with a second block of functionality (Block 2) that it had partially deployed. Further, after having terminated its plans for deploying the two other blocks of functionality (Block 3 and Block 4) that were intended to be part of the system, the department has identified April 2011 as the date by which it now expects to achieve full operational capability of the scaled-backed AHLTA system. Program officials told us they are taking steps to stabilize the existing system capabilities through 2015, as the department proceeds with plans to pursue yet another new electronic health record system.

In deploying Block 1, the department reported that it achieved all of the planned outpatient capabilities for direct patient care, including encounter documentation, order entry and results retrieval, encounter coding support, consult tracking, and alerts and reminders. According to the department, it deployed the AHLTA outpatient documentation capability worldwide, providing 77,000 clinicians with the ability to document over 148,000 outpatient encounters daily. The department stated that medical providers can access the patient's computer-based record from any military treatment facility. Also, DOD currently shares a significant amount of patient information with the Department of Veterans Affairs,

including outpatient pharmacy data, laboratory results, and radiology results on shared and separated service members.

In addition, with the deployment of Block 2, including enhancements to Block 1, dental capabilities were provided to 73 of 375 dental treatment facilities, allowing graphical dental charting, order and entry results retrieval, and automated dental readiness classification. In this regard, the capabilities were deployed to 46 Air Force dental medical facilities, 25 Navy facilities, and 2 Army facilities. Further, program officials stated that in October 2009, because of technical and functionality upgrades made over time to the legacy Spectacle Request Transmission System, funding was ceased for optometric capabilities for Block 2. The department stated that it plans to achieve full operational capabilities by April 2011. Table 2 shows the capabilities planned and delivered for Blocks 1 and 2.

Table 2: Capabilities Planned and Delivered for Blocks 1 and 2

Capability	Status
Block 1 (outpatient care)	
Encounter documentation	Met
Order entry and results retrieval	Met
Encounter coding support	Met
Consult tracking	Met
Alerts and reminders	Met
Health data dictionary	Met
Master patient index	Met
Role-based security	Met
Block 2	
Dental charting and documentation	In progress
Optometric documentation and order entry	Not Met

Source: GAO analysis of DOD data.

Nonetheless, program officials, as well as users of the system, acknowledged that problems with the system's performance have persisted. During a demonstration of the system's operation in April 2010, medical providers discussed problems with AHLTA, including limitations in its availability and usability. For example, the providers participating in the demonstration stated that it is time-consuming to document encounters using AHLTA because of the time required to enter information and navigate through the application screens. Thus, they sometimes must document portions of an outpatient encounter after the

patient leaves. In their experience, using the system at the time of the encounter would take attention away from the patient for unacceptable periods of time. Also, they stated that when system downtime occurs, providers can neither access patient data nor electronically document care; in these instances, medical notes are recorded manually and later entered in the system after it returns to operation—an inefficient process.

As noted in the earlier discussion, since fiscal year 2006 the department has been taking steps to address performance problems and enhance existing system capabilities.[14] DOD is proceeding with what it refers to as a "stabilization effort" to continue making improvements to the system and provide ongoing capabilities until a new system is acquired. According to DOD officials, the estimated cost of this effort for fiscal year 2010 through fiscal year 2015 is $826.3 million. The stabilization effort is expected to improve the speed, availability, and usability of the system; moreover, according to officials in the Office of the Deputy Secretary of Defense, the stabilization effort is expected to allow the department to meet its near-term needs and implement additional enhancements to support its future system.

DOD Has Initiated Planning Activities for the EHR Way Ahead

Because AHLTA has consistently experienced performance problems and has not delivered the full operational capabilities intended, DOD has initiated plans to develop a new electronic health record system. This new initiative is called the Electronic Health Record (EHR) Way Ahead. As with AHLTA, department officials stated that the new electronic health record system is expected to be a comprehensive, real-time health record for active and retired service members, their families, and other eligible beneficiaries. They added that the new system is being planned to address the capability gaps and performance problems of previous iterations, and to improve existing information sharing between DOD and the Department of Veterans Affairs and expand information sharing to include private sector providers.

Thus far, the department has taken several steps to launch its acquisition of the new system. Specifically, in February 2010 it established the EHR Way Ahead Planning Office to identify options for the future electronic health record system. The planning office currently resides within the

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[14]This effort included the AHLTA 3.3 software release discussed above.

MHS Joint Medical Information Systems Program Executive Office under the Office of the CIO.

In May 2010, the department approved plans to assess solutions for the new electronic health record system. In this regard, the planning office began conducting an analysis of alternatives to provide guidance on selecting a technical solution. According to planning officials, efforts to develop the analysis of alternatives are being supervised by the Office of the Assistant Secretary of Defense for Health Affairs, and this analysis is expected to define and evaluate reasonable alternatives for meeting the capability requirements. The analysis is currently scheduled to be completed by December 2010.

To facilitate the analysis of alternatives, planning officials stated that they had identified system capabilities needed to meet the department's medical mission. They added that a list of the "top 10" priority capabilities for a new system had been developed based on the gaps identified in prior iterations of their electronic health systems. (These priorities are summarized in table 3.)

Table 3: Top 10 Priorities for EHR Way Ahead

Priority	Capability needed to meet DOD's medical mission
1	Comprehensive medical and dental documentation, including encounter data, medications, physical examinations, occupational health (including industrial hygiene), environmental exposure information and ancillary service data (both inpatient and outpatient), documentation of care plan objectives, alternatives, patient education, health care services provided, patient disposition instructions (including deaths), and disposition of remains.
2	Global capture and exchange of all health data for beneficiaries—direct care, network, managed care, Veterans Affairs, active duty components, reserve components, etc.
3	Inpatient and outpatient order entry and management (laboratory, pharmacy, radiology, consults, health care plans, nutrition management, prescription spectacle orders).
4	Laboratory diagnostic services (includes results, retrieval and reporting); pharmacy services (includes dispensing, operations, reporting, and pharmacy data transaction service); radiology diagnostic services (includes imagery capture, results, retrieval, and reporting).
5	En-route care documentation on any transport platform.
6	Results retrieval (ancillary services and consults).
7	Data collection and decision support in austere environments starting at the point of injury and continuing through all levels of care.
8	Consult and referral management (includes referrals to the civilian health care sector).
9	Assessments of medical deployability of individual service members.
10	Patient administration (includes who the patient is, what he/she is entitled to, where he/she is located, etc.).

Source: GAO analysis of DOD data.

According to planning documents, following completion of the analysis, DOD expects to select a technical solution and to develop and release a delivery schedule.

DOD's fiscal year 2011 budget request includes $302 million for the EHR Way Ahead initiative.[15] For fiscal year 2012, the department intends to submit an updated budget request and the schedule for delivery of the EHR Way Ahead based on the results of the analysis of alternatives.

AHLTA Performance Was Hindered by Weaknesses in Key Acquisition Management and Planning Processes

The success of a large information technology project such as AHLTA is dependent on an agency possessing capabilities to effectively plan and manage acquisitions, design the associated systems, define and manage system requirements, and use effective measures to gauge user satisfaction. In the case of AHLTA, weaknesses in these key management areas contributed to DOD delivering a system that provided fewer capabilities than originally expected, experienced persistent performance problems, and ultimately, did not fully meet the needs of its intended users. Alleviating these areas of weakness will be essential to the success of further initiatives, including the AHLTA stabilization effort and the EHR Way Ahead, that the department undertakes in pursuit of its electronic health record system capabilities.

Project Plan Was Incomplete and Not Maintained

Program management principles and best practices emphasize the importance of having a project management plan in place that, among other things, establishes a complete description that ties together all program activities and evolves over time to continuously reflect the current status and desired end point of the project.[16] An effective plan is comprised of a description of the program's scope, cost, lines of responsibility and authority, management processes, and schedule. Such a plan incorporates all the critical areas of system development and is to be

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[15]In addition, DOD plans to spend $40 million on a related effort to test the exchange of electronic health records with the Department of Veterans Affairs and private health care providers and to work toward a goal announced by President Obama on April 9, 2009, that the departments would cooperate to create a joint virtual lifetime electronic health record for service members and veterans.

[16]See Institute of Electrical and Electronics Engineers (IEEE), *IEEE/EIA Guide for Information Technology*, IEEE/EIA 12207.1-1997 (April 1998) and Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration for Acquisition*, Version 1.2 (Pittsburgh, Pa, November 2007).

used as a means of determining what needs to be done, by whom, and when.

Other guidance, such as our Information Technology Investment Management framework,[17] states that effective program oversight of IT projects and systems, including those in operation and maintenance, involves maintaining approved project management plans that include expected cost and schedule milestones and measurable benefit and risk expectations.

However, officials did not follow best practices in developing a project management plan to guide the department's electronic health record system. Although the department established a project management plan, it did not include several standard components such as the project's scope, a requirements management plan, cost estimates and baseline, a schedule, and a staffing management plan. In addition, although DOD identified the plan as a keystone document for guiding the project, the plan was last revised in 2005 and was not updated during subsequent development work and the operations and maintenance phase to reflect significant changes to the program. These changes included termination and postponement of planned capabilities, and revisions to the acquisition processes used to guide the AHLTA program. As a result, a plan was not in place to effectively guide the program throughout these changes. Moreover, there is no such plan to guide current activities associated with the stabilization effort, which, as discussed previously, involves attempts to address system performance problems and enhance functionality.

According to program officials, the project management plan was last revised in 2005 before their focus shifted to addressing the system performance problems that occurred as a result of completing Block 1 deployment in December 2006. Nevertheless, significant changes occurred to the program's scope, cost, and schedule after Block 1 deployment, and the agency lacked a current and complete plan to guide activities and measure program progress. Going forward, developing and maintaining a comprehensive project plan will be an essential tool for overseeing the AHLTA stabilization effort, which is to provide crucial improvements to the system and act as a bridge over the next 5 years to the deployment of the EHR Way Ahead system. Further, having a comprehensive and current

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[17]GAO, *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity*, GAO-04-394G (Washington, D.C.: March 2004).

project plan for the EHR Way Ahead program will help to guide the project and provide oversight of the project's progress. Without a project management plan that reflects the status and goals of the project, DOD increases the risk that stakeholders will not have the insight into program status that is needed to exercise effective oversight of both the AHLTA stabilization effort and the EHR Way Ahead acquisition.

DOD Lacked a Systems Engineering Plan to Guide the Electronic Health Record System's Design

According to industry best practices,[18] systems engineering governs the total technical and managerial effort required to transform a set of user requirements and expectations into specific capabilities and, ultimately, into a system design that will meet users' needs. Systems engineering practices include developing solutions for achieving system performance requirements such as system availability, and ensuring compatibility when integrating multiple systems and their components. Further, DOD guidance states that a tailored and detailed systems engineering plan is a critical tool for guiding systems engineering practices throughout the life of an acquisition program. Having such a plan is particularly important for a system characterized by significant technical complexities.

DOD's electronic health record system design reflected numerous technical complexities, such as the need to capture, manage, and share health information across a worldwide network that must be available 24 hours a day, 7 days a week, and that is to serve a transient patient population. In addition, the system design involved a network that had to be integrated with a central patient database and multiple nonstandard hardware and software platforms, such as commercial, off-the-shelf products at over 800 military treatment facilities.

Nonetheless, although the program office recognized these types of system complexities as being part of the electronic health record system design, the office never established a tailored systems engineering plan to guide the acquisition, or to facilitate the resolution of the many performance problems that have plagued the system since its initial deployment.

In this regard, a particularly troublesome area for the department has been in deploying enhancements to the system. For example, following Block 1 deployment in 2006, the department implemented local cache servers in an

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[18]Carnegie Mellon Software Engineering Institute, *Capability Maturity Model Integration for Acquisition*, Version 1.2.

attempt to improve the system's operational availability. According to the department, the specific purpose of the local cache servers had been to mitigate the need to access patient medical information in the central data repository during system outages. However, after the servers were deployed, DOD realized that the placement of the servers within the system architecture did not resolve the problem and created a single point of failure. Rather than yield operational improvements, department officials acknowledged that these actions resulted in additional challenges, including the need for a costly local cache server redesign, which was begun in fiscal year 2009. Program documentation noted that the local cache server effort was probably one of the most difficult engineering challenges that the program office had faced so far. Further, as various issues were faced, it became increasingly clear that detailed planning in the earlier stages was not what it could have been. In April 2010, clinicians demonstrating the system at the Bethesda Naval Medical Center stated that the servers continued to be a major contributing factor to system availability issues.[19]

The lack of a systems engineering plan to guide the program office through this type of complexity is particularly notable in light of the DOD Inspector General's report of 2006, which stated that inadequate planning for technical complexities significantly impacts the cost, schedule, and performance of a program. The report further stated that the AHLTA program office had underestimated the technical complexity of integrating products with the electronic health record system and, as a result, remained at high risk for continued cost increases, schedule overruns, and unrealized performance goals.

In discussing this matter, agency officials stated that a tailored systems engineering plan had not been developed to guide the design of AHLTA because such a plan was not required when the system was originally

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[19]According to DOD, the desirable target for AHLTA system availability is 100 percent, meaning that the system is available to users whenever it is needed, and the performance threshold is 99 percent, meaning that if availability falls below 99 percent, performance is considered to be unacceptable. Further, a system performance report for the time period October 2008 to February 2010 did not show any months with availability at the desired level of 100 percent, and only 1 month when it was available at the acceptable level between 99 and 100 percent, and then only at the Army and Navy facilities. The Air Force experienced the lowest levels of availability, with 7 months that were between 93 and 97 percent availability. The report showed that system downtime included some system maintenance, but the primary cause of downtime was implementation of improvements to address performance problems.

planned. Specifically, the officials stated that, it was not until February 2004 that DOD issued a policy requiring that a systems engineering plan be in place for acquisition programs' milestone reviews; but all milestone reviews for AHLTA had been completed prior to this time.

However, current DOD guidance emphasizes the need for a tailored systems engineering plan to guide all systems engineering practices, including those that occur after the completion of milestone reviews. Without a tailored systems engineering plan to guide the program's efforts to address long-standing system performance problems as part of the AHLTA stabilization efforts, the department may continue to be challenged in achieving the desired results. Further, in planning for the acquisition of the new EHR Way Ahead system, it will be essential that the department establish early in the process and have in place a detailed and tailored plan to avoid encountering technical challenges similar to those of the AHLTA program, and thus again failing to meet users' needs.

Weaknesses in DOD's Requirements Processes Impacted AHLTA's Usability

According to recognized guidance,[20] using disciplined processes for developing and managing requirements can help reduce the risks of developing a system that does not meet user and operational needs. Requirements should serve as the basis for establishing agreement between users and developers and a shared understanding of the system to be developed. Effective requirements development practices include, among other things, involving users in identifying requirements throughout the project's life cycle to ensure system requirements are complete and accurately reflect their needs. Effective requirements management practices include maintaining bidirectional traceability of requirements to ensure that system-level requirements can be traced both backward to high-level operational requirements, and forward to low-level system design specifications.

For the AHLTA acquisition, program documentation revealed that users were not adequately involved throughout the requirements development process. According to the documentation, users did not seek involvement in the requirements development process and system developers did not seek user input when making changes to requirements. As a result,

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[20]See Federal Acquisition Regulation 39.102 and Carnegie Mellon, *Software Engineering Institute*, *Capability Maturity Model-Integration for Development*, Version 1.2 (Pittsburgh, Pa., August 2006) and *Software Acquisition Capability Maturity Model*, Version 1.03, CMU/SEI-2002-TR-010 (Pittsburgh, Pa., March 2002).

requirements were neither complete nor sufficiently detailed to guide system development, and did not adequately provide a shared understanding between the users and developers of how the system was to be developed. Program documentation noted that requirements often were not adequately specified and did not adequately reflect user needs. In particular, the program documentation revealed that, while users were involved in developing an initial set of requirements used to make system acquisition decisions, they were largely not involved in identifying new requirements and making changes to existing ones while the system was being developed and deployed.

In certain instances, because users were involved only at the beginning and end of the requirements development process, they were only able to determine that capabilities would not meet their needs after those capabilities had already been deployed. For example, when the dental application was in the process of being deployed to Army, Navy, and Air Force sites, the MHS senior leadership voted to halt further training and implementation because users reported that the capabilities were not complete and did not address their needs. Consequently, alternate dental solutions will be explored as part of the analysis of alternatives for the EHR Way Ahead, resulting in additional costs and delays in deploying dental capabilities that will meet users' requirements.

Since the initial deployment, the department has taken steps to increase user involvement in defining requirements. For example, to better involve users in the requirements process and identify issues with system usability, the program office held conferences in 2006 at which users identified over 200 new requirements for inclusion in the system. Program officials stated that the requirements identified during the conference were used to develop the AHLTA 3.3 software release. However, our evaluation of the requirements traceability matrix used to develop the AHLTA 3.3 release showed that bidirectional traceability had not been fully established; thus, the requirements were not always linked to high-level operational requirements or to more detailed design specifications. Without adequate traceability, the department cannot ensure that all agreed-upon requirements will be developed, fully tested, and work as intended.

In addition, the department has plans for making improvements in the requirements management process in its MHS Information Management/Information Technology Strategic Plan 2010–2015 and includes a goal to improve the requirements management process to enable greater participation of system users. According to the plan, this

will improve the value, quality, timeliness, and stakeholder ownership of the resulting system. However, because the department is in the early stages of implementing improvements for greater user participation, it is too early to determine their effectiveness.

As the department proceeds with the AHLTA stabilization effort and the new EHR Way Ahead system, ensuring that user needs are met will be essential to effective and cost-efficient delivery of system capabilities. Until the department ensures that a requirements development process with adequate user involvement is in place, it will continue to lack a vital tool for ensuring the efficient and effective delivery of electronic health record system capabilities that will meet the needs of its users.

Efforts to Improve User Satisfaction Were Not Guided by Effective Planning

DOD has stated that the success of AHLTA can be gauged by improvements in user satisfaction and user acceptance, among other things. In this regard, effectively managing program improvement activities to improve user satisfaction requires planning and executing such activities in a disciplined fashion. The Software Engineering Institute's IDEAL[SM][21] model is a recognized approach for managing efforts to make system improvements. According to this model, user satisfaction improvement efforts should include a written plan that serves as the foundation and basis for guiding improvement activities, including obtaining management commitment to and funding for the activities, establishing a baseline of commitments and expectations against which to measure progress, prioritizing and executing activities and initiatives, determining success, and identifying and applying lessons learned. Through such a structured and disciplined approach, improvement resources can be invested in a manner that produces optimal results.

However, DOD has not demonstrated that user satisfaction improvement efforts are being guided by a documented plan that defines prioritized improvement projects and associated resource requirements, schedules, and measurable goals and outcomes. Instead, efforts that the office undertook to improve user satisfaction were ad hoc and did not meet with success. Specifically, the program office stopped measuring AHLTA user

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[21]The Software Engineering Institute is a federally funded research and development center established at Carnegie Mellon University to address software engineering practices. IDEAL[SM] is a service mark of Carnegie Mellon University and stands for initiating, diagnosing, establishing, acting, and leveraging. For more information on this model, see *IDEAL[SM]: A User's Guide for Software Process Improvement* (CMU/SEI-96-HB-001).

satisfaction levels in July 2007 after overall user satisfaction had declined to its lowest point in more than 2 years. Between 2005 and 2007 the program office collected user satisfaction feedback through online user surveys, and used the data to identify areas for system improvements and to measure progress toward improving satisfaction. The results of the surveys showed not only that users rated their overall satisfaction level with the system between below average and average, but that user satisfaction levels had declined to a low point with the results of the final survey report of July 2007. Thus, as shown in figure 1, the program office was not able to improve user satisfaction during this time period.

Figure 1: Overall AHLTA User Satisfaction Ratings between April 2005 and July 2007
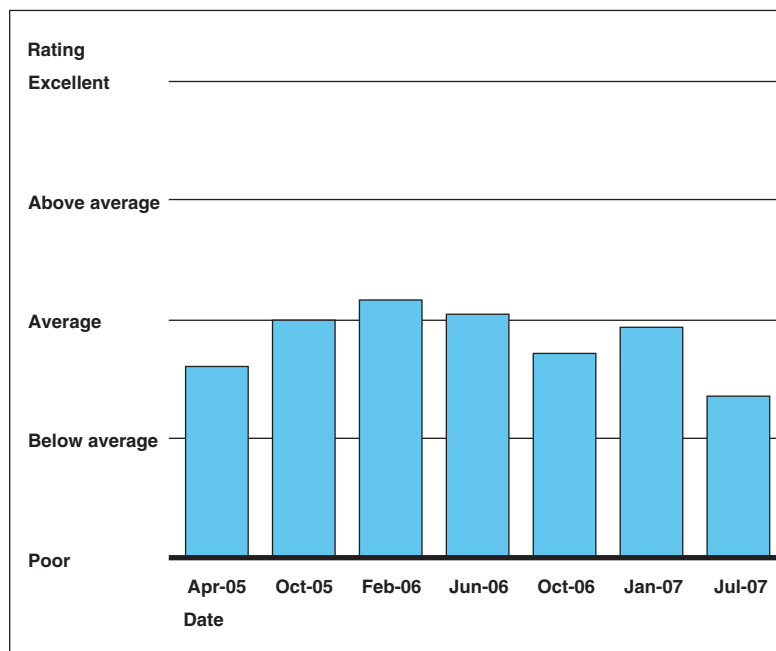
Source: GAO analysis of DOD data.

According to program officials, they have implemented a major effort toward improving user satisfaction with the AHLTA 3.3 software release. The improvements associated with this software release began as early as 2006 and include features such as improved medical coding support and increased speed of the order entry connection, as well as other changes to improve users' satisfaction with the system's performance and capabilities. Yet, program officials did not provide evidence of a plan to guide these efforts or a schedule for implementing these improvements,

and it is unclear how specific capabilities of the software release will be used to address specific user concerns. The lack of a documented plan to guide user satisfaction improvement activities is of particular significance because users have continued to express their dissatisfaction with the system. Program officials stated that additional online user satisfaction surveys were not conducted after 2007 because users had grown weary of the surveys and efforts to address user feedback from the existing survey results are ongoing. The next online survey is expected to be conducted after full deployment of AHLTA 3.3, but a schedule has not yet been set.

Given the history of system performance problems and the extent to which users have not been able to effectively and efficiently use AHLTA, it is critical that the department identify and implement system improvements in a disciplined and structured fashion. Without a documented improvement plan, efforts to improve user satisfaction, including those associated with the ongoing AHLTA stabilization effort, may be reduced to trial and error, and the office cannot adequately ensure that it is effectively investing program resources on improvement efforts that will result in a system that satisfies users. Further, since increasing user satisfaction is a key goal for the EHR Way Ahead, it is critical that a disciplined approach is established and maintained throughout the program's life cycle.

MHS Lacks Assurance of a Disciplined Acquisition Management Process to Guide Its Electronic Health Record Initiative

The use of disciplined processes to guide the effort of acquiring and implementing a major system has been shown to increase the likelihood of achieving intended results and reduce the risks associated with an acquisition to acceptable levels. Although there is no standard set of practices that will ever guarantee success, several organizations, such as Carnegie Mellon University's Software Engineering Institute and the Institute of Electrical and Electronics Engineers (IEEE),[22] as well as individual experts, have identified and developed the types of policies, procedures, and practices that have been demonstrated to reduce development time and enhance effectiveness. The key to having a disciplined system development effort is to have disciplined processes in multiple areas, including project planning, requirements management, systems engineering, system testing, and risk management. Because

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[22]The IEEE is a nonprofit, technical professional association that develops standards for a broad range of global industries, including the IT and information assurance industries and is a leading source for defining best practices.

change in a program is constant, effective processes should be implemented in each of these throughout the project life cycle. Effectively implementing the disciplined processes necessary to reduce project risks to acceptable levels is difficult because a project must effectively implement several best practices, and inadequate implementation of any one may significantly reduce or even eliminate the positive benefits of the others.

Recognizing weaknesses in its acquisition of systems such as AHLTA, MHS has been taking steps to institutionalize more disciplined management processes across all of its programs. In March 2008 the MHS CIO identified an approach for improving its management processes that included aligning MHS processes with best practices outlined in the Software Engineering Institute's Capability Maturity Model Integration (CMMI) for Acquisition. In support of the approach, certain program offices, including DHIMS (the program office responsible for the AHLTA acquisition), were selected for an internal evaluation to identify areas for improvement in the existing MHS processes. The assessment, which was conducted in May 2008, identified weaknesses in processes such as project management, requirements development, and project monitoring and control, among others. It also identified weaknesses in MHS's oversight of the implementation of these processes within program offices. Specifically, the assessment identified weaknesses in the area of Process and Product Quality Assurance, which is supposed to provide staff and management with objective insight into processes associated with work products. The assessment found little evidence that process evaluations were performed across the organization, quality assurance audits were conducted, and noncompliance issues were tracked and reported.

In response to the assessment, officials stated that they established a plan for addressing the identified weaknesses. Specifically, their goal was to achieve CMMI's "maturity level 2" for processes such as project planning and acquisition requirements development. Level 2 processes are "managed" processes, or processes that are planned and executed in accordance with policy; employ skilled people who have adequate resources to produce controlled outputs; involve relevant stakeholders; are monitored, controlled, and reviewed; and are evaluated for adherence to their process description. The department planned to conduct a formal external assessment of the maturity of its processes by December 2008.

Program officials stated that they provided guidance and assistance for program offices to adopt practices associated with CMMI maturity level 2 processes. However, they have yet to perform the planned external

assessment of their processes, and there is therefore little assurance that improvements have been carried out. As the department proceeds with the AHLTA stabilization effort, it is critical that it have disciplined processes in place to avoid past problems with not delivering system improvements as planned. Further, as the department is allocating resources to and planning for the EHR Way Ahead acquisition, it is critical that it have disciplined management processes in place to avoid repeating the mistakes of the past. Until the department ensures that these disciplined and managed processes are in place, it risks delivering another system with limited functionality and performance problems and that does not meet the needs of its users.

Conclusions

After over a decade of effort, DOD has not accomplished what it set out to achieve in acquiring a comprehensive electronic health record system. While it has delivered a number of outpatient capabilities, weaknesses in key management areas hindered its ability to deliver the full complement of intended capabilities and to ensure that the capabilities it has delivered meet required performance parameters. The program office did not maintain a comprehensive and current project management plan, a critical document that provides stakeholders insight into the project's plans and status. Also, despite the department's need to deliver a complex, worldwide system, it did not develop a systems engineering plan to help address the technical aspects of the project, and it continues to experience problems with system availability, speed, and usability. Further, the system requirements were too general and did not adequately reflect user needs. Although the department has collected user feedback, it did not establish a comprehensive plan for improving user satisfaction with the system. Recognizing weaknesses in acquisition management areas, the MHS CIO issued guidance for improving its management processes, but it has not performed the planned external assessment that it needs to certify that these improvements have been made or established a date for doing so.

As DOD continues to invest significant resources in a stabilization effort to address shortcomings of AHLTA and plan for the acquisition of a new electronic health record system, it is imperative that the department take immediate steps to improve its management of the initiative. Until it does so, it risks a continuation of the problems it has already experienced, which could again prevent DOD from delivering a comprehensive health record system for serving its service members and their families.

Recommendations for Executive Action

To help guide and ensure the successful completion of the AHLTA stabilization effort, we recommend that the Secretary of Defense, through the Assistant Secretary of Defense for Health Affairs, direct the MHS CIO to take the following six actions:

- Develop and maintain a comprehensive project plan that includes key elements, such as the project's scope, cost, schedule, and risks and update the plan to provide key information for stakeholders on the project's plans and status.

- Develop a systems engineering plan in accordance with DOD guidance to address the technical complexities of delivering a worldwide electronic health record system.

- Ensure that its requirements development process involves system users throughout the development process, to obtain an understanding of what will satisfy their needs.

- Ensure the establishment of bidirectional traceability for all system requirements.

- Develop and document a plan for improving user satisfaction that prioritizes improvement projects; identifies needed resources; includes schedules for improvement efforts, including future user feedback surveys; and links efforts to measurable outcomes and specific user needs.

- Establish acquisition management processes in accordance with industry best practices, including identifying milestones and a completion date for the external evaluation that MHS's processes are at maturity level 2 of the Capability Maturity Model Integration for Acquisition.

Further, to help ensure that the EHR Way Ahead does not have shortfalls similar to those experienced with AHLTA, we recommend that the above six management practices be implemented as part of the planning for this important initiative.

Agency Comments and Our Evaluation

The Deputy Assistant Secretary of Defense (Force Health Protection and Readiness), performing the duties of the Assistant Secretary of Defense (Health Affairs), provided written comments on a draft of this report. In its comments, the department agreed with our six recommendations and described actions planned to address them.

Specifically, to help guide and ensure the successful completion of the AHLTA stabilization effort, DOD stated that it will develop and maintain a comprehensive project plan in accordance with our recommendation and DOD acquisition program guidelines. It also stated that it plans to develop a systems engineering plan to address the technical complexities of the project in accordance with current DOD requirements. Further, to obtain an understanding of system users' needs, the department stated that it plans to engage users and manage the requirements development process in accordance with our recommendation. The department stated that it will ensure that bidirectional traceability is performed for all system requirements. Regarding its intent to develop and document a plan for improving user satisfaction, including identifying needed resources and a schedule for improvement, the department stated that it will augment its current user feedback plan to include these and other key elements, such as measurable outcomes. Further, in response to the need to establish acquisition management processes in accordance with industry best practices, at maturity level 2, the department said it plans to establish a milestone for completing the external review in accordance with Capability Maturity Model guidelines.

Finally, the department stated that it will ensure that the six recommendations are implemented as part of future EHR Way Ahead initiative. To the extent that the department follows through on implementing the recommendations, it should be better positioned to deliver a comprehensive electronic health care record for serving its service members and others entitled to military health care.

DOD also provided technical comments on our draft report. In these comments, DOD said it took exception to several inaccurate, misleading, and subjective statements provided in the report. The department said that GAO's statements conflicted with the extensive volume of programmatic documentation, written responses, and consistent interview feedback provided during the course of the audit. In particular, the department believed that the report did not sufficiently reflect AHLTA's operational capabilities and its benefit to DOD's worldwide health care operations. While we agree that the department provided substantial documentation, we believe that our analysis of the information received supports our findings. Where appropriate, however, we have made revisions to statements in the report to update our discussions of AHLTA's operational capabilities and the program's management.

The department's written comments are reproduced in appendix II. The department also provided technical comments, which we have incorporated in the report as appropriate

We are sending copies of the report to appropriate congressional committees, the Secretary of Defense, and other interested parties. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have questions about this report, please contact me at (202) 512-6304 or melvinv@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix III.

Sincerely yours,

Valerie C. Melvin
Director, Information Management
   and Human Capital Issues

Appendix I: Objectives, Scope, and Methodology

Our objectives were to (1) determine the Department of Defense's (DOD) status in implementing the Armed Forces Health Longitudinal Technology Application (AHLTA) system, (2) determine the department's plans for acquiring a new electronic health record system, and (3) evaluate the department's acquisition management for its electronic health record system.

To determine the department's status in implementing the AHLTA system, we reviewed project status reports, acquisition decision memorandums, quarterly defense acquisition executive summaries, monthly in-progress review reports, monthly contractor performance reports, and overarching integrated project team meeting minutes. We supplemented these reviews with interviews of DOD officials in the Defense Health Information Management System (DHIMS) Program Office, including the DHIMS Program Manager, Deputy Program Manager, and Director of Products Branch officials with whom we discussed the project's cost and schedule, as well as the planning, development, and deployment of the original and current release of AHLTA. We also attended two demonstrations of AHLTA: at the program office located in Falls Church, Virginia, and at the National Naval Medical Center in Bethesda, Maryland. We observed demonstrations of AHLTA system functionality and held discussions with system users. We also observed a daily technical review meeting with technical staff from the Army, Navy, and Air Force in which the discussion largely focused on the reporting of issues that caused the system to be unavailable to users at various locations for up to 24 hours. The discussion also included identification of known root causes of the availability problems (e.g., incorrectly configured firewalls, tripped network circuits, and problems with virtual private networks) and planned actions to address the issues.

To determine the department's plans for acquiring a new system, we reviewed Electronic Health Record (EHR) Way Ahead planning documents. Specifically, we reviewed the acquisition decision memorandum issued by the milestone decision authority, the Joint Requirements Oversight Council-approved Initial Capabilities Document to identify EHR needs, and the Capabilities-Based Assessment. We also reviewed the analysis of alternatives procedures for guidance on determining a technology solution for the new EHR. We also reviewed department briefings issued between 2008 and 2010, as well as a prepared statement to Congress from 2009 on preliminary plans for the EHR Way Ahead. These documents provided a high-level overview of the need and the goals for the new system, as well as plans for the system's enterprise architecture and expected capabilities. We supplemented our review by

interviewing officials from the EHR Way Ahead planning office, including
the department's Acting Chief Information Officer, the DHIMS Program
Manager, and the DHIMS Deputy Program Manager.

To evaluate the department's acquisition management for its electronic
health record system initiative, we evaluated key practices used by the
agency against best practices. In this regard, we examined practices
related to project management planning, systems engineering planning,
system requirements development and management, and user satisfaction
improvement planning and compared the agency's work with agency
policy, guidance, and recognized best practices. Specifically:

- To assess DOD's project planning for AHLTA, we compared the program's
project management plan against relevant guidance, including the Military
Health System's project management process area description and our
Information Technology Investment Management framework for assessing
and improving process maturity.

- We assessed the agency's approach to systems engineering by comparing
program documentation such as acquisition strategies and the AHLTA
project management plan to systems engineering guidance from the
Defense Acquisition University on systems engineering. We also reviewed
relevant agency policies, such as DOD Instruction 5000.02 which discusses
the use of systems engineering across the acquisition life cycle and
memorandums from the Office of the Under Secretary of Defense on a
2004 revision to the policy regarding use of a systems engineering plan, to
determine whether the AHLTA program was guided by appropriate
systems engineering planning documents such as a systems engineering
plan.

- Regarding requirements development, we reviewed program procedures
describing the processes for developing requirements and reviewed
relevant external evaluations of the effectiveness of those processes
against recognized guidance. Specifically, we reviewed an external
evaluation of the requirements development processes including the 2002
Carnegie Mellon External Assessment of the AHLTA program office and
the process area description or requirements management. We also
reviewed the 2008 internal assessment of requirements management; a
2009 concept of operations document for a more integrated,
departmentwide requirements development process; and the 2010 Joint
Requirements Oversight Council-approved Initial Capabilities Document,
which identifies past challenges with the department's requirements
processes. In addition, we analyzed the requirements traceability matrix
for the most recent version of AHLTA to determine the extent to which

bidirectional traceability had been performed. We also reviewed program documentation relative to requirements development and user community participation. In addition, we interviewed process improvement officials, including the cognizant official from the Office of the Chief Information Officer (CIO) about internal acquisition process evaluations and their results and the status of plans for improving acquisition management processes. We then compared the department's current approach to requirements development and management with best practices identified in the Software Engineering Institute's Capability Maturity Model Integration for Acquisition.

- To assess the department's approach to improving user satisfaction, we reviewed and analyzed program documentation pertaining to the collection, analysis, and utilization of AHLTA user satisfaction feedback such as seven survey reports and a postimplementation review that were produced between 2005 and 2007 and compared the agency's approach to best practices such as the Office of Management and Budget's Capital Programming Guide and Standards and Guidelines for Statistical Surveys. We also reviewed lessons learned reports from 2006 through 2008 and a user conference briefing from 2006 that identified areas of user dissatisfaction. In addition, we reviewed program office documents that identified improvement initiatives such as the AHLTA 3.3 software release and the deployment of local cache servers, which were intended to improve user satisfaction. We supplemented our review by interviewing program officials, including the DHIMS Program Manager and Deputy Program manager, to determine the extent to which user satisfaction improvement efforts and initiatives have been guided by documented plans. We then compared the department's approach to improving user satisfaction with the Software Engineering Institute's IDEAL[SM][1] model, which is a recognized approach for managing process improvement efforts such as managing improvements to user satisfaction.

- To assess DOD's plans to improve acquisition management processes, we reviewed documentation and interviewed officials from the DHIMS Program Office and the Office of Process Improvement on their plans to improve the processes based on the Software Engineering Institute's Capability Maturity Model Integration for Acquisition. We also reviewed

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[1]The Software Engineering Institute is a federally funded research and development center established at Carnegie Mellon University to address software engineering practices. IDEAL is a service mark of Carnegie Mellon University and stands for initiating, diagnosing, establishing, acting, and leveraging. For more information on this model, see *IDEAL[SM]: A User's Guide for Software Process Improvement* (CMU/SEI-96-HB-001).

DOD's 2008 internal assessment related to acquisition management
processes, action plans, and tasks planned for process improvement.

We supplemented our analysis with interviews with officials in the DHIMS
Office, including, the Program Manager, Deputy Program Manager,
Director of Products Branch and Engineering and Resources offices. We
also obtained written responses from the responsible program manager or
subject matter expert for areas of our review. These responses were
approved by the MHS CIO or the Program Executive Officer, Joint Medical
Information Systems/Deputy MHS CIO.

We did not conduct an independent validation of the life-cycle costs and
obligations provided to us by DOD.

We conducted this performance audit at the DHIMS Program Office in
Falls Church, Virginia, and the National Naval Medical Center, in
Bethesda, Maryland, from September 2009 through October 2010 in
accordance with generally accepted government auditing standards. Those
standards require that we plan and perform the audit to obtain sufficient,
appropriate evidence to provide reasonable basis for our findings and
conclusions based on our audit objectives. We believe that the evidence
obtained provides a reasonable basis for our findings and conclusions
based on our objectives.

Appendix II: Comments from the Department of Defense

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
HEALTH AFFAIRS
SKYLINE FIVE, SUITE 810, 5111 LEESBURG PIKE
FALLS CHURCH, VIRGINIA 22041-3206

TRICARE
MANAGEMENT
ACTIVITY

SEP 2 7 2010

Ms. Valerie C. Melvin
Director, Information Management
and Human Capital Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Ms. Melvin:

This is the Department of Defense (DoD) response to the recommendations in the Government Accountability Office (GAO) Draft Report GAO-11-50, "Information Technology – Opportunities Exist to Improve Management of DoD's Electronic Health Record Initiative," October 2010 (Engagement Code 310944).

DoD acknowledges receipt of the draft report and will address each of the recommendations and ensure appropriate measures are carried out effectively. DoD takes exception to several inaccurate, misleading, and subjective statements provided in the draft report. GAO's statements conflict with the extensive volume of programmatic documentation, written responses, and consistent interview feedback provided during the course of this audit. Enclosed are suggested technical comments and corrections to GAO's draft report.

Thank you for the opportunity to review and comment on the draft report. The points of contact for additional information are Ms. Lois Kellett, Lois.Kellett@tma.osd.mil, or (703) 681-8836; and Mr. Gunther Zimmerman, Gunther.Zimmerman@tma.osd.mil, or (703) 681-4360.

Sincerely,

George Peach Taylor, Jr., M.D.
Deputy Assistant Secretary of Defense
  (Force Health Protection and Readiness)
Performing the Duties of the
  Assistant Secretary of Defense
  (Health Affairs)

Attachments:
As stated

GAO Draft Report-Dated OCTOBER 2010
GAO-11-50 (Engagement Code 310944)

"Opportunities Exist to Improve Management of DoD's Electronic Health Record Initiative"

Department of Defense Comments to GAO Recommendations

RECOMMENDATION: Develop and maintain a comprehensive project plan that includes key elements, such as the project's scope, cost, schedule and risks and update the plan to provide key information for stakeholders on the project's plans and status.

DoD RESPONSE: Concur. DoD will develop and maintain a comprehensive project plan in accordance with this recommendation and DoD acquisition program guidelines.

RECOMMENDATION: Develop a systems engineering plan in accordance with DoD guidance to address the technical complexities of delivering a worldwide electronic health record system.

DoD RESPONSE: Concur. Since implementing a requirement to develop a Systems Engineering Plan (SEP) in February 2004, DoD will continue to develop and maintain a SEP in accordance with this recommendation.

RECOMMENDATION: Ensure that the requirements development process involves system users throughout the development process, to obtain an understanding of what will satisfy their needs.

DoD RESPONSE: Concur. DoD will continue to engage system users and manage the requirements development process in accordance with this recommendation.

RECOMMENDATION: Ensure the establishment of bidirectional traceability for all system requirements.

DoD RESPONSE: Concur. DoD will ensure the bidirectional traceability for requirements in accordance with this recommendation.

RECOMMENDATION: Develop and document a plan for improving user satisfaction that prioritizes improvement projects; identifies needed resources; includes schedules for improvement efforts, including future user feedback survey; and links efforts to measureable outcomes and specific user needs.

DoD RESPONSE: Concur. DoD will augment its current user feedback plan for improved user satisfaction in accordance with this recommendation.

RECOMMENDATION: Establish acquisition management processes in accordance with industry best practices, including indentifying milestones and a completion date for the external evaluation that MHS's processes are at maturity Level 2 of the Capability Management Maturity Model Integrated for Acquisition.

DoD RESPONSE: Concur. DoD continues to follow DoD acquisition program guidelines and will establish a milestone for an external review in accordance with the Capability Management Maturity Model guidelines.

RECOMMENDATION: Further, to help ensure that the EHR Way Ahead does not have shortfalls similar to those experienced with AHLTA, we recommend that the above management practices be implemented as part of the planning for this important initiative.

DoD RESPONSE: Concur. DoD will ensure that these recommendations are implemented as part of the EHR Way Ahead initiative.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Valerie C. Melvin, (202) 512-6304 or melvinv@gao.gov

Staff Acknowledgments

In addition to the contact named above, Cynthia J. Scott (Assistant Director); Harold Brumm, Jr.; Neil Doherty; Ronalynn Espedido; Rebecca Eyler; Nancy Glover; Joel Grossman; Linda Kochersberger; Lee McCracken; Madhav Panwar; Donald Sebers; Sylvia Shanks; Adam Vodraska; Daniel Wexler; and Robert Williams, Jr. made key contributions to this report.