

May 2006

BUSINESS SYSTEMS MODERNIZATION

DOD Continues to Improve Institutional Approach, but Further Steps Needed





Highlights of [GAO-06-658](#), a report to congressional committees

Why GAO Did This Study

For decades, the Department of Defense (DOD) has not been successful in repeated attempts to modernize its business systems and operations. To assist DOD, Congress included provisions in the Fiscal Year 2005 Ronald W. Reagan National Defense Authorization Act that were consistent with GAO's recommendations for developing a business enterprise architecture and associated enterprise transition plan and establishing and implementing effective information technology (IT) business system investment management structures and processes. The Act further requires that the Secretary of Defense submit an annual report to congressional defense committees on its compliance with certain requirements of the Act not later than March 15 of each year from 2005 through 2009. In response to the Act's mandate, GAO assessed the actions by DOD to comply with the requirements of the Act and determined the extent to which DOD has addressed GAO's prior recommendations.

What GAO Recommends

GAO is recommending that the department submit its enterprise architecture program management plan to defense congressional committees. DOD commented that GAO's findings are fair, and it expressed general agreement with GAO's recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-06-658.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Randolph C. Hite at (202) 512-3439 or hiter@gao.gov.

BUSINESS SYSTEMS MODERNIZATION

DOD Continues to Improve Institutional Approach, but Further Steps Needed

What GAO Found

As part of DOD's incremental strategy for developing and implementing its architecture, transition plan, and accountability framework for managing business systems, the department has taken steps over the last 6 months to address a number of the areas that GAO previously reported as falling short of the Act's requirements. However, additional steps are needed to fully comply with the Act and relevant guidance. For example,

- The architecture identifies an enterprisewide data standard to support financial management and reporting functions. However, the data elements—such as those associated with the planning, programming, and budgeting business process—are not yet part of the architecture.
- The enterprise transition plan now includes an initiative aimed at identifying capability gaps between the “As Is” and “To Be” architectural environments, and DOD continues to validate the inventory of ongoing IT investments that formed the basis for the prior version of the transition plan. However, the plan does not include, among other things, a complete listing of the legacy systems that will not be part of the target architecture, and it does not include system investment information for all of the department's agencies and combatant commands.
- The department's fiscal year 2007 IT budget submission was prepared using a system that was reconciled with DOD's single authoritative system inventory. This should improve the reliability of the budget submission.
- The IT investment management structures and processes that DOD previously defined are being refined and implemented across the department. However, the investment review board that is to focus on IT infrastructure and information assurance investments has still not been established.

DOD has also taken steps to address 29 prior GAO recommendations to strengthen the management of its business systems modernization through the adoption of enterprise architecture and investment management best practices. As a result of DOD's actions, 16 of the recommendations have now been implemented and 13 are in the process of being implemented.

Notwithstanding DOD's incremental strategy for improving its institutional approach to business systems modernization and complying with the Act, the department has yet to create or establish milestones for developing an enterprise architecture program management plan that defines, among other things, what the increments of improvement are, and how and when they will be accomplished, with particular emphasis and clarity around the near-term increments. It is important for the department to develop this plan as soon as possible because without it, the department is less likely to accomplish intended improvements and the Congress does not have the means to measure progress and hold the department accountable for doing so.

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Abbreviations

ASD(NII)/CIO	Assistant Secretary of Defense (Networks and Information Integration)/Chief Information Officer
BEA	Business Enterprise Architecture
BTA	Business Transformation Agency
CA	Certification Authority
CIO	Chief Information Officer
DBSMC	Defense Business Systems Management Committee
DITPR	DOD Information Technology Portfolio Repository
DOD	Department of Defense
DODAF	Department of Defense Architecture Framework
ETP	Enterprise Transition Plan
FEA	Federal Enterprise Architecture
FEAF	Federal Enterprise Architecture Framework
FCP	Forward Compatible Payroll
IRB	Investment Review Board
IT	information technology
NCES	Net-Centric Enterprise Services
NSS	National Security Systems
OMB	Office of Management and Budget
SFIS	Standard Financial Information Structure
SNAP-IT	Select and Native Programming Data System– Information Technology

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May 15, 2006

Congressional Committees

For decades, the Department of Defense (DOD) has not been successful in repeated attempts to modernize its timeworn business systems¹ and operations. In 1995, we first designated DOD's business systems modernization as "high risk," and we continue to designate it as such today.² As our research on successful public and private sector organizations has shown, attempting a large-scale systems modernization program in a large organization such as DOD without, among other things, a well-defined enterprise architecture³ and the associated investment management controls for implementing it often results in systems that are duplicative, stovepiped, non-integrated, and unnecessarily costly to manage, maintain, and operate.

In May 2001, we made recommendations to the Secretary of Defense that provided the means for effectively developing and implementing an enterprise architecture and limiting systems investments until the department had a well-defined architecture and a corporate approach to investment control and decision making.⁴ In July 2001, the department initiated a business management modernization program to, among other things, develop a business enterprise architecture and establish the investment controls needed to effectively implement it. This effort was begun as part of the Secretary of Defense's broad initiative to "transform the way the department works and what it works on."

¹Business systems are information systems that include financial and non-financial systems and support DOD's business operations, such as civilian personnel, finance, health, logistics, military personnel, procurement, and transportation. See 10 U.S.C. § 2222 (j) (2).

²GAO, *High-Risk Program*, [GAO-06-497T](#) (Washington, D.C.: Mar. 15, 2006).

³An enterprise architecture, or modernization blueprint, provides a clear and comprehensive picture of an entity, whether it is an organization (e.g., federal department or agency) or a functional or mission area that cuts across more than one organization (e.g., financial management). This picture consists of snapshots of the enterprise's current "As Is" operational and technological environment and its target or "To Be" environment, as well as a capital investment roadmap for transitioning from the current to the target environment. These snapshots further consist of "views," which are basically one or more architecture products that provide conceptual or logical representations of the enterprise.

⁴GAO, *Information Technology: Architecture Needed to Guide Modernization of DOD's Financial Operations*, [GAO-01-525](#) (Washington, D.C.: May 17, 2001).

Between 2001 and 2005, we reported that the department's business management modernization program was not being effectively managed, concluding in 2005 that hundreds of millions of dollars had been spent on an architecture and investment management structures that had limited use.⁵

To assist DOD in addressing these modernization management challenges, Congress included provisions in the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (the Act)⁶ that were consistent with our recommendations for developing a business enterprise architecture and associated enterprise transition plan, and establishing and implementing effective information technology (IT) business system investment management structures and processes. More specifically, the Act required the department to, among other things, (1) develop a business enterprise architecture, (2) develop a transition plan to implement the architecture, (3) include systems information in its annual budget submission, (4) establish a system investment approval and accountability structure, (5) establish an investment review process, and (6) approve and certify system modernizations costing in excess of \$1 million. The Act further requires that the Secretary of Defense submit an annual report to congressional defense committees on its compliance with certain requirements of the Act not later than March 15 of each year from 2005 through 2009. Additionally, the Act directs us to submit to congressional defense committees—within 60 days of DOD's report submission—an assessment of DOD's actions taken to comply with these requirements.

⁵See, for example, [GAO-01-525](#); *DOD Business Systems Modernization: Improvements to Enterprise Architecture Development and Implementation Efforts Needed*, [GAO-03-458](#) (Washington, D.C.: Feb. 28, 2003); *Information Technology: Observations on Department of Defense's Draft Enterprise Architecture*, [GAO-03-571R](#) (Washington, D.C.: Mar. 28, 2003); *Business Systems Modernization: Summary of GAO's Assessment of the Department of Defense's Initial Business Enterprise Architecture*, [GAO-03-877R](#) (Washington, D.C.: July 7, 2003); *DOD Business Systems Modernization: Important Progress Made to Develop Business Enterprise Architecture, but Much Work Remains*, [GAO-03-1018](#) (Washington, D.C.: Sept. 19, 2003); *DOD Business Systems Modernization: Limited Progress in Development of Business Enterprise Architecture and Oversight of Information Technology Investments*, [GAO-04-731R](#) (Washington, D.C.: May 17, 2004); *DOD Business Systems Modernization: Billions Being Invested without Adequate Oversight*, [GAO-05-381](#) (Washington, D.C.: April 29, 2005); *DOD Business Systems Modernization: Long-standing Weaknesses in Enterprise Architecture Development Need to Be Addressed*, [GAO-05-702](#) (Washington, D.C.: July 22, 2005).

⁶*Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005*, Pub. L. No. 108-375, § 332, 118 Stat. 1811, 1851-1856 (Oct. 28, 2004) (codified in part at 10 U.S.C. § 2222).

As agreed with your offices, the objectives of our review were to (1) assess the actions by DOD to comply with the requirements of Section 2222 of Title 10, U.S. Code and (2) determine the extent to which DOD has addressed our prior recommendations. To accomplish this, we used our November 2005 report⁷ as a baseline of comparison, focusing on the steps the department has taken to address the areas of noncompliance that we cited in that report.

We performed our work from January through May 2006 in accordance with generally accepted government auditing standards. Details on our objectives, scope, and methodology are contained in appendix I.

Results in Brief

As part of DOD's incremental strategy for developing and implementing its architecture, transition plan, and tiered accountability framework for managing business systems, the department has taken steps over the last 6 months to further comply with the Act and otherwise improve its overall approach to business systems modernization. On March 15, 2006, DOD released a minor update to its business enterprise architecture (version 3.1), developed an updated enterprise transition plan, and issued its annual report to Congress describing steps taken to address the Act's requirements, among other things. The updated architecture and transition plan, as well as the report and related documentation, reflect steps taken to address a number of the areas that we previously reported as falling short of the Act's requirements and related guidance. However, additional steps are needed to fully comply with the Act and relevant guidance. The following illustrate steps taken thus far to improve management of the department's business systems modernization effort and where further improvement is needed.

- The latest version of the architecture continues to specify DOD's Standard Financial Information Structure (SFIS) as an enterprisewide data standard for categorizing financial information to support financial management and reporting functions. In addition, the architecture now adds greater definition on standard processes, rules, and data for intra-governmental ordering and billing. However, certain SFIS data elements, such as those relating to the planning, programming, and budgeting business process area, have yet to be defined. According to DOD, these data elements will

⁷GAO, *DOD Business Systems Modernization: Important Progress Made in Establishing Foundational Architecture Products and Investment Management Practices, but Much Work Remains*, [GAO-06-219](#) (Washington, D.C.: Nov. 23, 2005).

be in the next version of the architecture. The latest version of the architecture also does not yet include a systems standards profile to facilitate data sharing among departmentwide business systems and promote interoperability with departmentwide IT infrastructure systems. Further, military services and defense agencies architectures have yet to be aligned with the departmental architecture. Once such missing scope and content is added, the architecture will be a more sufficient frame of reference to optimally guide and constrain DOD-wide system investment decision making.

- The enterprise transition plan now includes an initiative aimed at identifying capability gaps between the “As Is” and “To Be” architectural environments, and DOD continues to validate the inventory of ongoing IT investments that formed the basis for the prior version of the transition plan. Further, the plan provides information on progress on major investments over the last 6 months—including key accomplishments and milestones attained, and more information about the termination of legacy systems. However, it still does not identify, for example, all legacy systems that will not be part of the target architecture, and it does not include system investment information for all of the department’s agencies and combatant commands. Once missing content is added and all planned investments are validated by capability gap analyses, the department will be better positioned to sequentially manage the migration and disposition of existing business processes and systems—and the introduction of new ones.
- The fiscal year 2007 IT budget submission was prepared using a system that has been reconciled with DOD’s single authoritative system inventory. This should improve the completeness and reliability of the budget submission.
- The IT investment management structures and processes that DOD previously defined are being refined and implemented across the department. For example, DOD reports that 226 business systems, which represent about \$3.6 billion in modernization funding, were approved by the Defense Business Systems Management Committee (DBSMC). Further, it reports that over 290 business systems have been identified for phase-out/elimination. The extent to which these structures and processes will be applied to the department’s approximately 3,700 business systems is still evolving. Further, an investment review board required by the Act and DOD policy for IT infrastructure and information assurance investments has yet to be established.

The Act's requirements concerning the architecture, transition plan, budgetary disclosure, and investment management structures and processes are consistent with our prior recommendations. In taking steps to further comply with the Act, DOD has either implemented—or is in the process of implementing—these 29 prior recommendations. More specifically, the department has fully implemented 16 of the recommendations and is in the process of implementing the remaining 13. For example, the department has implemented our recommendation to issue a policy governing the development, implementation, and maintenance of an enterprise architecture. However, it has not implemented our recommendation to develop a plan governing the development, maintenance, and implementation of the enterprise architecture. Such a plan would, at a minimum, define what the incremental improvements will be, and how and when they will be accomplished. The plan would also include what (and when) architecture and transition plan scope and content—and architecture compliance criteria—will be added, with particular emphasis and clarity around the near-term increments. It is important for the department to develop this plan as soon as possible because without it, the department is less likely to accomplish intended improvements—and Congress will not have the means to measure progress and hold the department accountable. According to DOD officials, the department is committed to addressing our recommendations but has yet to provide any time frames.

To further assist the department in strengthening its business systems modernization efforts, to facilitate congressional oversight, and promote departmental accountability, we are recommending that the department submit its enterprise architecture program management plan to defense congressional committees.

In its written comments on a draft of this report, signed by the Deputy Under Secretary of Defense (Business Transformation) and reprinted in appendix III, the department stated that our findings are a fair representation of DOD's efforts to date, and while it does not agree with all of our points, it recognizes that even in areas of disagreement there is opportunity for dialog and learning. In this regard, the department provided additional comments in two areas.

First, DOD recognized the importance of addressing our recommendations, and stated that it is important that we make our recommendations sufficiently specific to permit reasonable implementation and that we provide prompt feedback on whether DOD's implementation actions are in line with the recommendations. We agree

and will continue to work proactively and constructively with the department to facilitate their implementation.

Second, DOD stated that it partially agreed with the recommendation in the draft report, characterizing it as developing a departmentwide enterprise architecture program management plan to gain control of the department's IT environment. According to DOD, such a plan would far exceed the current scope of business systems modernization, and thus addressing it would require more time than our recommendation allowed. We agree that the business enterprise architecture should be departmentwide in scope and should allow the department to gain control of its business IT environment. However, the recommendation in our draft report was only aimed at developing an incremental plan that would show what missing scope and content would be added in each incremental version of the architecture and transition plan to eventually have an architecture and transition plan that addressed the full scope of the department's business IT environment and permitted such control to be gained. It was not intended to be interpreted as actually having this scope and content added to the transition plan in the time frame specified. To further ensure that our recommendation is properly interpreted and implemented, and to address DOD's concern about the time frame that we cited, we have slightly modified the recommendation.

Background

DOD is a massive and complex organization. In fiscal year 2005, the department reported that its operations involved \$1.3 trillion in assets and \$1.9 trillion in liabilities; more than 2.9 million military and civilian personnel; and \$635 billion in net cost of operations. For fiscal year 2006, the department received appropriations of about \$403 billion.⁸ The department comprises a wide range of organizations, including the military services and their respective major commands and functional activities; numerous defense agencies and field activities; and various combatant and joint operational commands, which are responsible for military operations for specific geographic regions or theaters of operations.

In support of its military operations, the department performs an assortment of interrelated and interdependent business functions,

⁸This amount does not include an additional \$50 billion for military operations in Iraq and Afghanistan.

including logistics management, procurement, health care management, and financial management. DOD recently reported that, in order to support these business functions, it relies on 3,717 business systems. For fiscal year 2006, DOD received approximately \$15.5 billion—and for fiscal year 2007, DOD has requested approximately \$16 billion—in appropriated funds to operate, maintain, and modernize its business systems. As we have previously reported,⁹ DOD’s systems environment is overly complex and error prone, and is characterized by (1) little standardization across the department; (2) multiple systems performing the same tasks; (3) the same data stored in multiple systems; and (4) the need for manual data entry into multiple systems. In addition, our reports¹⁰ have continually shown that the department’s nonintegrated and duplicative systems contribute to fraud, waste, and abuse. Of the 25 areas on our governmentwide high-risk list, 8 are DOD program areas, and the department shares responsibility for 6 other governmentwide high-risk areas.¹¹ DOD’s business systems modernization is one of the high-risk areas, and it is an essential enabler to addressing many of the department’s other high-risk areas. For example, modernized business systems are integral to the department’s efforts to address its financial, supply chain, and information security management high-risk areas.

⁹GAO, *DOD Business Systems Modernization: Important Progress Made in Establishing Foundational Architecture Products and Investment Management Practices, but Much Work Remains*, [GAO-06-219](#) (Washington, D.C.: Nov. 23, 2005).

¹⁰See, for example, GAO, *Defense Inventory: Opportunities Exist to Improve Spare Parts Support Aboard Deployed Navy Ships*, [GAO-03-887](#) (Washington, D.C.: Aug. 29, 2003); *Military Pay: Army National Guard Personnel Mobilized to Active Duty Experienced Significant Pay Problems*, [GAO-04-89](#) (Washington, D.C.: Nov. 13, 2003); and *DOD Travel Cards: Control Weaknesses Resulted in Millions of Dollars of Improper Payments*, [GAO-04-576](#) (Washington, D.C.: June 9, 2004).

¹¹[GAO-06-497T](#). The eight specific DOD high-risk areas are: (1) approach to business transformation, (2) business systems modernization, (3) contract management, (4) financial management, (5) personnel security clearance, (6) supply chain management, (7) support infrastructure management, and (8) weapon systems acquisition. The six governmentwide high-risk areas are (1) disability programs, (2) interagency contracting, (3) information systems and critical infrastructure, (4) information sharing for homeland security, (5) human capital, and (6) real property.

Enterprise Architecture and Information Technology Investment Management Are Critical to Achieving Successful Systems Modernization

Effective use of an enterprise architecture, or a modernization blueprint, is a hallmark of successful public and private organizations. For more than a decade, we have promoted the use of architectures to guide and constrain systems modernization, recognizing them as a crucial means to this challenging goal: agency operational structures that are optimally defined in both the business and technological environments. Congress, the Office of Management and Budget (OMB), and the federal Chief Information Officer (CIO) Council have also recognized the importance of an architecture-centric approach to modernization. We, OMB, and the CIO Council have issued enterprise architecture guidance.¹² The Clinger-Cohen Act of 1996¹³ mandates that an agency's CIO develop, maintain, and facilitate the implementation of an IT architecture. Further, the E-Government Act of 2002¹⁴ requires OMB to oversee the development of enterprise architectures within and across agencies. In addition, we and OMB have issued guidance that emphasizes the need for system investments to be consistent with these architectures.¹⁵

A corporate approach to IT investment management is also characteristic of successful public and private organizations. Recognizing this, Congress developed and enacted the Clinger-Cohen Act of 1996,¹⁶ which requires OMB to establish processes to analyze, track, and evaluate the risks and results of major capital investments in information systems made by executive agencies.¹⁷ In response to the Clinger-Cohen Act and other statutes, OMB has developed policy and issued guidance for planning,

¹²CIO Council, *A Practical Guide to Federal Enterprise Architecture, Version 1.0* (Feb. 2001).

¹³*The Clinger-Cohen Act of 1996*, 40 U.S.C. § 11312 and 11315(b)(2).

¹⁴*The E-Government Act of 2002*, Public Law 107-347 (Dec. 17, 2002).

¹⁵*OMB Capital Programming Guide, Version 1.0* (July 1997) and GAO, *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity*, [GAO-04-394G](#) (Washington, D.C.: March 2004).

¹⁶*The Clinger-Cohen Act of 1996*, 40 U.S.C. sections 11101-11704. This Act expanded the responsibilities of OMB and the agencies that had been set under the *Paperwork Reduction Act* with regard to IT management. See 44 U.S.C. 3504(a)(1)(B)(vi) (OMB); 44 U.S.C. 3506(h)(5) (agencies).

¹⁷We have made recommendations to improve OMB's process for monitoring high-risk IT investments; see GAO, *Information Technology: OMB Can Make More Effective Use of Its Investment Reviews*, [GAO-05-276](#) (Washington, D.C.: April 15, 2005).

Enterprise Architecture: A
Brief Description

budgeting, acquisition, and management of federal capital assets.¹⁸ We have also issued guidance in this area,¹⁹ which defines institutional structures such as IRBs and associated processes, such as common investment criteria.

An enterprise architecture provides a clear and comprehensive picture of an entity, whether it is an organization (e.g., a federal department) or a functional or mission area that cuts across more than one organization (e.g., financial management). This picture consists of snapshots of both the enterprise's current ("As Is") environment and its target ("To Be") environment. These snapshots consist of "views," which are one or more architecture products (e.g., models, diagrams, matrixes, and text) that provide logical or technical representations of the enterprise. The architecture also includes a transition or sequencing plan, which is based on an analysis of the gaps between the "As Is" and "To Be" environments; this plan provides a temporal roadmap for moving between the two environments, and incorporates such considerations as technology opportunities, marketplace trends, fiscal and budgetary constraints, institutional system development and acquisition capabilities, legacy and new system dependencies and life expectancies, and the projected value of competing investments.

The suite of products produced for a given entity's enterprise architecture, including its structure and content, is largely governed by the framework used to develop the architecture. Since the 1980s, various architecture frameworks have been developed. Appendix IV discusses these various frameworks.

The importance of developing, implementing, and maintaining an enterprise architecture is a basic tenet of both organizational transformation and systems modernization. Managed properly, an enterprise architecture can clarify and help optimize the interdependencies and relationships among an organization's business operations (and the underlying IT infrastructure and applications) that support these operations. To support effective architecture management

¹⁸This policy is set forth and guidance is provided in *OMB Circular No. A-11* (Nov. 2, 2005) (section 300), and in OMB's *Capital Programming Guide*, which directs agencies to develop, implement, and use a capital programming process to build their capital asset portfolios.

¹⁹[GAO-04-394G](#).

IT Investment Management: A Brief Description

in the federal government, we have issued architecture management guidance, as has the federal CIO Council and OMB.²⁰ This guidance recognizes that when an enterprise architecture is employed in concert with other important management controls, such as portfolio-based capital planning and investment control practices, architectures can greatly increase the chances that an organization's operational and IT environments will be configured to optimize mission performance. Our experience with federal agencies has shown that investing in IT without defining these investments in the context of an architecture often results in systems that are duplicative, not well integrated, and unnecessarily costly to maintain and interface.²¹

IT investment management is a process for linking IT investment decisions to an organization's strategic objectives and business plans. Generally, it includes structures (including decision-making bodies known as IRBs), processes for developing information on investments (such as costs and benefits), and practices to inform management decisions (such as whether a given investment is aligned with an enterprise architecture). The federal approach to IT investment management is based on establishing systematic processes for selecting, controlling, and evaluating investments

²⁰GAO, *Information Technology: A Framework for Assessing and Improving Enterprise Architecture Management (Version 1.1)*, [GAO-03-584G](#) (Washington, D.C.: April 2003); and *A Practical Guide to Federal Enterprise Architecture, Version 1.0*.

²¹See, for example, GAO, *Homeland Security: Efforts Under Way to Develop Enterprise Architecture, but Much Work Remains*, [GAO-04-777](#) (Washington, D.C.: Aug. 6, 2004); *DOD Business Systems Modernization: Limited Progress in Development of Business Enterprise Architecture and Oversight of Information Technology Investments*, [GAO-04-731R](#) (Washington, D.C.: May 17, 2004); *Information Technology: Architecture Needed to Guide NASA's Financial Management Modernization*, [GAO-04-43](#) (Washington, D.C.: Nov. 21, 2003); *DOD Business Systems Modernization: Important Progress Made to Develop Business Enterprise Architecture, but Much Work Remains*, [GAO-03-1018](#) (Washington, D.C.: Sept. 19, 2003); *Business Systems Modernization: Summary of GAO's Assessment of the Department of Defense's Initial Business Enterprise Architecture*, [GAO-03-877R](#) (Washington, D.C.: July 7, 2003); *Information Technology: DLA Should Strengthen Business Systems Modernization Architecture and Investment Activities*, [GAO-01-631](#) (Washington, D.C.: June 29, 2001); and *Information Technology: INS Needs to Better Manage the Development of Its Enterprise Architecture*, [GAO/AIMD-00-212](#) (Washington, D.C.: Aug. 1, 2000).

that provides a systematic way for agencies to minimize risks while maximizing the returns of investments.²²

- During the selection phase, the organization (1) identifies and analyzes each project's risks and returns before committing significant funds to any project and (2) selects those IT projects that will best support its mission needs.
- During the control phase, the organization ensures that, as projects develop and investment expenditures continue, the project continues to meet mission needs at the expected levels of cost and risk. If the project is not meeting expectations or if problems arise, steps are quickly taken to address the deficiencies.
- During the evaluation phase, actual versus expected results are compared once a project has been fully implemented. This is done to (1) assess the project's impact on mission performance, (2) identify any changes or modifications to the project that may be needed, and (3) revise the investment management process based on lessons learned.

Consistent with our architecture management framework,²³ our investment management framework²⁴ recognizes the importance of an enterprise architecture as a critical frame of reference for organizations making IT investment decisions, stating that only investments that move the organization toward its target architecture—as defined by its sequencing plan—should be approved, unless a waiver is provided or a decision is made to modify the architecture. Moreover, this framework states that an organization's policies and procedures should describe the relationship between its architecture and its investment decision-making authority. Our experience has shown that mature and effective management of IT investments can vastly improve government performance and accountability, help to avoid wasteful IT spending, and leverage opportunities to improve delivery of services to the public.

²²GAO, *Executive Guide: Improving Mission Performance Through Strategic Information Management and Technology*, [GAO/AIMD-94-115](#) (Washington, D.C.: May 1994); Office of Management and Budget, *Evaluating Information Technology Investments, A Practical Guide* (Washington, D.C.: Nov. 1995); GAO, *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-making*, [GAO/AIMD-10.1.13](#) (Washington, D.C.: Feb. 1997); and [GAO-04-394G](#).

²³[GAO-03-584G](#).

²⁴[GAO-04-394G](#).

DOD's Institutional Approach to Business Systems Modernization

DOD's institutional approach to managing its business systems modernization efforts has changed several times since 2001. Most recently, in 2005, the department reassigned responsibility for providing executive leadership for the direction, oversight, and execution of its business transformation and systems modernization efforts to several entities. These entities include the DBSMC, which serves as the highest ranking governance body for business systems modernization activities; the Principal Staff Assistants, who serve as the certification authorities for business system modernizations in their respective core business missions; the IRBs, which form the review and decisionmaking bodies for business system investments in their respective areas of responsibility; and the Business Transformation Agency (BTA),²⁵ which leads and coordinates business transformation efforts across the department. Table 1 lists these entities and their roles and responsibilities.

Table 1: Roles and Responsibilities of Governance Entities

Entity	Roles and responsibilities	Membership
Defense Business Systems Management Committee	<ul style="list-style-type: none"> Provides strategic direction and plans for the business mission area in coordination with the warfighting and enterprise information environment mission areas. Serves as approving authority for business system modernization. Approves business mission area transformation plans and coordinates transition planning in a documented program baseline with critical success factors, milestones, metrics, deliverables, and periodic program reviews. Establishes key metrics and targets by which to track business transformation progress. Establishes policies and approves the business mission area strategic plan, the transition plan for implementation for business systems modernization, the transformation program baseline, and the business enterprise architecture. Executes a comprehensive communications strategy. 	Chaired by the Deputy Secretary of Defense; Vice Chair is the Under Secretary of Defense for Acquisition, Technology, and Logistics. Includes senior leadership in the Office of the Secretary of Defense, the military services' secretaries, and defense agencies' heads, such as the Assistant Secretary of Defense (Networks and Information Integration)/Chief Information Officer (ASD(NII)/CIO), the Vice Chairman of the Joint Chiefs of Staff, and the Commanders of the U.S. Transportation Command and Joint Forces Command.
Principal Staff Assistants	<ul style="list-style-type: none"> Support the DBSMC's management of enterprise business IT investments. Serve as the certification authorities accountable for the obligation of funds for respective business system modernizations within designated core business missions.^a Provide the DBSMC with recommendations for system investment approval. 	Officials who report directly to the Secretary or Deputy Secretary of Defense. These include the Under Secretaries of Defense; the Assistant Secretaries of Defense; the General Counsel of the Department of Defense; the Assistants to the Secretary of Defense; and the Directors of the Office of the Secretary of Defense.

²⁵The Business Management Modernization Program's mission for advancing departmentwide business transformation efforts, particularly with regard to business systems modernization, has been absorbed into the BTA.

Entity	Roles and responsibilities	Membership
Investment Review Boards	<ul style="list-style-type: none"> • Serve as the oversight and investment decision-making bodies for those business capabilities that support activities under their designated areas of responsibility. • Assess investments relative to their impact on end-to-end business process improvements supporting warfighter needs. • Certify that all business systems investments costing more than \$1 million are integrated and compliant with the business enterprise architecture. 	<p>Includes the Deputy Secretary of Defense; the Under Secretary of Defense (Comptroller); Under Secretary of Defense for Acquisition, Technology, and Logistics; Assistant Secretary of Defense (Personnel and Readiness); ASD(NII)/CIO; military services; defense agencies; and combatant commands.</p>
Business Transformation Agency ^b	<ul style="list-style-type: none"> • Serves as the day-to-day management entity of the business transformation effort at the DOD enterprise level. • Provides support to the executive governance bodies. • Integrates the work of the Principal Staff Assistants in the areas of business process reengineering, core business mission activities, and IRB matters. 	<p>Operates under the authority, direction, and control of the Under Secretary of Defense for Acquisition, Technology, and Logistics—the vice chair of the DBSMC. The day-to-day direction, management, and oversight is provided cooperatively by the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management).</p>

Source: DOD.

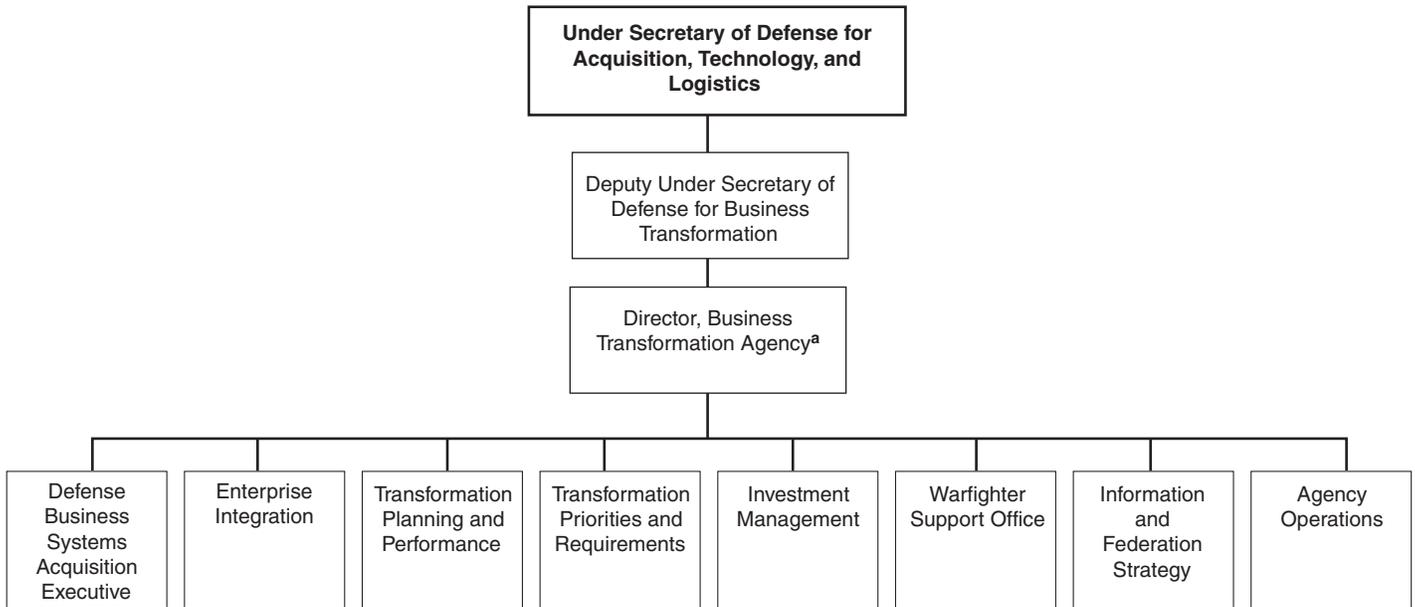
^aThe five core business missions are described in table 3.

^bThe organizational structure of the agency is outlined in figure 1 and the roles and responsibilities of the agency divisions are described in table 2.

The BTA, established in 2005, is organized into eight divisions, one of which is the office of the Defense Business Systems Acquisition Executive—the component acquisition executive for DOD enterprise-level systems and initiatives.²⁶ Figure 1 outlines the organizational structure of the agency and table 2 shows the roles and responsibilities of the agency divisions.

²⁶An enterprise-level system supports cross-organizational requirements, rather than a single group or component within an agency or organization. A DOD-wide system refers to a system for all of DOD. For example, the Defense Civilian Personnel Data System is the system that standardizes civilian human resource processes and promotes efficiency of service delivery for all DOD civilian personnel. An enterprise-level initiative refers to an initiative of an enterprise, rather than a group or component within an agency or organization. At DOD, an enterprise-level initiative can be an enterprise system, program, project, activity, or a family of enterprise systems.

Figure 1: Business Transformation Agency Organization



Source: DOD.

^aThis role is temporarily filled by the Deputy Under Secretary of Defense for Business Transformation and the Deputy Under Secretary of Defense for Financial Management.

Table 2: Business Transformation Agency Divisions

Office	Description
Defense Business Systems Acquisition Executive	<ul style="list-style-type: none"> Develops, coordinates, and integrates projects, programs, systems, and initiatives that provide DOD enterprisewide business capabilities to the warfighter. Exercises acquisition executive oversight for DOD enterprise-level business systems assigned by the DBSMC. Serves as the milestone decision authority for specific programs as directed by the DBSMC, and as the DOD component acquisition executive for business systems. Manages resources, including fiscal, personnel, and contracts for assigned systems and programs.
Enterprise Integration	<ul style="list-style-type: none"> Supports the integration of enterprise-level business capabilities. Ensures adoption of DOD-wide information and process standards, as defined in the business enterprise architecture (BEA).
Transformation Planning and Performance	<ul style="list-style-type: none"> Maintains and updates the department's BEA and corresponding enterprise transition plan. Monitors the performance of enterprise programs and initiatives by ensuring that they meet the milestones documented in the enterprise transition plan. Includes the Milestone Assurance Team, which monitors the performance of enterprise-level programs and initiatives.

Office	Description
Transformation Priorities and Requirements	<ul style="list-style-type: none"> • Serves as the primary link to the Principal Staff Assistants within the Office of the Secretary of Defense as well as other DOD-level organizations including the US Transportation Command, the Defense Logistics Agency, and the Defense Finance and Accounting Service. • Ensures that the functional priorities and requirements of these organizations are reflected in both the BEA and the enterprise transition plan, as well as in the guidance for business systems investment management. • Comprises a mix of senior leaders from both government and industry that have experience in business processes and systems technology.
Investment Management	<ul style="list-style-type: none"> • Provides leadership in investment management for DOD enterprise-level business systems. • Supports and coordinates IRB processes and actions for certification. • Reports on IRB certification status in congressional reports and DBSMC meetings. • Updates and defines IRB data elements in the DOD Information Technology Portfolio Repository and conducts the systems inventory for OMB.
Warfighter Support Office	<ul style="list-style-type: none"> • Identifies enterprise-level business issues that directly impact the warfighter and works to resolve these issues via systems capability and process improvements. • Engages with joint staff and combatant commands to identify and communicate requirements to the agency. • Monitors business process and system improvement initiatives sponsored by the agency and ensures their progress in accordance with performance objectives.
Information and Federation Strategy	<ul style="list-style-type: none"> • Manages the information strategy, which encompasses integration efforts, strategic planning, change management, and long-term internal and external communications. • Ensures that integrated best industry practices are applied to all areas of strategic planning and communications for the agency.
Agency Operations	<ul style="list-style-type: none"> • Provides centralized support across the agency, such as administrative services, personnel and staffing, contracting, budget, IT, security, and training. • Supports the monthly DBSMC meetings. • Coordinates with external stakeholders. • Establishes and maintains a central repository for records, deliverables, and policies for the agency.

Source: DOD.

DOD’s Business Enterprise Architecture: A Brief Description

In 2005, DOD adopted a 6-month incremental approach to developing its enterprise architecture as either a major release or a minor release.²⁷ DOD released version 3.0 of the business enterprise architecture on September 28, 2005, describing it as the initial baseline. According to DOD, this version was intended to provide a blueprint to help ensure near-term delivery of the right capabilities, resources, and materiel to the warfighter. To do so, this version focused on six business enterprise priorities—which DOD states are short-term objectives to achieve immediate results, within

²⁷According to DOD, major releases are to have substantially new architecture content that incorporates emerging enterprise priorities and capabilities in support of DOD enterprise systems and initiatives and the IRBs. Minor releases are not to contain new enterprise priorities or business capabilities, but instead are to provide extension and “clean up” of the preceding releases.

DOD's five core business missions—to be addressed through identification of corporate business needs and analysis of capability gaps (see table 3). The core business missions transcend DOD's various functional areas (e.g., planning, budgeting, IT, procurement, and maintenance) and are intended to be the means through which end-to-end warfighter support is delivered. Responsibility for the core business missions is assigned to specific Principal Staff Assistants.

Table 3: Core Business Missions and Associated Principal Staff Assistants

DOD core business mission	Description	Principal Staff Assistants
Human Resources Management	This mission includes all human resources-related processes necessary to recruit, train, and prepare personnel for warfighter organizations. It also includes providing trained, healthy, and ready personnel to combatant and combat support organizations, and ensures timely and accurate access to compensation and benefits for all DOD personnel.	Under Secretary of Defense (Personnel and Readiness)
Weapon System Lifecycle Management	This mission includes full life-cycle management of defense acquisition of weapons systems and automated information systems, including requirements, technology, development, production, and sustainment.	Under Secretary of Defense for Acquisition, Technology, and Logistics
Materiel Supply and Service Management	This mission includes the management of supply chains of materiel supply and services to maintain the readiness of non-deployed and deployed warfighters to support operations. It also includes all aspects associated with acquiring, storing, and transporting all classes of supplies.	Under Secretary of Defense for Acquisition, Technology, and Logistics
Real Property and Installations Lifecycle Management	This mission includes the provision of installations and facilities to house military forces, to store and maintain military equipment, and to serve as training and deployment platforms for dispatching warfighter units.	Under Secretary of Defense for Acquisition, Technology, and Logistics
Financial Management	This mission includes the provision of accurate and reliable financial information in support of the planning, programming, budgeting, and execution process to ensure adequate financial resources for warfighting mission requirements. It also includes providing information to reliably cost the conduct, output, and performance of DOD operations and missions, and the programs to support them.	Under Secretary of Defense (Comptroller)

Source: DOD.

Table 4 provides descriptions of the business enterprise priorities. According to the department, these business enterprise priorities will evolve and expand in future versions of the architecture.

Table 4: Business Enterprise Priorities

Business Enterprise Priority	Description
Personnel Visibility	Providing access to reliable, timely, and accurate personnel information for warfighter mission planning.
Acquisition Visibility	Providing transparency and access to acquisition information that is critical to supporting life-cycle management of the department's processes for delivering weapons systems and automated information systems.
Common Supplier Engagement	Aligning and integrating policies, processes, data, technology, and people to simplify and standardize the methods that DOD uses to interact with commercial and government suppliers.
Materiel Visibility	Improving supply chain performance.
Real Property Accountability	Acquiring access to real-time information on DOD real property assets.
Financial Visibility	Providing immediate access to accurate and reliable financial information that will enhance efficient and effective decision making.

Source: DOD.

In addition to focusing the scope of version 3.0 of the architecture on these priorities within the five core business missions, the extent to which each priority was to be addressed, according to DOD, was limited to answering four key groups of questions:

- Who are our people, what are their skills, and where are they located?
- Who are our industry partners, and what is the state of our relationship with them?
- What assets are we providing to support the warfighter, and where are these assets deployed?
- How are we investing our funds to best enable the warfighting mission?

To produce a version of the architecture within this scope, DOD created 12 of the 26 recommended products included in the *DOD Architecture Framework*—the structural guide that the department has established for developing an architecture²⁸—including 7 products that the framework designates as “essential.” For example, one essential product is the Operational Node Connectivity Description—a graphic showing

²⁸DOD, *Department of Defense Architecture Framework*, Version 1.0, Volume 1 (Aug. 2003) and Volume 2 (Feb. 2004).

“operational nodes” (organizations), including a depiction of each node’s information exchange needs.

On March 15, 2006, DOD released version 3.1 of the business enterprise architecture. According to program officials and our review of program documentation, version 3.1 is a minor release and—similar to version 3.0—addresses enterprise-level business and strategic plans, goals, objectives, and strategies. Program officials also noted that version 3.1 continues to be an outcome-based architecture that is focused on six business enterprise priorities within DOD's five core business missions, and that this version was developed following the same methodology and architectural framework as version 3.0. Program officials stated that the next release (version 4.0) will be similar to version 3.1, because it will also be a minor release.

Fiscal Year 2005 National Defense Authorization Act Requirements

Congress included six provisions in the Act²⁹ that are aimed at ensuring DOD’s development of a well-defined business enterprise architecture and associated enterprise transition plan, as well as the establishment and implementation of effective investment management structures and processes. The requirements are as follows:

(1) Develop a business enterprise architecture that:

- includes an information infrastructure that, at a minimum, would enable DOD to:
 - comply with all federal accounting, financial management, and reporting requirements;
 - routinely produce timely, accurate, and reliable financial information for management purposes;
 - integrate budget, accounting, and program information and systems; and
 - provide for the systematic measurement of performance, including the ability to produce timely, relevant, and reliable cost information;

²⁹Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Pub. L. No. 108-375, § 332, 118 Stat. 1811, 1851-1856 (Oct. 28, 2004) (codified in part at 10 U.S.C. § 2222).

-
- includes policies, procedures, data standards, and system interface requirements that are to be applied uniformly throughout the department; and
 - is consistent with OMB policies and procedures.

(2) Develop a transition plan for implementing the architecture that includes:

- an acquisition strategy for new systems needed to complete the enterprise architecture;
- a list and schedule of legacy business systems to be terminated;
- a list and strategy of modifications to legacy business systems; and
- time-phased milestones, performance metrics, and a statement of financial and non-financial resource needs.

(3) Identify each business system proposed for funding in DOD's fiscal year budget submissions and include:

- information on each business system proposed for funding in that budget;
- funds for current services and for business systems modernization; and
- the designated approval authority for each business system.

(4) Delegate the responsibility for business systems to designated approval authorities within the Office of the Secretary of Defense.

(5) Require each approval authority to establish investment review structures and processes, including a hierarchy of IRBs—each with appropriate representation from across the department. The review process must cover:

- review and approval of each business system by an IRB before funds are obligated;
- at least an annual review of every business system investment;
- use of threshold criteria to ensure an appropriate level of review and accountability;

-
- use of procedures for making architecture compliance certifications;
 - use of procedures consistent with DOD guidance; and
 - incorporation of common decision criteria.

(6) Effective October 1, 2005, DOD may not obligate appropriated funds for a defense business system modernization with a total cost of more than \$1 million unless the approval authority certifies that the business system modernization:

- complies with the business enterprise architecture;
- is necessary to achieve a critical national security capability or address a critical requirement in an area such as safety or security; or
- is necessary to prevent a significant adverse effect on an essential project in consideration of alternative solutions, and the certification is approved by the DBSMC.

Recent Review Indicates DOD Has Begun to Address Long-standing Weaknesses in Institutional Approach to Business Systems Modernization

Between May 2001 and July 2005, we have reported on DOD's efforts to develop an architecture and to establish and implement effective investment management structures and processes.³⁰ These reports identified serious problems and concerns about the department's architecture program, the quality of the architecture and the transition plan, and the lack of an investment management structure and controls to implement the architecture. To address these concerns, we made 34 recommendations to ensure that the architecture was well-defined, managed, and implemented.

In response to our recommendations and requirements in the Act and as described in the previous section, in 2005 DOD fundamentally changed its institutional approach to architecture development, management, and implementation. Consistent with our recommendations, DOD has also adopted an incremental approach to developing a purpose-driven and standards-based enterprise architecture, and it has established a tiered accountability structure through a hierarchy of investment oversight and decision-making entities for reviewing and approving business system investments.

In November 2005,³¹ we reviewed DOD's efforts to satisfy the six requirements cited in the Act. In our report and in testimony,³² we stated

³⁰GAO, *Information Technology: Architecture Needed to Guide Modernization of DOD's Financial Operations*, [GAO-01-525](#) (Washington, D.C.: May 17, 2001); *DOD Business Systems Modernization: Improvements to Enterprise Architecture Development and Implementation Efforts Needed*, [GAO-03-458](#) (Washington, D.C.: Feb. 28, 2003); *Information Technology: Observations on Department of Defense's Draft Enterprise Architecture*, [GAO-03-571R](#) (Washington, D.C.: Mar. 28, 2003); *Business Systems Modernization: Summary of GAO's Assessment of the Department of Defense's Initial Business Enterprise Architecture*, [GAO-03-877R](#) (Washington, D.C.: July 7, 2003); *DOD Business Systems Modernization: Important Progress Made to Develop Business Enterprise Architecture, but Much Work Remains*, [GAO-03-1018](#) (Washington, D.C.: Sept. 19, 2003); *DOD Business Systems Modernization: Limited Progress in Development of Business Enterprise Architecture and Oversight of Information Technology Investments*, [GAO-04-731R](#) (Washington, D.C.: May 17, 2004); *DOD Business Systems Modernization: Billions Being Invested without Adequate Oversight*, [GAO-05-381](#) (Washington, D.C.: April 29, 2005); *DOD Business Systems Modernization: Long-standing Weaknesses in Enterprise Architecture Development Need to Be Addressed*, [GAO-05-702](#) (Washington, D.C.: July 22, 2005).

³¹[GAO-06-219](#).

³²[GAO-06-219](#); and *Defense Management: Foundational Steps Being Taken to Manage DOD Business Systems Modernization, but Much Remains to be Accomplished to Effect True Business Transformation*, [GAO-06-234T](#) (Washington, D.C.: Nov. 9, 2005).

that DOD had partially satisfied the four legislative requirements relating to architecture development, transition plan development, budgetary disclosure, and investment review; it had satisfied the provision concerning designated approval authorities; and it was in the process of satisfying the provision for certification and approval of modernizations costing in excess of \$1 million. We concluded that the department had made important progress in establishing the kind of fundamental management structures and processes that are needed to correct the long-standing and pervasive IT management weaknesses that have led to our designation of DOD business systems modernization as a high-risk program, and that this progress provided a foundation on which to build. However, we also concluded that much more remained to be accomplished to fully satisfy the Act's requirements and address the department's IT management weaknesses, particularly with regard to sufficiently developing the enterprise architecture and transition plan and ensuring that investment review and approval processes are institutionally implemented.

DOD Is Taking Steps to Address Act's Requirements and Improve Approach to Modernizing Business Systems

DOD continues to take incremental steps to comply with the remaining five requirements of the Act and improve its business systems modernization approach. On March 15, 2006, DOD released a minor update to its business enterprise architecture (version 3.1), developed an updated enterprise transition plan, and issued its annual report to Congress describing steps taken and planned relative to the Act's requirements, among other things. These steps address several of the missing elements we previously identified relative to the legislative provisions concerning the architecture, transition plan, budgetary disclosure, investment review, and the reviews of systems costing in excess of \$1 million. DOD officials told us that additional steps are intended to fully implement the Act's requirements and address our prior concerns. According to program officials, this continued progress is a reflection of DOD leadership's commitment to effective business systems modernization. While this progress better positions the department to address the business systems modernization high-risk area, sustained leadership is essential to further improve its modernization approach, fully address the Act's requirements, and ultimately acquire and implement modernized business systems.

DOD Continues to Address Limitations in Prior Version of Architecture

Version 3.1 of the business enterprise architecture, according to DOD's most recent annual report to Congress, resolves several of the architecture gaps identified in the prior version and introduces several other minor improvements, but it does not include major content changes. This version

reflects steps taken by DOD to address some of the missing elements, inconsistencies, and usability issues that we identified in our prior report³³ related to the Act's requirements and related architecture guidance. According to DOD officials, they are committed to incrementally evolving the architecture's scope, content, internal alignment, and usability. Until they do, however, the architecture's utility will be limited.

With regard to complying with federal accounting, financial management, and reporting requirements, the architecture has much of the information needed to achieve compliance with the Department of the Treasury's *United States Standard General Ledger*,³⁴ such as the data elements or attributes that are needed to facilitate information sharing and reconciliation with the Treasury. In addition, the SFIS,³⁵ which includes a standard accounting classification structure, can allow DOD to standardize financial data elements necessary to support budgeting, accounting, cost management, and external reporting; it also incorporates many of the *Standard General Ledger's* attributes.

Further, version 3.1 provides new business rules for intra-governmental transactions³⁶ that can be automated to enforce compliance with federal accounting, financial management, and reporting requirements. For example, version 3.1 includes the intra-governmental transactions business rule "ENT_Available_Reimbursable_Authority"³⁷ to enforce compliance with a Generally Accepted Accounting Principle standard that funds to be paid can be received. Business rules are important because they explicitly translate important business policies and procedures into specific, unambiguous rules that govern what can and cannot be done.

However, version 3.1 does not yet address the locations where specified activities are to occur and where the systems are to be located. Program officials agreed; however, they stated that the architecture is not intended to include this level of detail because it is capabilities-based rather than

³³[GAO-06-219](#).

³⁴The *United States Standard General Ledger* provides a uniform chart of accounts and technical guidance used in standardizing federal agency accounting.

³⁵ SFIS is the department's common financial business language.

³⁶Intra-governmental transactions involve sales, services, or transfers between two entities of the federal government.

³⁷The ENT designation represents all business enterprise priorities.

solutions-based, and they said that this information will be contained either within the department's Global Information Grid³⁸ or in individual systems' program documentation. As previously reported,³⁹ we do not agree that information pertaining to locations is only germane to the solutions-based architectures, and the explicit linkage between the business enterprise architecture and Global Information Grid is not apparent. The identification of operationally significant and strategic business locations, as well as the need for a business logistics model, is a generally accepted best practice for defining the business operations of an architecture.⁴⁰ This is because the cost and performance of implemented business operations and technology solutions are affected by the location and therefore need to be examined, assessed, and decided on in an enterprise context rather than in a piecemeal, systems-specific fashion.

In addition, the architecture does not provide for compliance with all federal accounting, financial, and reporting requirements. For example, it does not apply the concept of tiered accountability to identify which laws, policies, and regulations are relevant at the enterprise level. Until it does, the department cannot effectively identify overlaps in IT spending by the components⁴¹ and programs for common functions or enterprise requirements. In addition, some business rules are at inconsistent levels of detail within the architecture. For example, some business rules are defined in high-level conceptual terms (e.g., "ENT_Cost_Reporting") while others are defined more specifically at an operational level (e.g., "ENT_DOD_Obligations_Against"). Until standard enterprise-level operational rules are defined and developed, DOD components will continue to implement operational procedures that are inconsistent because they are based on their own unique interpretations of the laws, policies, and regulations.

³⁸DOD defines the Global Information Grid as the globally interconnected, end-to-end set of information, capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support personnel.

³⁹[GAO-06-219](#).

⁴⁰See, for example, J. A. Zachman, "A Framework for Information Systems Architecture," *IBM Systems Journal* 26, no. 3 (1987); Paula Hagan, "Relating Elements of the Zachman Framework, Spewak's Enterprise Architecture Planning, and DOD Products" (June 18, 2002); and B. Craig Meyers and Patricia Oberndorf, "Managing Software Acquisition Open Systems and COTS Products" (Addison-Wesley, 2001).

⁴¹DOD "components" include the military services, combatant commands, defense agencies, and DOD field activities.

With regard to timely, accurate, and reliable financial information for management purposes, we reported in November 2005⁴² that SFIS had not been completed or implemented and that the architecture had yet to include standard definitions of key terms in the architecture—such as all enterprise-level terms. Since then, the department has completed phase I of the SFIS initiative, which is focused on standardizing general ledger and external financial reporting requirements, and has incorporated associated definitions in the architecture. In addition, the department continues to evolve the integrated dictionary and include definitions and descriptions of many terms used in the architecture. For example, the integrated dictionary in version 3.1 includes a business enterprise priority dictionary from which it is easy to find descriptions of business priorities such as “acquisition visibility,” “common supplier engagement,” and “financial visibility.” Further, version 3.1 provides additional compliance based on modifications to intra-governmental transaction concepts (e.g., a standard capability for creating and routing requisitions, purchase orders, billings, payments, and collections) to provide enhanced visibility to buying and selling transactions between entities of the federal government. This enhanced visibility facilitates easy access to information about intra-governmental transactions, thereby supporting the requirement to routinely produce timely information.

However, additional SFIS definition efforts remain under way, and the department plans to further define key data elements and attributes that are not yet in the architecture. For example, according to program officials, data elements—such as those relating to the planning, programming, and budgeting business process area—have yet to be defined. According to DOD, these data elements will be in the next version of the architecture. Further, although the integrated dictionary contains definitions of many terms (e.g., business capabilities, data objects, and system functions), it has yet to contain definitions of key accounting and budget terms such as “balance forwarded” and “receipt balances” that are used in the description of the data object termed “Receipt Account Trial Balance and Ledgers.” According to DOD’s architecture framework, the integrated dictionary should enable the set of architecture products to stand alone, allowing them to be read and understood with minimum reference to outside resources. Program officials agreed and stated that both the SFIS and the integrated dictionary will evolve and be incorporated into future releases.

⁴²[GAO-06-219](#).

Moreover, version 3.1 does not identify and explicitly define all business rules that would enable the financial information to be verified and validated on the basis of timeliness, accuracy, and reliability. For example, although a *United States Standard General Ledger* transaction library⁴³ was developed, its use as a business rule in a business process model—or an enabler to an operational activity to verify and validate the accuracy of transaction postings (or the relationships among transactions)—is not explicitly defined and identified in version 3.1. In addition, architectural elements that are identified and intended to address this requirement are not always well defined. For example, “review and certify financial statement” is identified as a process in the integrated dictionary, but depicted as an operational event in the process labeled “perform financial reporting” in the operational event-trace description product, which indicates when activities are to occur within operational processes. In addition, “perform financial reporting” is identified as both an event and a process in the integrated dictionary. Beyond these definitional ambiguities, identified business rules are not always allocated to specific systems in the architecture. For example, business rules are not allocated to the Business Enterprise Information Services—an enterprise-level automated reporting system intended to provide timely, accurate, and reliable business information across the department to support auditable financial statements and provide detailed financial information visibility for management in support of the warfighter; and to integrate budget, accounting, and program information that is widely dispersed among systems and organizations across the department. Such limitations constrain the utility and effectiveness of the architecture in guiding and constraining system development.

With regard to the integration of budgeting, accounting, and programming information and systems, we reported in November 2005⁴⁴ that the architecture did not include certain elements—such as a fully defined and implemented SFIS—and all systems needed to achieve integration. According to DOD, version 3.1 incorporates 59 SFIS phase 1 data elements and 109 business rules. In addition, this version provides content relevant

⁴³This is a library of DOD standard accounting transactions that result from specific business events (e.g., ordering depot-level repair parts). It can be used as a baseline to institutionalize the *United States Standard General Ledger* across components; and along with SFIS, it provides a standard for DOD to update existing (and deploy new) business systems.

⁴⁴[GAO-06-219](#).

to the integration of intra-governmental transaction functionality for reimbursable orders, which is important in addressing the financial visibility and common supplier engagement business enterprise priorities. This functional integration can lead to the simplification of system and data integration. Nevertheless, version 3.1 does not specify all systems needed to achieve integration, as evidenced by instances in which the architecture provides “placeholders” or generic references for yet-to-be-defined systems (e.g., Financial Management System Entity). Program officials agreed and stated that these systems would be added as solutions are defined to address identified capability gaps.

In addition, although version 3.1 includes separate entity relationship diagrams for the accounting, budget, and cost functional areas, it does not describe the relationships of entities across the planning, programming, budgeting, and execution process. According to the architecture’s overview and summary information, this overall business process has yet to be fully developed, including definition around the interdependencies that currently exist in the “As Is” planning, programming, budgeting, and execution process. As a result, the architecture does not yet support effective development of planning, programming, budgeting, and execution systems.

With respect to the systematic measurement of performance—including the ability to produce timely, relevant, and reliable cost information—version 3.1 adds features linking the architecture business capabilities to systems and initiatives in the transition plan. For example, the architecture indicates that the business capability termed “financial reporting” will be enabled by the Business Enterprise Information Services system. These linkages provide an alignment of system investments with the architecture and thus can be used to establish business performance measures for system investments. In addition, the department has developed an initial baseline of capability metrics in the updated transition plan, which according to program officials will be used to measure progress towards achieving capability outcomes.

However, version 3.1 still does not provide for the systematic measurement of performance (i.e., the means by which the department can measure the intended mission value to be delivered by the portfolio of programs in the architecture). The architecture also does not include standard methods to collect and evaluate performance data and SFIS data elements that support systematic measurement of performance have yet to be developed. Program officials acknowledged this missing content and

stated that they plan to include measurements and targets in future releases.

In addition, version 3.1 does not describe business performance shortfalls to be addressed based on a capability gap analysis between the “As Is” and the “To Be” environments. Program officials stated that such performance shortfalls, such as the inability to properly eliminate intra-governmental transactions, are being identified through a variety of sources (e.g., Inspector General and DOD Performance and Accountability reports along with our own reports). However, they agreed that there is a need to synthesize and prioritize these inputs so that a better understanding can be obtained on the performance shortfalls that have to be addressed through the “To Be” solutions.

With respect to policies, procedures, data standards, and system interface requirements, version 3.1 requires that SFIS be established as an enterprisewide data standard for categorizing financial information along several dimensions (e.g., appropriation account, budget program, organizational, transactional, trading partner, and cost accounting) to support financial management and reporting functions. Further, version 3.1 adds greater definition on standard processes, rules, and data for intra-governmental ordering and billing.

However, as stated earlier, SFIS data elements have not been completely defined and continue to evolve. In addition, the architecture has yet to include a systems standards profile to facilitate data sharing among departmentwide business systems and interoperability with departmentwide IT infrastructure systems. Program officials acknowledged that the architecture does not include a systems standards profile and stated that they are working with the Assistant Secretary of Defense (Networks and Information Integration)/Chief Information Officer (ASD(NII)/CIO) to address this in future versions.

With regard to OMB policies and procedures, similar to version 3.0, the latest version does not include a depiction of the “As Is” architecture, which is essential to performing a gap analysis to identify capability and system performance shortfalls that the transition plan is to address. Also, it does not include either an “As Is” or “To Be” depiction of all business processes, such as key aspects of the planning, programming, budgeting, and execution processes; the technology infrastructure; and security architecture. In response, program officials stated that “As Is” environment analyses and definitions have occurred and are planned on in an “as needed” and “just enough” basis. For example, they described “As

Is” analysis and definition that has occurred at the system level for several of the enterprise-level systems (e.g., DOD Real Property Information Systems), and work under way to further understand the interdependencies that exist in the current planning, programming, budgeting, and execution business process as an essential part of developing the “To Be” description of this process. While the “As Is” description is not included in versions 3.0 and 3.1, according to a program official, the “As Is” work is in fact now being used to perform a business capability gap analysis and guide transformation based on the current set of priorities. In our view, the issue is not whether each architecture release includes all of the elements of an “As Is” environment, but that the releases disclose at a minimum the “As Is” analyses that have and that have not been performed. It is also in our view that DOD should describe in the architecture releases the importance or irrelevance of “As Is” analyses to the systems and initiatives in the enterprise transition plan and the operational activities and business processes in the target architecture.

In addition to these areas, version 3.1 has also yet to address other limitations we previously reported. Specifically:

- Version 3.1 products are not yet fully integrated. For example, the operational event-trace description product—which indicates when activities are to occur within operational processes—is decomposed to a greater level of detail than the corresponding operational activity model, which shows the operational activities (or tasks) that are to occur and the input and output process flows among these activities. Program officials acknowledged this and stated that they are working to improve the operational activity models for several business enterprise priorities (e.g., Personnel Visibility and Financial Visibility). In particular, the updated transition plan identifies business capability outcome metrics for additional operational activities, such as “Manage Vacancy Recruiting.”
- Version 3.1 is not yet adequately linked to the component architectures and transition plans, which is particularly important given the department’s federated approach to developing and implementing the architecture. As we previously reported, a federated architecture is composed of a set of coherent but distinct entity architectures. The members of the federation collaborate to develop an integrated enterprise architecture that conforms to the enterprise view and to the overarching rules of the federation. In its March 15, 2006, report to Congress, the department stated that integration will be an ongoing goal. To accomplish this goal, program officials told us that a federation strategy is being developed and will be implemented in future versions of the architecture and transition plan. However, they did not have an enterprise architecture

development management plan containing this strategy.

As we previously reported, the department has taken a 6-month incremental approach to developing the business enterprise architecture and meeting the Act's requirements. DOD officials told us that, as a minor release, version 3.1 was not intended to include new priorities or capabilities; but instead was intended to provide extension and "clean up" of the preceding release. They further stated that this approach of developing minor releases provides the department the means by which to balance architecture maintenance and implementation.

We support DOD taking an incremental approach to developing the business enterprise architecture, recognizing that adopting such an approach is a best practice that we have advocated. In addition, we believe that version 3.1 provides an improved foundation on which to continue to build a more complete architecture.

However, although the department agreed to develop a near-term plan it has not yet developed or established milestones for developing a near- or a long-term plan that will provide details on what will be included in these incremental architecture developments and what will not be included, with particular emphasis and clarity around the near-term increments. Without such a plan, the department is less likely to accomplish intended improvements. In addition, once the missing scope, content, and related shortcomings described is added, the architecture will be a more sufficient frame of reference to optimally guide and constrain DOD-wide system investment decision making.

DOD Has Made and Intends to Make More Improvements to Transition Plan

According to the department's most recent annual report to Congress, the March 15, 2006, version of its enterprise transition plan provides information on progress on major investments over the last 6 months—including key accomplishments and milestones attained, as well as new information on near-term activities (i.e., within the next 6 months) at both the enterprise and component levels. DOD also reports that this latest version of the transition plan indicates which of the limitations and gaps that we identified in the earlier plan have been addressed. DOD has taken a number of steps to improve its enterprise transition plan and address

some of the missing elements that we previously identified⁴⁵ relative to the Act's requirements and related transition planning guidance.

With respect to the development of an acquisition strategy, the March 2006 transition plan refines and updates the September 2005 transition plan. As we previously reported, the September 2005 transition plan was largely based on a bottom-up planning process in which ongoing programs were examined and categorized in the plan around business enterprise priorities and capabilities, including a determination as to which programs would be designated and managed as DOD-wide programs versus component programs. To improve on this plan, the department defines an initiative that is based on shortfalls of current business capabilities. For example, version 3.1 of the architecture includes an initiative—referred to as the intra-governmental transactions initiative—that was based on a current “As Is” business capability shortfall relative to DOD’s ability to properly eliminate intra-governmental transactions. This shortfall was highlighted as a material weakness in DOD’s *Fiscal Year 2005 Performance and Accountability Report*.

DOD continues to validate the inventory of ongoing IT investments that formed the basis for the prior version of the transition plan. Specifically, DOD intends future updates to the plan to continue to introduce the results of ongoing and planned analyses of gaps between its “As Is” and “To Be” architectural environments, in which capability and performance shortfalls are described and investments (such as transformation initiatives and systems) that are to address these shortfalls are clearly identified. In fact, DOD officials stated that they anticipate the scope and funding of some on-going programs in the plan—such as the Defense Integrated Military Human Resources System and the intra-governmental transactions initiative—to be revised to align them to achieve a desired business capability. Program officials stated that this evolution of the plan will be driven by (1) identifying gaps between the architecture requirements and currently planned program activities and (2) planning new systems and initiatives to address gaps identified in priorities, capabilities, and existing program activities. In particular, DOD plans to identify gaps (i.e., shortfalls) in the performance of its business capabilities in the next version of the architecture and, as transformation efforts mature, DOD will introduce a more top-down, capability-based approach.

⁴⁵ [GAO-06-219](#).

With respect to the identification of legacy systems that will and will not be part of the “To Be” architectural environment, including modifications to these systems, the prior plan identified some, but not all, of these systems. To address this limitation, the current plan identifies a number of additional legacy systems that will be terminated and thus will not be part of the target environment. For example, the plan now includes a number of recently determined termination dates for systems such as the Cash Reconciliation System, Financial Reporting System, and Navy Prompt Payment Interest. Furthermore, in its annual report to Congress, DOD noted that the military services collectively have identified over 290 legacy systems for elimination. DOD also indicated that this number is expected to change over time as more systems come in for certification and enterprise solutions are identified and refined. Moreover, the plan now reflects legacy systems identified to date for enterprise and component priorities and, according to officials, the list will continue to evolve as investment decisions are made via the tiered accountability investment review structure. For example, the Air Force has reassessed the systems migrating to the target Expeditionary Combat Support System, and this is reported in the March 2006 plan. Program officials noted that this number will fluctuate as the scope of the Expeditionary Combat Support System changes.

The March 2006 transition plan, however, does not yet include a number of the elements we have previously identified.

- It does not include a complete listing of the legacy systems that will not be part of the target architecture. In particular, the termination dates for many legacy systems remain unknown, making it unclear whether or not they will be part of the target environment. For example, the plan does not provide specific dates for terminating legacy systems such as the Personnel Records Management System, Defense Departmental Reporting System, and Base Accounts Receivable System.

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- The plan does not include system and budget information for 13 of its 15 defense agencies⁴⁶ and for 8 of its 9 combatant commands.⁴⁷ Program officials told us that information for these defense agencies and combatant commands is not included because, similar to the September plan, it was focused on the largest business-focused organizations in DOD, which they defined as those meeting tier 1 and tier 2 IRB certification criteria.⁴⁸ According to the officials, the majority of these organizations do not have investments that meet the threshold criteria. Nevertheless, they appended that additional components will be added as appropriate when they have large business system investments planned. They also stated that the Defense Information Systems Agency's IT infrastructure investments will not be reflected in the enterprise transition plan because the capabilities that these investments are intended to deliver are reflected in the Global Information Grid rather than in the business enterprise architecture. As we

⁴⁶DOD included system and budget information for the Defense Financial and Accounting Service and Defense Logistics Agency in the transition plan. DOD did not include this information for the following defense agencies: (1) Ballistic Missile Defense Organization, (2) Defense Advanced Research Projects Agency, (3) Defense Commissary Agency, (4) Defense Contract Audit Agency, (5) Defense Contract Management Agency, (6) Defense Information Systems Agency, (7) Defense Intelligence Agency, (8) Defense Legal Services Agency, (9) Defense Security Cooperation Agency, (10) Defense Security Service, (11) Defense Threat Reduction Agency, (12) National Imagery and Mapping Agency, and (13) National Security Agency.

⁴⁷DOD included system and budget information for the Transportation Command in the transition plan. DOD did not include this information for the (1) Central Command, (2) Joint Forces Command, (3) Pacific Command, (4) Southern Command, (5) Space Command, (6) Special Operations Command, (7) European Command, and (8) Strategic Command.

⁴⁸As defined in the department's *Investment Review Process Overview and Concept of Operations for Investment Review Boards*, tier 1 systems include all systems that are classified as a "major automated information system" or a "major defense acquisition program." A major automated information system is a program or initiative that is so designated by the ASD(NII)/CIO or that is estimated to require program costs in any single year in excess of \$32 million (fiscal year 2000 constant dollars), total program costs in excess of \$126 million (fiscal year 2000 constant dollars), or total life-cycle costs in excess of \$378 million (fiscal year 2000 constant dollars). A major defense acquisition program is so designated by the Secretary of Defense, or it is a program estimated by the Secretary of Defense to require an eventual total expenditure for research, development, test, and evaluation of more than \$300 million (fiscal year 1990 constant dollars) or an eventual total expenditure for procurement of more than \$1.8 billion (fiscal year 1990 constant dollars). Tier 2 systems include those with modernization efforts of \$10 million or greater but that are not designated as a major automated information system or a major defense acquisition program, or programs that have been designated as IRB interest programs because of their impact on DOD transformation objectives. The tier system includes another tier in addition to these two: tier 3 systems are modernization efforts that have anticipated costs greater than \$1 million but less than \$10 million.

previously reported,⁴⁹ exclusion of Defense Information Systems Agency investments is particularly limiting, given that this agency and its investments provide the infrastructure services that business systems depend on to operate. Without including information on the timing and content of these investments, the critical relationship between infrastructure and systems becomes blurred in many ways. For example, it becomes unclear whether a new business system will be able to reuse existing infrastructure components or services—thereby leveraging established capabilities—or whether it will have to introduce duplicative capabilities as part of the business system investment.

- The plan does not include a complete listing of the legacy systems that will be part of the target architecture, nor does it include explicit strategies for modifying those legacy systems identified in the plan’s system migration diagrams. In particular, the plan identifies those legacy systems for which some of its functionality will be migrated; however, it does not indicate whether or not these systems will still be operational in the “To Be” environment or will eventually be terminated. For example, although the plan identifies the Cargo Movement Operations System as one where the functionality will only be partially migrated, neither the plan nor version 3.1 of the architecture indicate whether this system will continue to be a part of the target environment.

With respect to milestones, performance metrics, and resource needs, the plan identifies incremental milestones and resource needs for major investments and performance metrics for certain investments. The plan also identifies progress against program milestones that were depicted in the September 2005 plan. For example, in an effort to improve visibility into personnel activities, DOD reported that, for the Defense Civilian Personnel Data System, it met the milestone to deploy a data warehouse capability to facilitate data sharing. It also reported that, for this system, it has set a September 2008 milestone for developing an implementation strategy for integrating modules supporting functionality that is currently provided by stand-alone applications. However, it does not include other important information needed to understand the sequencing of these business investments. In particular, it does not include such information as organizational, process, and technology improvements required to achieve identified milestones. In addition, if an investment is dependent on Net-

⁴⁹[GAO-06-219](#).

Centric Enterprise Services (NCES)⁵⁰ for its core services, it should include the above information in establishing its deployment milestone and detail any issue associated with the incremental deployment of the NCES program.

Beyond these areas, the March 2006 plan has yet to completely define specific business capabilities that are needed to support the business enterprise priorities. For example, according to DOD, the Materiel Visibility business enterprise priority requires additional capabilities related to the supply chain planning process, but neither these capabilities nor associated investments were in the plan. Program officials agreed and stated that future versions of the architecture and the transition plan will address the supply chain planning process, as well as other yet-to-be-identified process requirements (i.e., capability gaps).

As we previously reported, the department is taking an incremental approach to developing its enterprise transition plan. In doing so, the department's latest plan improves on the prior plan, and program officials stated that many of the missing elements that we identified will be included in future iterations of the plan. This incremental approach is both a best practice and is consistent with our previous recommendation. However, the latest plan is still missing important content and the department has yet to develop or establish milestones for developing a near- or a long-term plan that will provide details on what will be included in each incremental iteration of the enterprise transition plan, with particular emphasis and clarity focused on the near-term increments. Without such a plan, the department is less likely to accomplish intended improvements. A transition plan is to be an acquisition strategy that recognizes timing and technological dependencies among planned systems investments, as well as other considerations, such as market trends and return on investment. The plan should enable the department to affirm that the set of programs in the plan are the appropriate ones to fill the gap between where it is now architecturally and where it wants to be. In addition, the plan should not only define schedule milestones but also include commitments for system capabilities and associated outcomes. Once missing content is added and all planned investments are validated

⁵⁰NCES is intended to provide capabilities that are key to enabling ubiquitous access to reliable decision-quality information. NCES capabilities can be packaged into four product lines: service-oriented architecture foundation (e.g., security and information assurance), collaboration (e.g., application sharing), content discovery and delivery (e.g., delivering information across the enterprise), and portal (e.g., user-defined Web-based presentation).

by capability gap analyses, the department will be better positioned to sequentially manage the migration and disposition of existing business processes and systems—and the introduction of new ones.

DOD Is Addressing Issues Related to Reporting Business Systems

DOD has taken steps to meet the Act's requirements⁵¹ relative to the identification of all business systems in its IT budget request. In particular, program officials told us that the DOD Information Technology Portfolio Repository (DITPR) has been established as the authoritative repository for certain information about DOD's systems, such as system names and the responsible DOD components. Further, this repository is being expanded to contain information required for the certification, approval, and annual reviews of these business system investments. To ensure consistency of DOD's fiscal year 2007 IT budget submission with this authoritative inventory, DOD has reconciled (and intends to continue reconciling) DITPR with the database that it uses to prepare its IT budget submissions, referred to as Select and Native Programming Data System–Information Technology (SNAP-IT). According to program and military service officials, DOD is taking steps to ensure that each system investment is entered in DITPR and SNAP-IT, as appropriate, and it is continually reconciling the information between the two to ensure consistency.

To further improve the completeness and reliability of the fiscal year 2007 IT budget request, program officials told us that business system investments greater than \$1 million were broken out individually, but that more needs to be done before smaller systems—those with modernization funding less than \$1 million over the future years' defense program (fiscal years 2006-2011)—are individually visible in the budget. DOD's steps should help ensure the completeness and reliability of its IT budget submissions, and increase compliance with the Act's requirements relative to DOD's IT budgetary disclosure.

⁵¹The *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* specifies information that the department is to incorporate in its budget request for fiscal year 2006 and each fiscal year thereafter. Specifically, the Act states that each budget request must include information on (1) each defense business system for which funding is being requested; (2) all funds, by appropriation, for each such business system, including funds by appropriation specifically for current services (operation and maintenance) and systems modernization; and (3) the designated approval authority for each business system.

DOD Has Efforts Under Way to Control its Business System Investments

The Act specifies two basic requirements, effective October 1, 2005, for obligation of funds for business system modernizations costing more than \$1 million. First, it requires that these modernizations be certified by a designated “approval authority”⁵² as meeting specific criteria.⁵³ Second, it requires that the DBSMC approve each certification. The Act also states that failure to do so before the obligation of funds for any such modernization constitutes a violation of the Anti-deficiency Act.⁵⁴ In this regard, the department reported in September 2005 that the DBSMC had approved 166 business system modernizations, and in March 2006 that an additional 60 business systems were approved by the DBSMC. According to DOD, these 226 business systems represent about \$3.6 billion in modernization investment funding.

A key element of the department’s approach to reviewing and approving business systems investments is the use of what it refers to as “tiered accountability.” DOD’s tiered accountability approach involves an investment control process that begins at the component level and works its way through a hierarchy of review and approval authorities, depending on the size and significance of the investment. In our discussions with Army, Navy, and Air Force officials, they emphasized that the success of the process depends on them to perform a thorough analysis of each business system before it is submitted for higher-level review and approval.

According to the department’s March 2006 report, the investment review and approval process has identified over 290 systems for phase-

⁵²Approval authorities, including the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Under Secretary of Defense (Comptroller); the Under Secretary of Defense for Personnel and Readiness; the Assistant Secretary of Defense for Networks and Information Integration/Chief Information Officer of the Department of Defense; and the Deputy Secretary of Defense or an Under Secretary of Defense, as designated by the Secretary of Defense, are responsible for the review, approval, and oversight of business systems and must establish investment review processes for systems under their cognizance.

⁵³A key condition identified in the Act includes certification by designated approval authorities that the defense business system modernization is (1) in compliance with the enterprise architecture; (2) necessary to achieve critical national security capability or address a critical requirement in an area such as safety or security; or (3) necessary to prevent a significant adverse effect on a project that is needed to achieve an essential capability, taking into consideration the alternative solutions for preventing such an adverse effect.

⁵⁴31 U.S.C. § 1341(a) (1) (A); see 10 U.S.C. § 2222(b).

out/elimination. Furthermore, in January 2006, the department eliminated further development of the Forward Compatible Payroll System (FCP). According to the department's fiscal year 2007 budget request selected capital investment report, FCP was intended to address the military pay problems that are generated by the existing obsolete military pay system. However, in reviewing the program status, it was determined that FCP would duplicate the functionality contained in the Defense Integrated Military Human Resources System. Therefore, it was unnecessary to continue investing in two military payroll systems. According to the department's fiscal year 2007 IT budget request, approximately \$33 million was sought for fiscal year 2007 and about \$31 million was estimated for fiscal year 2008 for FCP. Eliminating this duplicative system will enable DOD to use this funding for other priorities. The funding of multiple systems that perform the same function is one reason the department has thousands of business systems. Identifying and eliminating duplicative systems helps optimize mission performance and accountability and supports the department's transformation goals.

The department's March 2006 report to congressional defense committees also notes that the investment review process has identified approximately 40 business systems for which the requested funding was reduced and the funding availability periods were shortened to less than the number of years requested. Based on information provided by the BTA program officials, there was a reduction of funding and the number of years that funding will be available for 14 Army business systems, 8 Air Force business systems, and 8 Navy business systems. More specifically, the Army's Future Combat Systems Advanced Collaborative Environment program requested funding of \$100 million for fiscal years 2006 to 2011, but the amount approved was reduced to approximately \$51 million for fiscal years 2006 to 2008. Similarly, Navy's Military Sealift Command Human Resources Management System requested funding of about \$19 million for fiscal years 2006 to 2011, but the amount approved was approximately \$2 million for the first 6 months of fiscal year 2006. According to Navy officials, this system initiative will be reviewed to ascertain whether it has some of the same functionality as the Defense Civilian Personnel Data System. Funding system initiatives for shorter time periods can help reduce the financial risk by providing additional opportunities for monitoring a project's progress against established milestones and help ensure that the investment is properly aligned with the architecture and the department's overall goals and objectives.

Besides limiting funding as part of the investment review and approval process, this process is also resulting in conditions being place on system

investments. These conditions identify specific actions that must be taken and the specific time frames attached to when the actions must be completed. For example, in the case of the Army's Logistics Modernization Program, a system initiative that we have previously reported on, one of the noted conditions was that the Army had to address the issues discussed in our report.⁵⁵ In our May 2004 report, we recommended that the department establish a mechanism that provides for tracking all business systems modernization conditional approvals to provide reasonable assurance that all specific actions are completed on time.⁵⁶ The department's action is consistent with the intent of our recommendation. Further, the military service officials indicated that the tracking systems will be one of the "tools" they will use as part of the required statutory annual system reviews. In the case of the Army, officials noted that they had requested an update on the status of each condition by April 7, 2006.

Notwithstanding the above described efforts to control the department's business system investments, formidable challenges remain. In particular, military service officials told us that the review of those business systems that have modernization funding of less than \$1 million represents the majority of the department's reported 3,717 business systems, and that reviews of these systems are only now being started on an annual basis. In April 2006, the department issued guidance entitled "Investment Certification and Annual Review Process User Guidance," which complements the department's May 2005 guidance on its IRB process. According to Air Force officials, the additional guidance is intended to help ease the administrative burden associated with performing the system reviews and further instill consistency among the DOD components. However, the extent to which the structures and processes will be applied to the department's 3,717 business systems is still evolving. Given the large number of systems involved, it is important that the system review and approval process be effectively implemented for all systems. For example, we reported in April 2005,⁵⁷ that the Army, the Navy, and the Air Force have 193; 1,512; and 166 logistics systems, respectively. Such large numbers of systems indicate a real possibility for eliminating unnecessary duplication and avoiding unnecessary spending.

⁵⁵ [GAO-04-615](#) and *Army Depot Maintenance: Ineffective Oversight of Depot Maintenance Operations and System Implementation Efforts*, [GAO-05-441](#) (Washington, D.C.: June 30, 2005).

⁵⁶ [GAO-04-615](#).

⁵⁷ [GAO-05-381](#).

DOD Has Not Established All Required Investment Review Boards

The Act directs that DOD establish five IRBs, each responsible and accountable for controlling certain business system investments to ensure compliance and consistency with the business enterprise architecture. Four of the five designated IRBs have been established, the exception being an IRB chaired by the ASD(NII)/CIO. According to the Act and the Deputy Secretary of Defense's March 19, 2005, memorandum, the ASD(NII)/CIO-chaired IRB is responsible and accountable for any business system that primarily supports IT infrastructure or information assurance activities. According to ASD(NII)/CIO officials, this IRB has not been established because the CIO does not have direct control and accountability over any business systems, thus making this IRB unnecessary. These officials further noted that if there is specific infrastructure that would be necessary for a given business system, a representative of the ASD(NII)/CIO office is a participant in each of the other four IRBs.

The Act's requirement that modernizations costing more than \$1 million must be certified by a designated "approval authority" and subsequently approved by the DBSMC prior to funds being obligated not only applies to any business systems that constitute functional area applications but also to any infrastructure that constitutes a business system. Our analysis of the department's detailed fiscal year 2007 budget request documents disclosed approximately \$47 million of infrastructure modernizations costing more than \$1 million that are designated by DOD in those documents as in support of the business mission area. Investment in infrastructure is an integral part of both an enterprise architecture and transition plan, and should, therefore, be subject to the same investment management structures and processes as the application systems that they support.

DOD Is Implementing Our Prior Recommendations

The Act's requirements concerning the architecture, transition plan, budgetary disclosure, and investment management structures and processes—as discussed earlier—are consistent with our prior recommendations. Over the last 5 years, we have made 34 recommendations to assist the department in developing a well-defined and useful business enterprise architecture and using it to gain control over its ongoing business system investments. (See app. II for details on the status of our recommendations.) DOD agreed with our recommendations and stated its commitment to implement them. Of the

34 recommendations, DOD had taken steps to fully implement 4 and 29 of our recommendations were still open as of November 2005, meaning that DOD had yet to fully implement them.⁵⁸

In its March 15, 2006, annual report to Congress, DOD restated its commitment to address each of the remaining 29 open recommendations. It also reported that it had fully implemented 23 of the open recommendations and was in the process of implementing 6.

In taking steps to further comply with the Act, DOD has also taken (and continues to take) actions to implement our open recommendations. Of the 29 remaining recommendations, DOD has taken steps to fully implement 16 and is in the process of implementing the remaining 13. For example, DOD has fully acted on our recommendations to

- issue a policy that directs the development, implementation, and maintenance of an architecture and
- establish a hierarchy of IRBs to gain control over ongoing IT investments.

DOD is also taking steps related to, for example, our recommendations to develop an architecture program management plan and adopt a strategic approach to meeting the program's human capital needs. However, additional steps are needed to fully implement these recommendations.

- The department included a high-level, notional description of steps it plans to take over the next year related to architecture development, maintenance, and implementation. Program officials also described in broad terms these plans orally to us. In particular, the department intends to define and implement a metrics framework to measure results in terms of operational performance improvement, add scope and content to the architecture in 6-month increments, and define and use criteria to gauge investment compliance with the architecture. However, the department has yet to develop an enterprise architecture program management plan to describe, among other things, what the architecture and transition plan increments individually or collectively will include and not include, and how the quality and utility of these increments will be determined.

⁵⁸One of our recommendations was absorbed into another recommendation, which resulted in a total of 29 remaining open recommendations.

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- Program officials told us that they have begun analyzing the architecture program's workforce needs and capabilities using a three-phase approach. Phase I—which according to DOD is complete—resulted in the development of a knowledge and skills model for the program's architecture and transition plan staff. The second phase is in progress—according to DOD—and involves identifying and assessing the knowledge and skills of the existing architecture and transition plan staff. According to program officials, this phase will set overall program needs and provide the basis for identifying gaps and recommendations for filling the gaps. Phase III will implement the recommendations. According to DOD, it has not yet established milestones for Phase III.

Program officials, including the Special Assistant to the Deputy Under Secretary of Defense (Business Transformation) and the Director of Transformation Planning and Performance, stated that the department is committed to addressing all of our open recommendations. However the department has yet to establish milestones for addressing all our recommendations. It is important that the department move swiftly in doing so because these recommendations are aimed at strengthening architecture management activities, adding missing content to architecture products, and controlling ongoing and planned business system investments. Until it does, the department will not be able to effectively guide and constrain its business modernization efforts and move away from non-integrated business systems development efforts.

Conclusions

Since our last report, DOD has continued to make important progress in defining and implementing institutional management controls (i.e., processes, structures, and tools), but much remains to be accomplished relative to the National Defense Authorization Act for Fiscal Year 2005 requirements and relevant guidance. In particular, the business enterprise architecture and the enterprise transition plan are still missing important content and the business system investment process is not yet fully established and institutionalized at all organizational levels. DOD recognizes this and has stated its commitment to incrementally improve its business systems modernization controls relative to most of these areas. It is critically important that DOD swiftly implement our open recommendations, including developing a well-defined enterprise architecture program management plan, as we have previously noted and recommended, and the department has agreed to do so. However, the department has yet to develop this plan or establish milestones for developing it. Until it does, the likelihood of sustained incremental improvement to its modernization management controls will be

diminished and the means of holding the department accountable for such improvement will be missing. Even with this plan and the associated management control improvements, however, the more formidable challenge facing the department is how well it can implement these controls over the years ahead on each and every business system investment. While not a guarantee, institutionalization of well-defined modernization management controls can go a long way in addressing this longer-term challenge.

Recommendations for Executive Action

To further assist the department in institutionalizing well-defined business systems modernization management controls, to facilitate congressional oversight, and promote departmental accountability, we recommend that the Secretary of Defense direct the Deputy Secretary of Defense, as the chair of the DBSMC, to submit an enterprise architecture program management plan to defense congressional committees. At a minimum, the plan should define what the department's incremental improvements to the architecture and transition plan will be, and how and when they will be accomplished, including what (and when) architecture and transition plan scope and content and architecture compliance criteria will be added into which versions. In addition, the plan should include an explicit purpose and scope for each version of the architecture, along with milestones, resource needs, and performance measures for each planned version, with particular focus and clarity on the near-term versions.

Agency Comments and Our Evaluation

In its written comments on a draft of this report, signed by the Deputy Under Secretary of Defense (Business Transformation) and reprinted in appendix III, the department stated that it appreciated our analysis of its plans and activities and our associated recommendations, adding that we continue to be a constructive player in the department's efforts to transform its business operations and that it welcomes our insights and looks forward to our future participation in its transformation efforts. The department also stated that our assessment and findings are a fair representation of DOD's efforts to date, and while it does not agree with all of our points, it recognizes that even in areas of disagreement there is opportunity for dialog and learning. In this regard, the department provided additional comments in two areas.

First, DOD recognized the importance of addressing our recommendations, and stated that it has moved aggressively over the past year to do so. It also stated that it is important that we make recommendations that are sufficiently specific to permit reasonable

implementation and that we provide prompt feedback on whether DOD's implementation actions are in line with the recommendations. We agree and will continue to work proactively and constructively with the department to facilitate the implementation of the recommendations in the future.

Second, DOD stated that it partially agreed with the recommendation in the draft report, characterizing it as developing a departmentwide enterprise architecture program management plan to gain control of the department's IT environment. According to DOD, such a plan would far exceed the current scope of business systems modernization, and thus addressing it would require it to first explore the feasibility of such a departmentwide approach and more time than our recommended July 31, 2006 date for providing the plan to defense congressional committees. Accordingly, DOD stated that it would issue a formal position on our recommendation by September 30, 2006.

We agree that the business enterprise architecture should be departmentwide in scope and that its content should address, and thus allow it to gain control of, the department's business IT environment, which would include both business systems and supporting IT infrastructure and shared services (e.g., information security). However, the recommendation in our draft report was not aimed at adding this scope and content to the architecture and transition plan by July 31, 2006. Rather, it was aimed at developing an incremental plan that would show what missing scope and content would be added in each incremental version of the architecture and transition plan to eventually have an enterprise architecture that addressed the full scope of the department's business IT environment. The exploration activities that DOD identifies in its comments would thus be one aspect of what would be done under this incremental program management plan. Further, as we recommended, this plan would be much clearer and more precise with respect to the purpose, scope, and content of the next version of the architecture and transition plan, as well as the time frames and resources for producing it, and understandably more notional with respect to the later versions that perhaps require exploration activities and further thought.

Because the plan that we recommended is fundamental to the continued improvement of the architecture and transition plan and congressional oversight, we believe that it needs to be developed and provided to defense congressional committees expeditiously. However, to further ensure that the intent of our recommendation is properly interpreted, and to address DOD's concern about the time needed to address it, we have

slightly modified the recommendation to add clarifying language and to exclude a date for the plan's submission to defense congressional committees.

We are sending copies of this report to interested congressional committees; the Director, Office of Management and Budget; the Secretary of Defense; the Deputy Secretary of Defense; the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Under Secretary of Defense (Comptroller); the Assistant Secretary of Defense (Networks and Information Integration)/Chief Information Officer; the Under Secretary of Defense (Personnel and Readiness); and the Director, Defense Finance and Accounting Service. This report will also be available at no charge on our Web site at <http://www.gao.gov>.

If you or your staff have any questions on matters discussed in this report, please contact me at (202) 512-3439 or hiter@gao.gov, or McCoy Williams at (202) 512-9095 or williamsm1@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.



Randolph C. Hite
Director
Information Technology Architecture and Systems Issues



McCoy Williams
Director
Financial Management Assurance

List of Committees

The Honorable John Warner
Chairman
The Honorable Carl Levin
Ranking Minority Member
Committee on Armed Services
United States Senate

The Honorable Ted Stevens
Chairman
The Honorable Daniel K. Inouye
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Duncan L. Hunter
Chairman
The Honorable Ike Skelton
Ranking Minority Member
Committee on Armed Services
House of Representatives

The Honorable C.W. Bill Young
Chairman
The Honorable John P. Murtha
Ranking Minority Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Objectives, Scope, and Methodology

Our objectives were to (1) assess the actions by the Department of Defense (DOD) to comply with the requirements of Section 2222 of Title 10, U.S. Code¹ and (2) determine the extent to which DOD has addressed our prior recommendations.

Consistent with the Act and as agreed with the staffs of congressional defense committees, we used our November 2005 report ([GAO-06-219](#)) as a baseline and evaluated DOD's efforts relative to the remaining five requirements in the Act: (1) development of an enterprise architecture that includes an information infrastructure enabling DOD to support specific capabilities, such as data standards and system interface requirements; (2) development of a transition plan for implementing the enterprise architecture that includes specific elements, such as the acquisition strategy for new systems; (3) inclusion of business systems information in DOD's budget submission; (4) establishment of business systems investment review processes and structures; and (5) approval of defense business systems investments in excess of \$1 million.

To determine whether the architecture addressed the requirements specified in the Act, we reviewed version 3.1 of the business enterprise architecture, which was released on March 15, 2006. This review included analyzing the scope and content of version 3.1 architecture products to determine whether they addressed the missing elements we identified in our November 2005 report. In addition, we requested a traceability matrix demonstrating where in the architecture each of the elements was addressed and interviewed program officials to validate the information in this matrix. In reviewing the products, we focused on the changes from version 3.0 and the traceability matrix prepared by DOD. In addition, we interviewed key program officials, including the Director of Transformation Planning and Performance; Special Assistant to the Deputy Under Secretary of Defense (Business Transformation); Chief Architect; and the Enterprise Transition Plan Team lead, to obtain an understanding of the steps taken and planned to address the missing elements we previously reported and to ascertain the relationship between the architecture and the plan.

¹*Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005*, Public Law 108-375, § 332, 118 Stat. 1811, 1851-1856 (Oct. 28, 2004) (codified in part at 10 U.S.C. § 2222).

To determine whether the enterprise transition plan addressed the requirements specified in the Act, we reviewed the updated enterprise transition plan released on March 15, 2006, and included in DOD's March 15, 2006, annual report to Congress. This review included determining whether the transition plan addressed the missing elements identified in our November 2005 report, such as an acquisition strategy for new systems and a statement of financial and non-financial resource needs. Specifically, we requested a traceability matrix demonstrating where in the transition plan each of the elements was addressed and interviewed program officials to validate the information in this matrix. In reviewing the plan, we focused on the changes from the September 30, 2005, version and the traceability matrix prepared by DOD. We interviewed program officials, including the Director of Transformation Planning and Performance; Special Assistant to the Deputy Under Secretary of Defense (Business Transformation); Chief Architect; and the Enterprise Transition Plan Team lead to obtain an understanding of the steps taken and planned to address the missing elements we previously reported, and to ascertain the relationship between the plan and the architecture.

To determine whether DOD's fiscal year 2007 information technology (IT) budget submission was prepared in accordance with the criteria set forth in the Act, we reviewed and analyzed DOD's fiscal year 2007 IT budget request. As part of our analysis, we determined the portion of the budget request that related to the department's business systems and related infrastructure. We reviewed the accompanying budget exhibits and selected capital investment reports to obtain additional information on specific business systems.

To determine whether DOD has established investment review structures and processes and issued a standard set of investment review and decision-making criteria, we reviewed applicable policies and procedures issued by the department. In this regard, we interviewed program officials to determine whether the one investment review board (IRB) that we reported as not being established in our November 2005 report had since been established, and if not, the reasons why. We also examined process documents to see whether they provide for key requirements in the Act, such as annual reviews of every investment and use of business enterprise architecture compliance criteria.

To determine whether the department was reviewing and approving business system investments exceeding \$1 million, we obtained from DOD the list of business system investments certified by the IRBs and approved by the Defense Business Systems Management Committee. Because of

time constraints, we selectively verified the information provided by the department with the certification and approval information in the budget request to identify any anomalies. We also analyzed the fiscal year 2006 column of the fiscal year 2007 budget request to ascertain the specific number of business systems earmarked for modernization funding in excess of \$1 million. We selected systems from our analysis of the IT budget with DOD's list of systems to ascertain if the business systems were certified and approved as stipulated by the Act. For these selected systems, we obtained and reviewed documentation related to the certification and approval process as specified in the Act and outlined in the department's tiered accountability concept. Furthermore, we met with representatives from the Army, the Navy, and the Air Force to ascertain the specific actions that were taken (or planned to be taken) in order to perform the annual systems reviews as required by the Act.

To determine the extent to which DOD has addressed our open recommendations, we met with program officials, including the Director of Transformation Planning and Performance, Chief Architect, and the Enterprise Transition Plan Team lead, to obtain an understanding of the steps taken and planned to address our recommendations. We obtained and analyzed documentation that described the specific corrective actions taken. We reviewed program documentation, such as the March 15, 2006, annual report, updated transition plan, and version 3.1 of the architecture to determine whether DOD addressed our recommendations related to architecture scope and content. We used our Enterprise Architecture Management Maturity Framework, which describes the stages of management maturity, to update the status of key elements of architecture management best practices that DOD had not adopted. To make this determination, we reviewed program documentation, such as program policies and procedures, configuration and communications plans, and charters for the governance bodies; and we compared them to the elements in the framework. We also reviewed documentation regarding DOD verification and validation activities in the architecture development process. In addition, we reviewed the guidance establishing the IRBs and describing the investment management process.

We did not independently validate the reliability of the cost and budget figures provided by DOD, because the specific amounts were not relevant to our findings.

We conducted our work at DOD headquarters offices in Arlington, Virginia, from January through May 2006 in accordance with generally accepted government auditing standards.

Appendix II: Prior Recommendations on DOD's Business Enterprise Architecture and Investment Management

GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
GAO-01-525: Information Technology: Architecture Needed to Guide Modernization of DOD's Financial Operations, May 17, 2001.			
(1) The Secretary of Defense immediately designate DOD financial management modernization a departmental priority and accordingly direct the Deputy Secretary of Defense to lead an integrated program across the department for modernizing and optimizing financial management operations and systems.	X		Previously implemented
(2) The Secretary immediately issue a DOD policy that directs the development, implementation, and maintenance of an enterprise architecture (EA).	X		The Deputy Secretary of Defense issued a memorandum on February 7, 2005, establishing the Defense Business Systems Management Committee (DBSMC), whose responsibilities, among other things, include the approval of the business enterprise architecture (BEA) and the enterprise transition plan (ETP). On October 7, 2005, the Deputy Secretary of Defense also issued a memorandum establishing the Business Transformation Agency (BTA), which is responsible for maintaining and updating the BEA and the ETP.
(3) The Secretary immediately modify the Senior Financial Management Oversight Council's charter to <ul style="list-style-type: none"> designate the Deputy Secretary of Defense as the Council Chair and the Under Secretary of Defense (Comptroller) as the Council Vice-Chair; empower the Council to serve as DOD's EA steering committee, giving it the responsibility and authority to ensure that a DOD EA is developed and maintained in accordance with the DOD Architecture Framework; empower the Council to serve as DOD's financial management investment review board, giving it the responsibility and authority to (1) select and control all DOD financial management investments and (2) ensure that its investment decisions treat compliance with the EA as an explicit condition for investment approval that can be waived only if justified by a compelling written analysis; and expand the role of the Council's System Compliance Working Group to include supporting the Council in determining the compliance of each system investment with the enterprise architecture at key decision points in the system's development or acquisition life cycle. 	X		In February 2005, the Deputy Secretary of Defense established the DBSMC, as the highest ranking governance body responsible for overseeing DOD business systems modernization efforts and <ul style="list-style-type: none"> designated the Deputy Secretary of Defense as the Chair and the Under Secretary of Defense for Acquisition, Technology, and Logistics as Vice-Chair; assigned the committee the responsibility of reviewing and approving all major releases of the BEA and ETP and assigned the BTA the responsibility for maintaining and updating the BEA in accordance with DOD Architecture Framework; delegated, on March 19, 2005, the authority for the review, approval, and oversight of the planning, design, acquisition, deployment, operation, maintenance, and modernization of defense business systems to the designated approval authority for each business area;^a and issued criteria for reviewing all business systems annually and for certifying business system modernizations over \$1 million. The department's guidance recognizes that one of the key elements in evaluating its business system investments is the importance of being consistent with the BEA.

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
<p>(4) The Secretary immediately make the Assistant Secretary of Defense (Command, Control, Communications, & Intelligence), in collaboration with the Under Secretary of Defense (Comptroller), accountable to the Senior Financial Management Oversight Council for developing and maintaining a DOD enterprise architecture.</p> <p>In fulfilling this responsibility, the Assistant Secretary appoint a chief architect for DOD business management modernization and establish and adequately staff and fund an enterprise architecture program office that is responsible for developing and maintaining a DOD-wide EA in a manner that is consistent with the framework defined in the Chief Information Officer (CIO) Council's published guide for managing enterprise architectures. In particular, the Assistant Secretary should take appropriate steps to ensure that the Chief Architect</p> <ul style="list-style-type: none"> • obtains executive buy-in and support; • establishes architecture management structure and controls; • defines the architecture process and approach; • develops the baseline architecture, the target architecture, and the sequencing plan; • facilitates the use of the architecture to guide business management modernization projects and investments; and • maintains the architecture. 	X		<p>The BTA, whose management and oversight is provided cooperatively by the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management) briefs the DBSMC monthly on, among other things, the status of the BEA. The Assistant Secretary of Defense (Networks and Information Integration)/DOD Chief Information Officer (ASD(NII)/CIO) is a member of the DBSMC.</p> <p>In fulfilling this responsibility, the department has appointed a Chief Architect under the BTA, and developed a position description that outlines the roles and responsibilities of the chief architect. In addition, in July 2001, it established a program office and according to program officials, the department has adequate staff and funding for developing and maintaining the architecture. Moreover, the department has taken steps to</p> <ul style="list-style-type: none"> • obtain executive buy-in and support, as evidence by the establishment of the DBSMC; • establish the architecture management structure and controls—such as establishing one division under the BTA to oversee architecture development and maintenance, and another to oversee the long-term internal and external communication activities; • define the process and approach for developing the current version of the architecture; • develop the target or "To Be" architecture and the transition plan, and intend to incorporate an "As Is" strategy in the next version of the architecture; • use the architecture to guide its business modernization projects and investments; and • assign the BTA the responsibility for maintaining the architecture.
<p>(5) The ASD(NII)/CIO report at least quarterly to the Senior Financial Management Oversight Council on the Chief Architect's progress in developing an EA, including the Chief Architect's adherence to enterprise architecture policy and guidance from the Office of Management and Budget (OMB), the CIO Council, and DOD.</p>	X		<p>In February 2005, the Deputy Secretary of Defense established the DBSMC. As mentioned earlier, the DBSMC is comprised of senior executives from across DOD, including the ASD(NII)/CIO and is chaired by the Deputy Secretary of Defense.</p> <p>As stated earlier, the BTA, whose management and oversight is provided cooperatively by the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management), briefs the DBSMC monthly on—among other things—the status of DOD's efforts to develop, implement, and maintain the architecture and the transition plan, including adherence to relevant policies and guidance.</p>

**Appendix II: Prior Recommendations on
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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(6) The Senior Financial Management Oversight Council report to the Secretary of Defense every 6 months on progress in developing and implementing an EA.	X		In February 2005, the Deputy Secretary of Defense established the DBSMC. As mentioned earlier, the DBSMC is chaired by the Deputy Secretary of Defense, who is briefed monthly on the progress of the architecture's development and implementation. According to the DBSMC charter, the chair will report to the Secretary of Defense, as appropriate.
(7) The Secretary reports every 6 months to the congressional defense authorizing and appropriating committees on progress in developing and implementing an EA.	X		Previously implemented
(8) Until an enterprise architecture is developed and the Council is positioned to serve as DOD's financial management investment review board as recommended, the Secretary of Defense limit DOD components' financial management investments to the deployment of systems that have already been fully tested and involve no additional development or acquisition costs; stay-in-business maintenance needed to keep existing systems operational; management controls needed to effectively invest in modernized systems; and new systems or existing system changes that are congressionally directed or are relatively small, cost effective, and low risk and can be delivered in a relatively short time frame.		X	On June 2, 2005, the Under Secretary of Defense for Acquisition, Technology, and Logistics set forth guidance that identified the processes to establish and operate IRBs for the purpose of reviewing all business system investments at least annually and for certifying business system modernizations over \$1 million as required by the Fiscal Year 2005 National Defense Authorization Act. Furthermore, in April 2006, the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management) issued BEA compliance guidance. Since the April 2006 guidance was issued after completion of our field work, we have not had the opportunity to assess the guidance to ascertain if it addresses the recommendation.
GAO-03-458: DOD Business Systems Modernization: Improvements to Enterprise Architecture Development and Implementation Efforts Needed, February 28, 2003.			
(1) The Secretary of Defense ensure that the enterprise architecture executive committee members are singularly and collectively made explicitly accountable to the Secretary for the delivery of the enterprise architecture, including approval of each version of the architecture.	X		Previously implemented

**Appendix II: Prior Recommendations on
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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(2) The Secretary of Defense ensure that the enterprise architecture program is supported by a proactive marketing and communication program.		X	<p>Under the BTA, the department has established an Information and Federation Strategy office whose responsibilities include internal and external communications. In February 2006, this office developed a communication strategy and communications plan.</p> <p>Based on the best practices defined by the CIO Council's <i>A Practical Guide to Federal Enterprise Architecture</i>, we found that the communications plan adhered to some of the guidelines—such as identifying key audiences, purpose, scope and function and identifying communication tools and a number of outreach programs to be used when conveying the message to the targeted audiences.</p> <p>However, the department's plan and strategy does not fully adhere to the criteria set forth by best practices. In particular, the plan lacked an explanation of roles and responsibilities and does not include details regarding evaluation, metrics, and feedback.</p>
(3) The Secretary of Defense ensure that the quality assurance function includes the review of adherence to process standards and reliability of reported program performance, is made independent of the program management function, and is not performed by subject matter experts involved in the development of key architecture products.	X		<p>The department has established a quality assurance function, which is an embedded process within the overall architecture development. This function includes the review of adherence to process standards, as appropriate, and it reports to a BTA division that is independent of the division responsible for developing and maintaining the architecture. It is also authorized to elevate issues to the Under Secretary of Defense for Acquisition, Technology, and Logistics.</p>
(4) The Secretary gain control over ongoing IT investments by establishing a hierarchy of investment review boards, each responsible and accountable for selecting and controlling investments that meet defined threshold criteria, and each composed of the appropriate level of executive representatives, depending on the threshold criteria, from across the department.		X	<p>On March 19, 2005, the Deputy Secretary of Defense delegated the authority for the review, approval, and oversight of the planning, design, acquisition, deployment, operation, maintenance, and modernization of defense business systems to the designated approval authority for each business area. Additionally, on June 2, 2005, the Under Secretary of Defense for Acquisition, Technology, and Logistics set forth guidance that identified the processes to establish and operate IRBs for the purpose of reviewing all business system investments.</p>
(5) The Secretary gain control over ongoing IT investments by establishing a standard set of criteria to include (a) alignment and consistency with the DOD enterprise architecture and (b) our open recommendations governing limitations in business systems investments pending development of the architecture.		X	<p>As noted above, the Under Secretary of Defense for Acquisition, Technology, and Logistics has issued criteria for reviewing all business system investments. The guidance points out that one of the key elements in evaluating the department's business system investments is the importance of being consistent with the BEA. Furthermore, in April 2006, the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management) issued BEA compliance guidance.</p>

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(6) The Secretary gain control over ongoing IT investments by directing these boards to immediately apply these criteria in completing reviews of all ongoing IT investments and to not fund investments that do not meet these criteria unless they are otherwise justified by explicit criteria waivers.	X		As noted above, the Under Secretary of Defense for Acquisition, Technology, and Logistics has issued criteria for reviewing all business system investments. The guidance points out that one of the key elements in evaluating the department's business system investments is the importance of being consistent with the BEA. Furthermore, in April 2006, the Deputy Under Secretary of Defense (Business Transformation) and the Deputy Under Secretary of Defense (Financial Management) issued BEA compliance guidance, which the IRBs have been directed to use.
GAO-03-1018: DOD Business Systems Modernization: Important Progress Made to Develop Business Enterprise Architecture, but Much Work Remains, September 19, 2003.			
(1) The Secretary of Defense or his appropriate designee define and implement an effective investment management process to proactively identify, control, and obtain DOD Comptroller review and approval of expenditures for new and ongoing business systems investments exceeding \$1 million while the architecture is being developed and after it is completed, and which includes clearly defined domain owners' roles and responsibilities for selecting and controlling ongoing and planned system investments.	X		On June 2, 2005, the Under Secretary of Defense for Acquisition, Technology, and Logistics set forth guidance that is to be used in reviewing all business system investments at least annually and for certifying business system modernizations over \$1 million as required by the Fiscal Year 2005 National Defense Authorization Act. In its March 15, 2006, report to congressional defense committees, the department reported that the DBSMC had certified a total of 226 systems, which represents about \$3.6 billion in modernization funding.
(2) The Secretary of Defense or his appropriate designee implement the core elements in our <i>Enterprise Architecture Framework for Assessing and Improving Enterprise Architecture Management</i> that we identify in this report as not satisfied, including ensuring that minutes of the meetings of the executive body charged with directing, overseeing, and approving the architecture are prepared and maintained.		X	DOD has taken some actions to address the 31 elements identified in GAO's <i>Enterprise Architecture Framework</i> for assessing and improving enterprise architecture management. DOD has addressed 17 of the 31 elements. For example, the BEA is an integral component of the IT investment management process and the quality of the BEA products is measured and reported. DOD has begun to address 7 additional elements. For example, although the BEA plans call for developing metrics for measuring progress, quality, and compliance, it does not call for developing metrics for return on investment. DOD has yet to begin addressing the remaining 7 elements. For example, architecture descriptions have yet to address security and return on architecture investment is not measured and reported.
(3) The Secretary of Defense or his appropriate designee update version 1.0 of the architecture to include the 340 Joint Financial Management Improvement Program requirements that our report identified as omitted or not fully addressed.	X		Previously implemented

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(4) The Secretary of Defense or his appropriate designee update version 1.0 of the architecture to include the 29 key elements governing the "As Is" architectural content that our report identified as not being fully satisfied.		X	<p>Program officials stated that "As Is" environment analyses and definitions have occurred—and are planned on in an "as needed" and "just enough" basis. For example, they described "As Is" analysis and definition that has occurred at the system level for several of the enterprise-level systems (e.g., DOD Real Property Information Systems), and work under way to further understand the interdependencies that exist in the current planning, programming, budgeting, and execution business process as an essential part of developing the "To Be" description of this process. While not included in versions 3.0 and 3.1, according to an official, the "As Is" work is in fact now being used to perform a business capability gap analysis and guide transformation based on the current set of priorities.</p> <p>However, DOD has yet to disclose, at a minimum, the "As Is" analyses that have and that have not been performed in the architecture releases. In addition, DOD has yet to describe in the architecture releases the importance and/or irrelevance of "As Is" analyses to the systems and initiatives in the enterprise transition plan, and the operational activities and business processes in the target architecture.</p>
(5) The Secretary of Defense or his appropriate designee update version 1.0 of the architecture to include the 30 key elements governing the "To Be" architectural content that our report identified as not being fully satisfied.		X	<p>DOD issued BEA version 3.1 on March 15, 2006, which addressed some limitations in the prior version that we reported. However, version 3.1 is still missing certain scope and content. For example, this version continues to specify DOD's Standard Financial Information Structure (SFIS) as an enterprisewide data standard for categorizing financial information to support financial management and reporting functions. In addition, it adds greater definition on standard processes, rules, and data for intra-governmental ordering and billing. However, certain SFIS data elements, such as those relating to the planning, programming, and budgeting business process area have yet to be defined. In addition, the architecture has yet to include a systems standards profile to facilitate data sharing among departmentwide business systems and promote interoperability with departmentwide IT infrastructure systems. Further, military services and defense agencies architectures have yet to be aligned with this departmental architecture.</p>
(6) The Secretary of Defense or his appropriate designee update version 1.0 to ensure that "To Be" architecture artifacts are internally consistent, to include addressing the inconsistencies described in this report as well as including user instructions or guidance for easier architecture navigation and use.		X	<p>Version 3.1 of the architecture provides significant improvements with regard to navigation and use and addresses the internal consistency of the architecture artifacts that we previously described.</p>

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(7) The Secretary of Defense or his appropriate designee update version 1.0 of the architecture to include (a) the 3 key elements governing the transition plan content that our report identified as not being fully satisfied and (b) those system investments that will not become part of the "To Be" architecture, including time frames for phasing out those systems.		X	DOD issued an updated enterprise transition plan on March 15, 2006. This plan provides information on progress on major investments over the last 6 months, including key accomplishments and milestones attained. Further, the plan builds on the prior plan by defining an initiative aimed at identifying capability gaps between the "As Is" and "To Be" architectural environments, and DOD continues to validate the inventory of ongoing IT investments that formed the basis for the prior version of the transition plan. However, while the plan includes more information about the termination of legacy systems, it still does not identify, for example, all legacy systems that will not be part of the target architecture—and it does not include system investment information for all of the department's agencies and combatant commands.
(8) The Secretary of Defense or his appropriate designee update version 1.0 of the architecture to address comments made by the verification and validation contractor.		X	According to the verification and validation contractor, of the 157 comments from version 3.0, 123 were deemed potentially in scope for version 3.1. Of these 123 comments, they stated that 85 were deferred to the next architecture release and 38 were to be addressed in version 3.1. The verification and validation contractor is currently reviewing version 3.1 and has yet to report on whether the 38 comments were addressed in version 3.1.
(9) The Secretary of Defense or his appropriate designee develop a well-defined, near-term plan for extending and evolving the architecture and ensure that this plan includes addressing our recommendations, defining roles and responsibilities of all stakeholders involved in extending and evolving the architecture, explaining dependencies among planned activities, and defining measures of activity progress.		X	The department included a high-level, notional description of steps it plans to take over the next year related to architecture development, maintenance, and implementation in its most recent annual report to Congress. In particular, the department intends to define and implement a metrics framework to measure results in terms of operational performance improvement, add scope and content to the architecture in 6-month increments, and define and use criteria to gauge investment compliance with the architecture. However, the department has yet to develop a plan to describe, among other things, what the architecture and transition plan increments individually or collectively will include and not include, with particular emphasis and clarity on near-term increments, the resources needed to produce the increments, who will be responsible for producing them, and how the quality and utility of these increments will be determined.
(10) The Secretary of Defense or his appropriate designee limit the pilot projects to small, low-cost, low-risk prototype investments that are intended to provide knowledge needed to extend and evolve the architecture, and are not to acquire and implement production version system solutions or to deploy an operational system capability.		X	According to program officials, the Office of the Under Secretary of Defense for Business Transformation has prepared a draft policy on initiatives that will serve to define a pilot project in terms of size and scope, and detail the process for obtaining approval and funding.

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
GAO-04-615: DOD Business Systems Modernization: Billions Continue to Be Invested with Inadequate Management Oversight and Accountability, May 27, 2004.			
(1) The Secretary of Defense direct the Under Secretary of Defense (Comptroller) and the Assistant Secretary of Defense for Networks and Information Integration to develop a standard definition for DOD components to use to identify business systems.	X		This recommendation was absorbed into GAO-05-381 recommendation #2.
(2) The Secretary of Defense direct the Assistant Secretary of Defense for Networks and Information Integration to expand the existing IT Registry to include all business systems.	X		On July 13, 2004, the ASD(NII)/CIO directed establishment of the DOD Information Technology Portfolio Repository (DITPR). According to BTA officials, all identified business systems have been entered into the DITPR. As of April 2006, the department reported that it had 3,717 business systems.
(3) The Secretary of Defense direct the Under Secretary of Defense (Comptroller) to establish a mechanism that provides for tracking all business systems modernization conditional approvals to provide reasonable assurance that all specific actions are completed on time.	X		The DITPR is being used to track and monitor investment decisions. For example, if the DBSMC notes that a business system must show how it is compliant with the SFIS, that action is maintained in the DITPR and, on completion, the completion date is entered into DITPR.
GAO-05-381: DOD Business Systems Modernization: Billions Being Invested without Adequate Oversight, April 29, 2005.			
(1) The Secretary of Defense direct that the DOD CIO, in consultation with the domains, review the 56 systems reclassified from business systems to national security systems to determine how these should be properly reported in the fiscal year 2007 IT budget request.	X		The department has appropriately classified the 56 systems in its fiscal year 2007 IT budget request.
(2) The Secretary of Defense direct that the Defense Business Systems Management Committee work with the investment review boards to review the reported business systems inventory so systems are defined in accordance with the definition specified in the Fiscal Year 2005 Defense Authorization Act.	X		The department's business systems are reported in its fiscal year 2007 budget request in accordance with the criteria specified in the Act.

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(3) The Secretary of Defense direct that the DBSMC develop a comprehensive plan that addresses implementation of our previous recommendations related to the BEA and the control and accountability over business systems investments (at a minimum, the plan should assign responsibility and estimated time frames for completion).		X	DOD has documented a series of actions that address our recommendations. In its March 15, 2006, report to Congress, DOD stated that it had fully implemented our 23 open recommendations and was in the process of implementing 6. We agree that DOD has taken actions to implement our open recommendations, with 16 being implemented and 13 in the process of being implemented. However, while DOD included a high-level summary in its March 15, 2006 annual report to Congress, it did not include information such as responsibilities, time frames, and actions planned to address all of the recommendations that have yet to be fully implemented.
(4) The Secretary of Defense direct that the comprehensive plan we recommend be incorporated into the department's second annual report due March 15, 2006, to defense congressional committees, as required by the Fiscal Year 2005 Defense Authorization Act to help facilitate congressional oversight.		X	In its March 15, 2006, annual report to Congress, the department included a high-level summary that outlines the status of our recommendations. However, as noted above, it did not fully satisfy our recommendation.
GAO-05-702: DOD Business Systems Modernization: Long-standing Weaknesses in Enterprise Architecture Development Need to Be Addressed, July 22, 2005.			
(1) The Secretary of Defense should direct the Deputy Secretary of Defense, as the chair of DBSMC and in collaboration with DBSMC members, to immediately fully disclose the state of its BEA program to DOD's congressional authorization and appropriations committees, including its limited progress and results to date, as well as specific plans and commitments for strengthening program management and producing measurable results that reflect the department's capability to do so.	X		In its March 15, 2006, annual report to Congress, DOD disclosed the current state of the BEA program by including key milestones for fiscal years 2006 and 2007, accomplishments since September 2005, and limitations of and gaps in the architecture and transition plan. For example, in an effort to improve visibility into personnel activities, in fiscal year 2006, DOD reported that it has deployed a civilian personnel data warehouse to facilitate data sharing. In addition, the department reported that termination and migration dates had yet to be determined for a number of systems.
(2) The Secretary of Defense should direct the Deputy Secretary of Defense, as the chair of the DBSMC and in collaboration with DBSMC members, to ensure that each of our recommendations related to the BEA management and content are reflected in the plans and commitments.		X	In its March 15, 2006, annual report to Congress, the department included a high-level summary that outlines the status of our recommendations. However, it did not include information such as responsibilities, time frames, and actions planned to address all of the recommendations that have yet to be fully implemented.

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GAO report information and recommendation	Implemented?		GAO assessment
	Yes	In Process	
(3) The Secretary of Defense should direct the Deputy Secretary of Defense, as the chair of the DBSMC and in collaboration with DBSMC members, to ensure that plans and commitments provide for effective BEA workforce planning, including assessing workforce knowledge and skills needs, determining existing workforce capabilities, identifying gaps, and filling these gaps.		X	Program officials told us that they have begun analyzing the architecture program's workforce needs and capabilities using a three-phase approach. Phase I, which according to DOD is complete, resulted in the development of a knowledge and skills model for the program's architecture and transition plan staff. The second phase, which according to DOD is in progress, involves identifying and assessing the knowledge and skills of the existing architecture and transition plan staff. According to program officials, this phase will set overall program needs and provide the basis for identifying gaps and recommendations for filling the gaps. Phase III will implement the recommendations. According to DOD, it has not yet established milestones for Phase III.

Source: GAO.

^aApproval authorities include the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Under Secretary of Defense (Comptroller); the Under Secretary of Defense for Personnel and Readiness; and the Assistant Secretary of Defense for Networks and Information Integration/Chief Information Officer of the Department of Defense. These approval authorities are responsible for the review, approval, and oversight of business systems and must establish investment review processes for systems under their cognizance.

^bDOD defines the Global Information Grid as the globally interconnected, end-to-end set of information, capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support personnel.

^c*Department of Defense Fiscal Year 2007 IT/NSS President's Budget, Report on Defense Business Systems Modernization FY2005 National Defense Authorization Act, Section 332 February 2006.*

Appendix III: Comments from the Department of Defense



ACQUISITION
TECHNOLOGY
AND LOGISTICS

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04 MAY 2006

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Director, Information Technology Architecture and Systems Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Mr. Hite:

This is the Department of Defense (DoD) response to the GAO draft report, "BUSINESS SYSTEMS MODERNIZATION: DOD Continues to Improve Institutional Approach, but Further Steps Needed," dated April 28, 2006, (GAO Code 310616/GAO-06-658).

GAO continues to be a constructive partner in the Department's efforts to transform internal business operations. Analysis of our plans and activities, as well as recommendations for refinement, provide important learning on best practices as we move forward. We especially appreciate the support and recognition for the Department's continued progress in laying the groundwork for success.

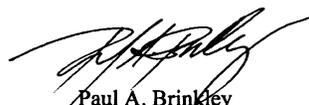
We believe the GAO's assessments and findings represent a fair representation of the Department's efforts to date. We do not agree on all points, yet even in areas of disagreement, we recognize the opportunity for dialog and learning on both sides. There are two points, detailed below, on which we would like to comment:

Responsiveness to addressing GAO concerns: As noted by GAO, it is vitally important that the Department move quickly to institutionalize the changes, policies and procedures that have been recently instituted in order to maximize the potential for overall success in transforming business operations. To that end, the Department moved aggressively over the past year to address not only GAO's recommendations, but also innumerable other challenges and barriers encountered along the way. While it is important that DoD respond to GAO's recommendations, it is equally important that GAO make recommendations sufficiently specific in scope that they can be reasonably implemented and that GAO provide prompt feedback on whether our efforts are in line with their concerns.



New GAO Recommendation: Regarding the GAO's new recommendation that the Department develop a department-wide enterprise architecture program management plan to gain greater control of the Department's IT environment, this far exceeds the scope of business systems modernization. The Department will explore the feasibility of a department-wide approach to this issue, and publish a formal position on this recommendation by September 30, 2006. Our response to this recommendation is enclosed.

The Department made important progress over the last year in reshaping its approach to modernizing its business operations. With the development of the Business Enterprise Architecture and Enterprise Transition Plan, we now have the important tools necessary to guide our transformation effort. With the implementation and institutionalization of the Defense Business Systems Management Committee and Investment Review Boards, we have brought the issues of business transformation to the forefront of senior leadership attention across the Department. Now, with the Business Transformation Agency in place, the Department's focus is on delivering the promise that these important tools and processes represent. We welcome GAO's insights and look forward to their participation in our future efforts.



Paul A. Brinkley
Deputy Under Secretary of Defense
(Business Transformation)

Enclosure:
As Stated

GAO DRAFT REPORT - DATED APRIL 28, 2006
GAO CODE 310616/GAO-06-658

**“BUSINESS SYSTEMS MODERNIZATION: DOD CONTINUES TO IMPROVE
INSTITUTIONAL APPROACH, BUT FURTHER STEPS NEEDED”**

**DEPARTMENT OF DEFENSE COMMENTS
TO THE RECOMMENDATION**

RECOMMENDATION 1: The GAO recommended that the Secretary of Defense direct the Deputy Secretary of Defense to submit an enterprise architecture program management plan to defense congressional committees by July 31, 2006. (p. 52/GAO Draft Report)

DOD RESPONSE: Partially Concur. The Department will need time to explore the feasibility of a Department-wide approach to this issue, and will publish a formal position on this recommendation by September 30, 2006.

Appendix IV: Summary of Several Architecture Frameworks

Various enterprise architecture frameworks are available for organizations to follow. Although these frameworks differ in their nomenclatures and modeling approaches, they consistently help define an enterprise's operations in both (1) logical terms, such as interrelated business processes and business rules, information needs and flows, and work locations and users; and (2) technical terms, such as hardware, software, data, communications, and security attributes and performance standards. The frameworks help define these perspectives for both the enterprise's current, or "As Is," environment and its target, or "To Be," environment—as well as a transition plan for moving from the "As Is" to the "To Be" environment.

For example, John A. Zachman developed a structure or framework for defining and capturing an architecture.¹ This framework describes six windows or "perspectives" from which to view the enterprise: those of (1) the strategic planner, (2) system user, (3) system designer, (4) system developer, (5) subcontractor, and (6) system itself. Zachman also proposed six models that are associated with each of these perspectives; these models describe (1) how the entity operates, (2) what the entity uses to operate, (3) where the entity operates, (4) who operates the entity, (5) when entity operations occur, and (6) why the entity operates. Zachman's framework provides a conceptual schema that can be used to identify and describe an entity's existing and planned components and their relationships to one another before beginning the costly and time-consuming efforts associated with developing or transforming the entity.

Since Zachman introduced his framework, a number of other frameworks have been proposed. In August 2003, the department released version 1.0 of the *DOD Architecture Framework (DODAF)*.² The DODAF defines the type and content of the architectural products, as well as the relationships among the products that are needed to produce a useful architecture. Briefly, it decomposes an architecture into three primary views: operational, systems, and technical standards³ (see fig. 2). According to DOD, the three interdependent views are needed to ensure that IT systems

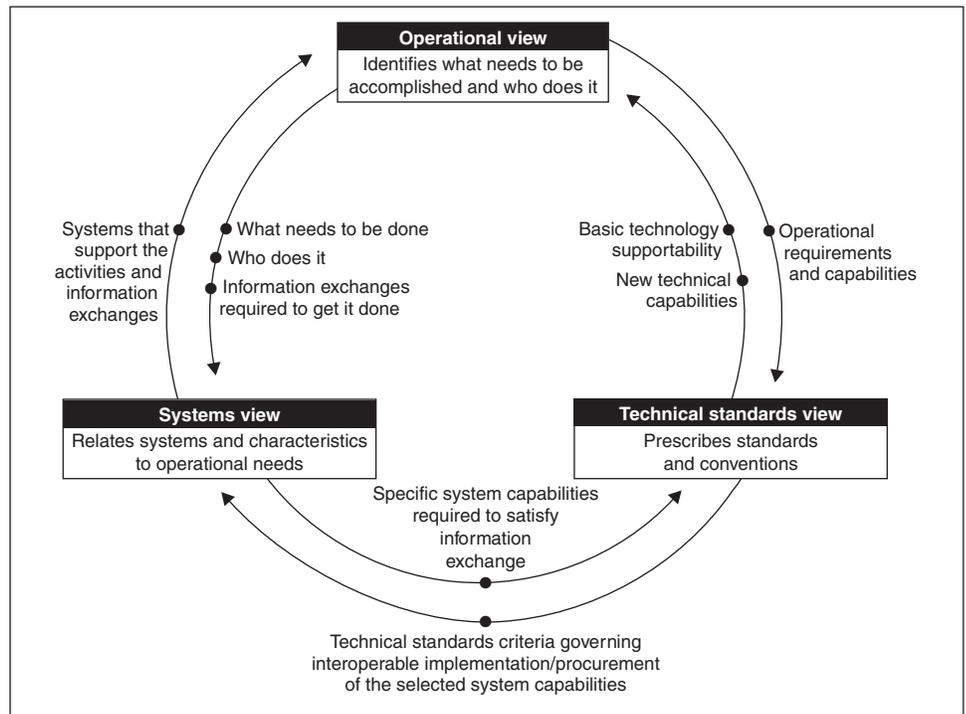
¹J.A. Zachman, "A Framework for Information Systems Architecture," *IBM Systems Journal* 26, no. 3 (1987).

²DOD, *Department of Defense Architecture Framework, Version 1.0, Volume 1* (Aug. 2003) and *Volume 2* (Feb. 2004).

³There are some overarching aspects of architecture that relate to all three of the views. These overarching aspects—such as goals, mission statements, and concepts of operations—are captured in the All-view products.

support operational needs and that they are developed and implemented in an interoperable and cost-effective manner.

Figure 2: Interdependent DODAF Views of an Architecture



Source: DOD Architecture Framework Version 1.0, Volume 1.

In September 1999, the federal CIO's Council published the Federal Enterprise Architecture Framework (FEAF), which is intended to provide federal agencies with a common construct on which to base their respective architectures and to facilitate the coordination of common business processes, technology insertion, information flows, and system investments among federal agencies. FEAF describes an approach, including models and definitions, for developing and documenting architecture descriptions for multiorganizational functional segments of the federal government. Similar to most frameworks, FEAF's proposed models describe an entity's business, the data necessary to conduct the business, applications to manage the data, and technology to support the applications.

In addition, the OMB established the Federal Enterprise Architecture (FEA) Program Management Office to develop a federated enterprise

architecture in the context of five “reference models, and a security and privacy profile that overlays the five models.”

- The Business Reference Model is intended to describe the federal government’s businesses, independent of the agencies that perform them. This model consists of four business areas: (1) services for citizens, (2) mode of delivery, (3) support delivery of services, and (4) management of government resources. It serves as the foundation for the Federal Enterprise Architecture. The OMB expects agencies to use this model as part of their capital planning and investment control processes to help identify opportunities to consolidate information technology investments across the federal government. Version 2.0 of this model was released in June 2003.
- The Performance Reference Model is intended to describe a set of performance measures for major information technology initiatives and their contribution to program performance. According to OMB, this model will help agencies produce enhanced performance information; improve the alignment and better articulate the contribution of inputs, such as technology, to outputs and outcomes; and identify improvement opportunities that span traditional organizational boundaries. Version 1.0 of this model was released in September 2003.
- The Service Component Reference Model is intended to identify and classify information technology service (i.e., application) components that support federal agencies and promote the reuse of components across agencies. This model is intended to provide the foundation for the reuse of applications, application capabilities, components (defined as “a self-contained business process or service with predetermined functionality that may be exposed through a business or technology interface”), and business services. According to OMB, this model is a business-driven, functional framework that classifies service components with respect to how they support business or performance objectives. Version 1.0 of this model was released in June 2003.
- The Data Reference Model is intended to describe, at an aggregate level, the types of data and information that support program and business line operations and the relationships among these types. This model is intended to help describe the types of interactions and information exchanges that occur across the federal government. Version 2.0 of this model was released in November 2005.
- The Technical Reference Model is intended to describe the standards, specifications, and technologies that collectively support the secure

delivery, exchange, and construction of service components. Version 1.1 of this model was released in August 2003.

- The Security and Privacy Profile is intended to provide guidance on designing and deploying measures that ensure the protection of information resources. OMB has released version 1.0 of the profile.

Appendix V: GAO Contacts and Staff Acknowledgments

GAO Contacts

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Acknowledgments

In addition to the contacts named above, key contributors to this report were Darby Smith, Assistant Director; Neelaxi Lakhmani, Acting Assistant Director; and Susan Czachor, Francis Dymond, Eric Essig, Nancy Glover, Anh Le, John Martin, Mai Nguyen, Debra Rucker, and Andrea Smith.

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