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INFORMATION TECHNOLOGY

Federal Agencies Need to Address Aging Legacy Systems

David A. Powner, Director, Information Technology
Management Issues

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GAO Highlights

Highlights of [GAO-16-696T](#), a testimony before the Committee on Oversight and Government Reform, House of Representatives

Why GAO Did This Study

The President's fiscal year 2017 budget request for IT was more than \$89 billion, with much of this amount reportedly for operating and maintaining existing (legacy) IT systems. Given the magnitude of these investments, it is important that agencies effectively manage their IT O&M investments.

GAO was asked to summarize its report being released today that (1) assesses federal agencies' IT O&M spending, (2) evaluates the oversight of at-risk legacy investments, and (3) assesses the age and obsolescence of federal IT.

In preparing the report on which this testimony is based, GAO reviewed 26 agencies' IT O&M spending plans for fiscal years 2010 through 2017 and OMB data. GAO further reviewed the 12 agencies that reported the highest planned IT spending for fiscal year 2015 to provide specifics on agency spending and individual investments.

What GAO Recommends

In the report being released today, GAO is making multiple recommendations, one of which is for OMB to finalize draft guidance to identify and prioritize legacy IT needing to be modernized or replaced. In the report, GAO is also recommending that selected agencies address obsolete legacy IT O&M investments. Nine agencies agreed with GAO's recommendations, two partially agreed, and two stated they had no comment. The two agencies that partially agreed, the Departments of Defense and Energy, outlined plans that were consistent with the intent of GAO's recommendations.

View [GAO-16-696T](#). For more information, contact David A. Powner at (202) 512-9286 or pownerd@gao.gov.

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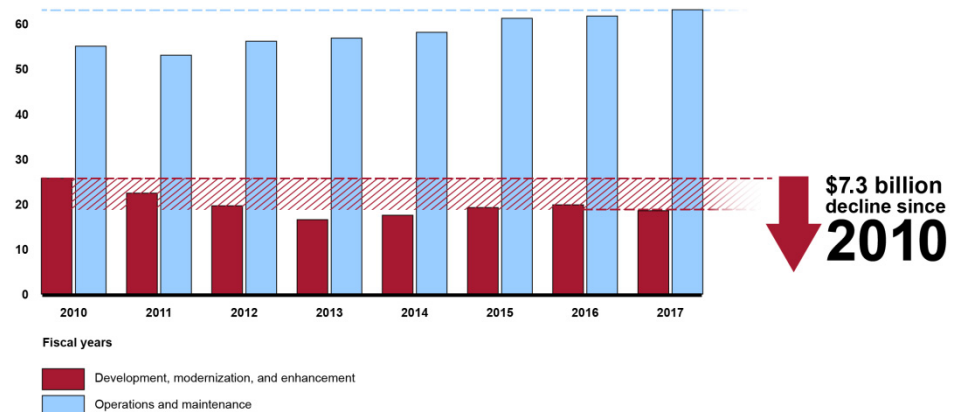
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Federal Agencies Need to Address Aging Legacy Systems

What GAO Found

The federal government spent more than 75 percent of the total amount budgeted for information technology (IT) for fiscal year 2015 on operations and maintenance (O&M) investments. Specifically, 5,233 of the government's approximately 7,000 IT investments are spending all of their funds on O&M activities. Such spending has increased over the past 7 fiscal years, which has resulted in a \$7.3 billion decline from fiscal years 2010 to 2017 in development, modernization, and enhancement activities.

Total Federal IT Spending by Type (in billions)



Source: GAO analysis of agency data. | GAO-16-696T

Many IT O&M investments in GAO's review were identified as moderate to high risk by agency CIOs and agencies did not consistently perform required analysis of these at-risk investments. Until agencies fully review their at-risk investments, the government's oversight of such investments will be limited and its spending could be wasteful.

Federal legacy IT investments are becoming increasingly obsolete: many use outdated software languages and hardware parts that are unsupported. Agencies reported using several systems that have components that are, in some cases, at least 50 years old. For example, the Department of Defense uses 8-inch floppy disks in a legacy system that coordinates the operational functions of the nation's nuclear forces. In addition, the Department of the Treasury uses assembly language code—a computer language initially used in the 1950s and typically tied to the hardware for which it was developed. OMB recently began an initiative to modernize, retire, and replace the federal government's legacy IT systems. As part of this, OMB drafted guidance requiring agencies to identify, prioritize, and plan to modernize legacy systems. However, until this policy is finalized and fully executed, the government runs the risk of maintaining systems that have outlived their effectiveness. The following table provides examples of legacy systems across the federal government that agencies report are 30 years or older and use obsolete software or hardware, and identifies those that do not have specific plans with time frames to modernize or replace these investments.

Examples of Legacy Investments and Systems

Agency	Investment or system	Description	Agency-reported age	Specific, defined plans for modernization or replacement
Department of the Treasury	Individual Master File	The authoritative data source for individual taxpayers where accounts are updated, taxes are assessed, and refunds are generated. This investment is written in assembly language code—a low-level computer code that is difficult to write and maintain—and operates on an IBM mainframe.	~56	No - The agency has general plans to replace this investment, but there is no firm date associated with the transition.
Department of the Treasury	Business Master File	Retains all tax data pertaining to individual business income taxpayers and reflects a continuously updated and current record of each taxpayer's account. This investment is also written in assembly language code and operates on an IBM mainframe.	~56	No - The agency has general plans to update this system, but there is no time frame established for this update.
Department of Defense	Strategic Automated Command and Control System	Coordinates the operational functions of the United States' nuclear forces, such as intercontinental ballistic missiles, nuclear bombers, and tanker support aircrafts. This system runs on an IBM Series/1 Computer—a 1970s computing system—and uses 8-inch floppy disks.	53	Yes - The agency plans to update its data storage solutions, port expansion processors, portable terminals, and desktop terminals by the end of fiscal year 2017.
Department of Veterans Affairs	Personnel and Accounting Integrated Data	Automates time and attendance for employees, timekeepers, payroll, and supervisors. It is written in Common Business Oriented Language (COBOL)—a programming language developed in the 1950s and 1960s—and runs on IBM mainframes.	53	Yes - The agency plans to replace it with a project called Human Resources Information System Shared Service Center in 2017.
Department of Veterans Affairs	Benefits Delivery Network	Tracks claims filed by veterans for benefits, eligibility, and dates of death. This system is a suite of COBOL mainframe applications.	51	No - The agency has general plans to roll capabilities into another system, but there is no firm time frame associated with this transition.
Department of Justice	Sentry	Provides information regarding security and custody levels, inmate program and work assignments, and other pertinent information about the inmate population. The system uses COBOL and Java programming languages.	35	Yes - The agency plans to update the system through September 2016.
Social Security Administration	Title II Systems	Determines retirement benefits eligibility and amounts. The investment is comprised of 162 subsystems, some of which are written in COBOL.	31	Yes - The agency has ongoing modernization efforts, including one that is experiencing cost and schedule challenges due to the complexities of the legacy software.

Source: GAO analysis of IT Dashboard data, agency documentation, and interviews. || GAO-16-696T

Note: Age was reported by agencies. Systems and investments may have individual components newer than the reported age.

Chairman Chaffetz, Ranking Member Cummings, and Members of the Committee

Thank you for the opportunity to participate in today's hearing on the federal government's legacy information technology (IT) systems. The President's fiscal year 2017 budget request for IT was more than \$89 billion, with over 70 percent reportedly for operating and maintaining existing IT systems. Given the size and magnitude of these investments, it is important that agencies effectively manage the operations and maintenance (O&M) of existing investments.

As requested, this statement summarizes our report being released today that (1) assesses federal agencies' IT O&M spending, (2) evaluates the oversight of at-risk legacy investments, and (3) assesses the age and obsolescence of federal IT.¹

In that report, our review of O&M spending included the Office of Management and Budget (OMB) and the 26 agencies that report to OMB's IT Dashboard.² For specific information on individual systems or investments, we focused on the 12 agencies that reported the highest planned IT spending for fiscal year 2015, given that these agencies make up over 90 percent of reported federal IT spending.³

¹GAO, *Information Technology: Federal Agencies Need to Address Aging Legacy Systems*, [GAO-16-468](#) (Washington, D.C.: May 25, 2016).

²In June 2009, OMB established the IT Dashboard, a public website that provides detailed information on major IT investments at 26 federal agencies. Agencies are to report, via the Dashboard, the performance of their IT investments. Currently, the Dashboard publicly displays information on the cost, schedule, and performance of over 700 major federal IT investments at 26 federal agencies. The 26 agencies are the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, the Interior, Justice, Labor, State, Transportation, the Treasury, and Veterans Affairs; U.S. Army Corps of Engineers, Environmental Protection Agency, General Services Administration, National Aeronautics and Space Administration, National Archives and Records Administration, National Science Foundation, Nuclear Regulatory Commission, Office of Personnel Management, Small Business Administration, Social Security Administration, and U.S. Agency for International Development.

³These agencies are the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Homeland Security, Justice, State, Transportation, the Treasury, Veterans Affairs, and the Social Security Administration.

To assess federal agencies' IT O&M spending, we reviewed data reported to OMB as part of the budget process for fiscal years 2010 through 2017. We analyzed that data to determine whether spending had changed over those years and compared OMB's associated performance measure to federal best practices.⁴

We evaluated the extent to which the 12 selected federal agencies are performing oversight on their existing legacy investments by reviewing agency IT Dashboard data to identify investments in O&M that had been designated as being moderate to high risk. We also reviewed agency documentation such as TechStat⁵ documentation and operational analyses, as available.

To assess the age and obsolescence of federal IT, we reviewed agency documentation, such as operational analyses and enterprise architecture documents, and interviewed agency officials. We also requested that the 12 agencies provide a list of their three oldest systems. We compared OMB and agencies' current practices with federal guidance to determine whether OMB and agencies are adequately managing the age and obsolescence of federal IT.

To assess the reliability of the OMB budget data and IT Dashboard data, we reviewed related documentation, such as OMB guidance on budget preparation, capital planning, and IT Dashboard submissions. In addition, we corroborated with each agency that the data downloaded were accurate and reflected the data it had reported to OMB. We determined that the data were reliable for the purposes of our reporting objectives.

The work upon which this testimony is based was conducted in accordance with generally accepted government auditing standards.

⁴Department of the Navy, Office of the Chief Information Officer, *Guide for Developing and Using Information Technology (IT) Performance Measurements* (Washington, D.C.: October 2001); and General Services Administration, Office of Governmentwide Policy, *Performance-Based Management: Eight Steps To Develop and Use Information Technology Performance Measures Effectively* (Washington, D.C.: 1996).

⁵In January 2010, the Federal CIO began leading TechStat sessions—face-to-face meetings to terminate or turn around IT investments that are failing or are not producing results. These meetings involve OMB and agency leadership and are intended to increase accountability and improve performance. OMB also empowered agency CIOs to begin to hold their own TechStat sessions within their respective agencies by June 2012.

Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. A more detailed description of the scope and methodology of our work is provided in our report being issued today.

Background

Over the last three decades, Congress has enacted several laws to assist agencies and the federal government in managing IT investments. For example, to assist agencies in managing their investments, Congress enacted the Clinger-Cohen Act of 1996.⁶ More recently, in December 2014, Congress enacted IT acquisition reform legislation (commonly referred to as the Federal Information Technology Acquisition Reform Act or FITARA)⁷ that, among other things, requires OMB to develop standardized performance metrics, including cost savings, and to submit quarterly reports to Congress on cost savings.

In carrying out its responsibilities, OMB uses several data collection mechanisms to oversee federal IT spending during the annual budget formulation process. Specifically, OMB requires federal departments and agencies to provide information related to their Major Business Cases (previously known as exhibit 300) and IT Portfolio Summary (previously known as exhibit 53).⁸

OMB directs agencies to break down IT investment costs into two categories: (1) O&M and (2) development, modernization, and enhancement (DME). O&M (also known as steady-state) costs refer to the expenses required to operate and maintain an IT asset in a production environment. DME costs refers to those projects and activities that lead to new IT assets/systems, or change or modify existing IT assets to substantively improve capability or performance.

⁶40 U.S.C. § 11101, et seq.

⁷Pub. L. No. 113-291, div. A, title VIII, subtitle D, 128 Stat. 3292, 3438-50 (Dec. 19, 2014).

⁸OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget* (June 30, 2015).

In addition, OMB has developed guidance that calls for agencies to develop an operational analysis policy for examining the ongoing performance of existing legacy IT investments to measure, among other things, whether the investment is continuing to meet business and customer needs.⁹

Nevertheless, federal IT investments have too frequently failed or incurred cost overruns and schedule slippages while contributing little to mission-related outcomes. The federal government has spent billions of dollars on failed and poorly performing IT investments which often suffered from ineffective management, such as project planning, requirements definition, and program oversight and governance.¹⁰

Accordingly, in February 2015, we introduced a new government-wide high-risk area, *Improving the Management of IT Acquisitions and Operations*.¹¹ This area highlights several critical IT initiatives underway, including reviews of troubled projects, an emphasis on incremental development, a key transparency website, data center consolidation, and the O&M of legacy systems.

To make progress in this area, we identified actions that OMB and the agencies need to take. These include implementing the recently-enacted statutory requirements promoting IT acquisition reform, as well as implementing our previous recommendations. In the last 6 years, we made approximately 800 recommendations to OMB and multiple agencies to improve effective and efficient investment in IT. As of October 2015, about 32 percent of these recommendations had been implemented.

⁹OMB, *Preparation, Submission, and Execution of the Budget*, Circular No. A-11 (June 30, 2015); OMB Memorandum M-10-27 (June 2010), requires agencies to establish a policy for performing operational analyses on steady-state investments as a part of managing and monitoring investment baselines. Parts of this guidance do not apply to the Department of Defense.

¹⁰GAO, *Information Technology: OMB and Agencies Need to More Effectively Implement Major Initiatives to Save Billions of Dollars*, [GAO-13-796T](#) (Washington, D.C.: July 25, 2013).

¹¹GAO, *High-Risk Series: An Update*, [GAO-15-290](#) (Washington, D.C.: Feb. 11, 2015).

GAO Has Reported on the Need to Improve Oversight of Legacy IT

We have previously reported on legacy IT and the need for the federal government to improve its oversight of such investments. For example, in October 2012,¹² we reported on agencies' operational analyses policies and practices. In particular, we reported that although OMB guidance called for each agency to develop an operational analysis policy and perform such analyses annually, the extent to which the selected federal agencies we reviewed carried out these tasks varied significantly. The Departments of Defense (Defense), the Treasury (Treasury), and Veterans Affairs (VA) had not developed a policy or conducted operational analyses.

As such, we recommended that the agencies develop operational analysis policies, annually perform operational analyses on all investments, and ensure the assessments include all key factors. Further, we recommended that OMB revise its guidance to include directing agencies to post the results of such analyses on the IT Dashboard. OMB and the five selected agencies agreed with our recommendations and have efforts planned and underway to address them. In particular, OMB issued guidance in August 2012 directing agencies to report operational analysis results along with their fiscal year 2014 budget submission documentation (e.g., exhibit 300) to OMB. Thus far, operational analyses have not yet been posted on the IT Dashboard.

We further reported in November 2013 that agencies were not conducting proper analyses. Specifically, we reported¹³ on IT O&M investments and the use of operational analyses at selected agencies and determined that of the top 10 investments with the largest spending in O&M, only a Department of Homeland Security (DHS) investment underwent an operational analysis. DHS's analysis addressed most, but not all, of the factors that OMB called for (e.g., comparing current cost and schedule against original estimates). The remaining agencies did not assess their investments, which accounted for \$7.4 billion in reported O&M spending. Consequently, we recommended that seven agencies perform

¹²GAO, *Information Technology: Agencies Need to Strengthen Oversight of Billions of Dollars in Operations and Maintenance Investments*, [GAO-13-87](#) (Washington, D.C.: Oct. 16, 2012).

¹³GAO, *Information Technology: Agencies Need to Strengthen Oversight of Multibillion Dollar Investments in Operations and Maintenance*, [GAO-14-66](#) (Washington, D.C.: Nov. 6, 2013).

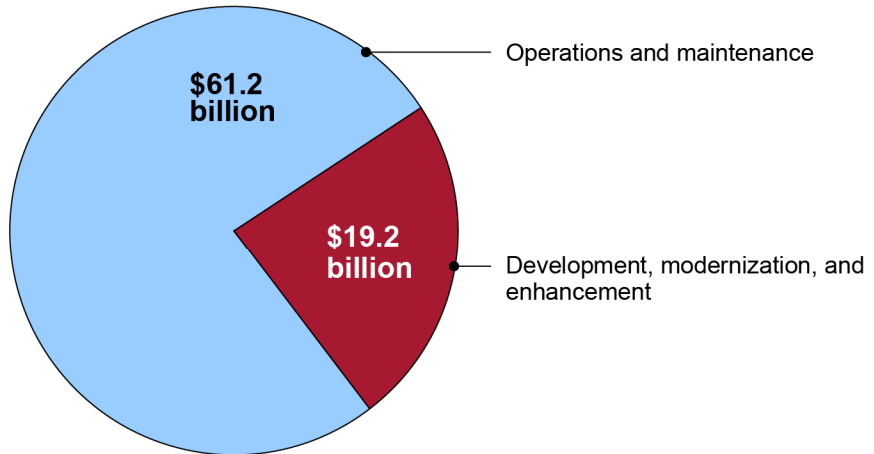
operational analyses on their IT O&M investments and that DHS ensure that its analysis was complete and addressed all OMB factors. Three of the agencies agreed with our recommendations; two partially agreed; and two agencies had no comments.

Government-wide Spending on IT Operations and Maintenance Is Increasing

As discussed in our report, federal agencies reported spending the majority of their fiscal year 2015 IT funds on operating and maintaining a large number of legacy (i.e., steady-state) investments. Of the more than \$80 billion reportedly spent on federal IT in fiscal year 2015, 26 federal agencies¹⁴ spent about \$61 billion on O&M, more than three-quarters of the total amount spent. Specifically, data from the IT Dashboard shows that, in 2015, 5,233 of the government's nearly 7,000 IT investments were spending all of their funds on O&M activities. This is a little more than three times the amount spent on DME activities (see figure 1).

¹⁴This \$80 billion represents what 26 agencies reported to OMB on planned IT spending. However, this \$80 billion figure is understated. This figure does not include spending for Defense classified IT systems; and 58 independent executive branch agencies, including the Central Intelligence Agency. Additionally, not all executive branch IT investments are included in this estimate because agencies have differed on what they considered an IT investment. For example, some have considered research and development systems as IT investments, while others have not.

Figure 1: Fiscal Year 2015 Federal Spending on IT Operations and Maintenance and Development, Modernization, and Enhancement



Source: GAO analysis of Office of Management and Budget's Information Technology Dashboard | GAO-16-696T

According to agency data reported to OMB's IT Dashboard, the 10 IT investments spending the most on O&M for fiscal year 2015 total \$12.5 billion, 20 percent of the total O&M spending, and range from \$4.4 billion on Department of Health and Human Services' (HHS) Centers for Medicare and Medicaid Services' Medicaid Management Information System¹⁵ to \$666.1 million on HHS's Centers for Medicare and Medicaid Services IT Infrastructure investment (see table 1).

¹⁵The 50 states, the District of Columbia, and the 5 U.S. territories each administer a state-based Medicaid program. Every state must implement a claims processing and information retrieval system to support the administration of the program. This investment represents the federal share of state Medicaid systems' cost. In technical comments on a draft of our report, HHS stated that it does not manage any of these IT assets or control how this money is spent.

Table 1: Ten Largest Expenditures on Operations and Maintenance Investments in Fiscal Year 2015, in millions

Agency	Investment	Fiscal year 2015 funds in millions
Department of Health and Human Services	Centers for Medicare and Medicaid Services' Medicare Management Information System ^a	\$4,381.0
Department of Defense	Defense Information Systems Network	\$1,252.2
Department of Veterans Affairs	Medical IT Support	\$1,234.9
Department of Defense	Next Generation Enterprise Network Increment 1	\$1,057.7
Social Security Administration	Infrastructure Operations and Maintenance	\$864.0
Department of Veterans Affairs	Enterprise IT Support	\$809.5
Department of Defense	Network Enterprise Technology Command	\$767.5
Department of Defense	Network Enterprise Center Staff Operations Costs	\$752.8
Department of Defense	Non-Defense Information Systems Network Telecomm	\$688.8
Department of Health and Human Services	Centers for Medicare and Medicaid Services IT Infrastructure – Ongoing	\$666.1
Total		\$12,474.5 million

Source: GAO analysis of agency budgetary data. | GAO-16-696T

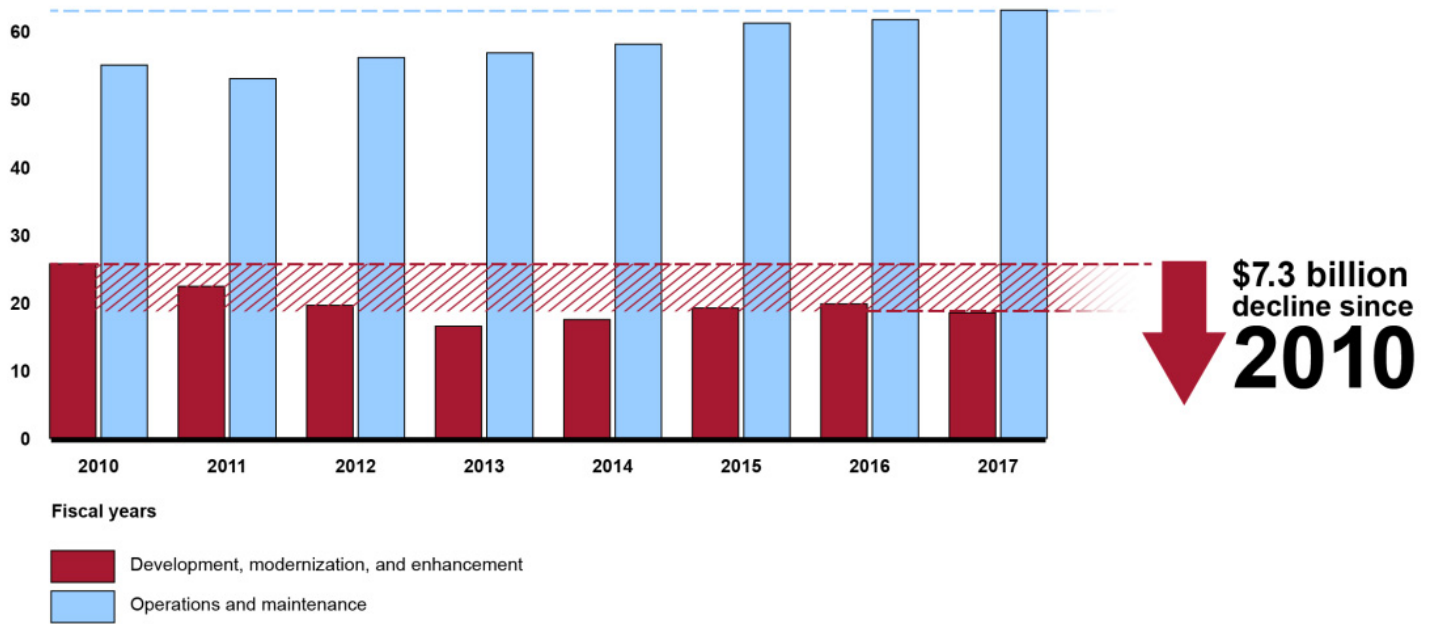
Note:

^aThis investment represents the federal share of state Medicaid systems' cost. In technical comments on a draft of our report, the Department of Health and Human Services stated that it does not manage any of these IT assets or control how this money is spent.

Spending on O&M Has Increased over 7 Years

Over the past 7 fiscal years, O&M spending has increased, while the amount invested in developing new systems has decreased by about \$7.3 billion since fiscal year 2010. (See figure 2.)

Figure 2: Summary of IT Spending by Fiscal Year from 2010 through 2017 (Dollars in Billions)

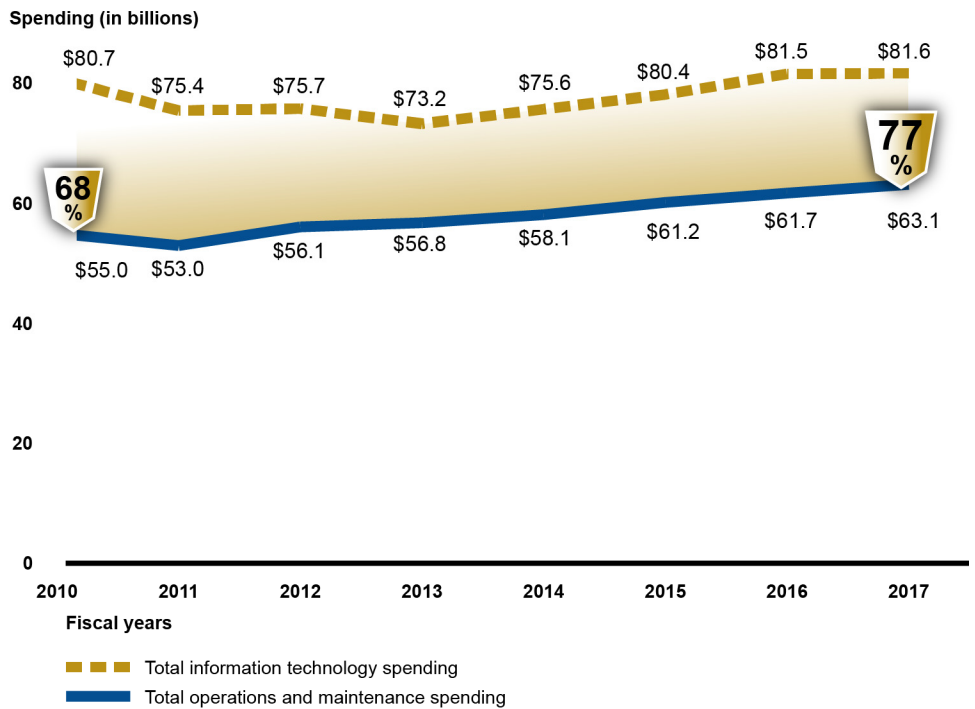


Source: GAO analysis of agency data. | GAO-16-696T

Note: According to DOD officials, the department's fiscal year 2010 IT expenditures reported to the IT Dashboard includes both classified and unclassified spending, whereas its fiscal year 2011 to 2017 expenditures only include unclassified spending.

Further, agencies have increased the amount of O&M spending relative to their overall IT spending by 9 percent since 2010. Specifically, in fiscal year 2010, O&M spending was 68 percent of the federal IT budget, while in fiscal year 2017, agencies plan to spend 77 percent of their IT funds on O&M. (See figure 3.)

Figure 3: Percentage of IT Spending on Operations and Maintenance from Fiscal Year 2010 to Fiscal Year 2017



Source: GAO analysis of agency data. | GAO-16-696T

Further, 15 of the 26 agencies have increased their spending on O&M from fiscal year 2010 to fiscal year 2015, with 10 of these agencies having over a \$100 million increase. The spending changes per agency range from an approximately \$4 billion increase (HHS) to a decrease of \$600 million (National Aeronautics and Space Administration).

OMB staff in the Office of E-Government and Information Technology have recognized the upward trend of IT O&M spending and identified several contributing factors, including (1) the support of O&M activities requires maintaining legacy hardware, which costs more over time, and (2) costs are increased in maintaining applications and systems that use older programming languages, since programmers knowledgeable in these older languages are becoming increasingly rare and thus more expensive. Further, OMB officials stated that in several situations where agencies are not sure whether to report costs as O&M or DME, agencies default to reporting as O&M. According to OMB, agencies tend to

categorize investments as O&M because they attract less oversight, require reduced documentation, and have a lower risk of losing funding.

Many O&M Investments Were at Risk and Lacked Proper Oversight

According to OMB guidance,¹⁶ the O&M phase is often the longest phase of an investment and can consume more than 80 percent of the total lifecycle costs. As such, agencies must actively manage their investment during this phase. To help them do so, OMB requires that CIOs submit ratings that reflect the level of risk facing an investment.

In addition, in instances where investments experience problems, agencies can perform a TechStat, a face-to-face meeting to terminate or turn around IT investments that are failing or not producing results.¹⁷ In addition, OMB directs agencies to monitor O&M investments through operational analyses, which should be performed annually and assess costs, schedules, whether the investment is still meeting customer and business needs, and investment performance.

Several O&M investments were rated as moderate to high risk in fiscal year 2015.¹⁸ Specifically, CIOs from the 12 selected agencies reported that 23 of their 187 major IT O&M investments were moderate to high risk as of August 2015. They requested \$922.9 million in fiscal year 2016 for these investments. Of the 23 investments, agencies had plans to replace or modernize 19 investments. However, the plans for 12 of those were general or tentative in that the agencies did not provide specificity on time frames, activities to be performed, or functions to be replaced or enhanced. Further, agencies did not plan to modernize or replace 4 of the investments (see table 2). The lack of specific plans to modernize or replace these investments could result in wasteful spending on moderate and high-risk investments.

¹⁶OMB, *Preparation, Submission, and Execution of the Budget*, Circular No. A-11 (2015).

¹⁷OMB, *25 Point Implementation Plan to Reform Federal Information Technology Management* (Washington, D.C.: Dec. 9, 2010).

¹⁸Agencies submit ratings on major investments from their CIO, which, according to OMB's instructions, should reflect the level of risk facing an investment relative to that investment's ability to accomplish its goals. To do so, each agency CIO is to assess his or her IT investments against a set of six pre-established evaluation factors identified by OMB and then assign a rating of 1 (high risk and red) to 5 (low risk and green) based on the CIO's best judgement of the level of risk facing the investment.

Table 2: Moderate to High-Risk Operations and Maintenance Investments

Agency	Investment title (IT portfolio)	CIO rating, as of August 2015	Specific, defined plans for modernization or replacement
Department of Agriculture	Resource Ordering and Status System	Moderate	Yes - Agency plans to replace the system in 2018.
	Public Safety Land Mobile Radio System	Moderate	No - Agency recently began a modernization initiative; however, it is not clear when it will be completed.
	Forest Service Computer Base	Moderate	No - Agency has general plans to restructure the investment to allow better visibility into the underlying systems, but has not provided plans for functions to be replaced or enhanced.
	Enterprise Telecommunications Shared Services	High	Yes - Agency has several modernization efforts underway, including one to consolidate networks.
Department of Commerce	National Oceanic and Atmospheric Administration/ National Weather Service Telecommunication Gateway System	High	Yes - Agency plans to retire the system in fiscal year 2017 and replace it with a new system.
	Office of Chief Information Officer Enterprise Cyber Security Monitoring and Operations	Moderate	No - Agency has general plans to update cyber monitoring across the agency, but has not provided specific activities or timelines associated with this effort.
Department of Energy	Contractor Business Financial and Administrative Systems	Moderate	No - Agency has no firm future plans for retirement or modernization.
Department of Health and Human Services	Centers for Medicare and Medicaid Services Medicare Appeals System	Moderate	No - The agency has general plans for continuous modernization, as funding allows, but has not provided specific activities or timelines associated with this effort.
	Trusted Internet Connection Investment	High ^a	No - Agency has general plans to continually evaluate the investment and perform necessary improvements as needed, but has not provided plans for specific functions to be replaced or enhanced.
Department of Homeland Security	Immigration and Customs Enforcement - Detention and Removal Operations Modernization	Moderate	Yes - Agency has specific plans to improve the core database infrastructure in fiscal year 2016.
	Immigration and Customs Enforcement - IT Infrastructure	Moderate	Yes - Agency plans to replace its IT equipment that is outdated in 2016.
	National Protection and Programs Directorate - Infrastructure Security Compliance – Chemical Security Assessment Tool	Moderate	No - Agency has general plans for minor enhancements, but has not provided specific timelines associated with this effort.
	OneNet	Moderate	No - Agency has general plans for continuous updates to this investment as user requirements change, but has not provided specific timelines associated with this effort.
	Coast Guard - Vessel Logistics System	Moderate	No - Agency has plans to decommission one system within the investment in 2016. The agency has general plans to replace the full investment in the future with the Logistics Information Management System, but there is no firm transition date.
	Coast Guard - Core Accounting System Suite	Moderate	Yes - Agency plans to retire the system in fiscal year 2018 with a migration to federal shared services.

	Coast Guard - Standard Workstation Infrastructure Recapitalization and Sustainment	Moderate	No - Agency has general plans, including a migration to Windows 10, but did not provide dates on when this would happen.
	Customs and Border Protection - Tactical Communications Modernization	Moderate	Yes - Agency plans to decommission obsolete equipment by the end of fiscal year 2017.
	Customs and Border Protection - Integrated Fixed Towers	High ^a	No - Agency has no plans for retirement or modernization at this time because the investment only reached initial operating capability in October 2015. It plans to reach final operating capability in fiscal year 2020.
	National Protection and Programs Directorate – Federal Protective Service Tac Com Equipment and Support	Moderate	No - Agency has general plans to update the program, but no firm date associated with the effort.
	Customs and Border Protection - Tethered Aerostat Radar System	Moderate	No - Agency has no plans for replacement or modernization of the investment, but is currently undergoing an analysis of alternatives to determine whether they should modernize or replace the system.
	Customs and Border Protection – TRIRIGA	Moderate	No - Agency has no plans for replacement or modernization of the investment.
Department of the Treasury	Departmental Offices IT Infrastructure Mainframes and Servers Services and Support	Moderate	No - Agency has general plans to update this investment, but has not provided specific activities or timelines associated with this effort.
	Departmental Offices IT Infrastructure End User Systems and Support	Moderate	No - Agency has general plans to update this investment, but has not provided specific activities or timelines associated with this effort.

Source: GAO analysis of IT Dashboard data, agency documentation, and interviews. | GAO-16-969T

Note:

^aAccording to agency officials, this investment has since been lowered to moderate risk.

While agencies generally conducted the required operational analyses, they did not consistently perform TechStat reviews on all of the at-risk investments. Although not required, agencies had performed TechStats on only five of the 23 at-risk investments. In addition, operational analyses were not conducted for four of these investments (see table 3).

Table 3: At-Risk Investments and Required Analyses and Oversight Activities

Agency	Investment	TechStat performed	Operational analysis performed
Department of Agriculture	Resource Ordering and Status System	X	X
	Public Safety Land Mobile Radio System		X
	Forest Service Computer Base		X
	Enterprise Telecommunications Shared Services		X
Department of Commerce	National Oceanic and Atmospheric Administration / National Weather Service Telecommunication Gateway System	X	X

Office of Chief Information Officer Enterprise Cyber Security Monitoring and Operations			
Department of Energy	Contractor Business Financial and Administrative Systems	X	X
Department of Health and Human Services	Centers for Medicare and Medicaid Services Medicare Appeals System	X	X
	Trusted Internet Connection Investment		X
Department of Homeland Security	Immigration and Customs Enforcement - Detention and Removal Operations Modernization		X
	Immigration and Customs Enforcement - IT Infrastructure		X
	National Protection and Programs Directorate - Infrastructure Security Compliance – Chemical Security Assessment Tool		X
	OneNet		X
	Coast Guard - Vessel Logistics System		X
	Coast Guard - Core Accounting System Suite		X
	Coast Guard - Standard Workstation Infrastructure Recapitalization and Sustainment		X
	Customs and Border Protection - Tactical Communications Modernization		X
	Customs and Border Protection - Integrated Fixed Towers		X
	National Protection and Programs Directorate – Federal Protective Service Tac Com Equipment and Support	X	X
	Customs and Border Protection - Tethered Aerostat Radar System		X
Customs and Border Protection – TRIRIGA		X	
Department of the Treasury	Departmental Offices IT Infrastructure Mainframes and Servers Services and Support		
	Departmental Offices IT Infrastructure End User Systems and Support		

Source: GAO analysis of agency documentation. | GAO-16-696T

Agencies provided several reasons for not conducting TechStats and required assessments. For example, according to agency officials, several of the investments' risk levels were reduced to low or moderately low risk in the months since the IT Dashboard had been publicly updated.¹⁹ Regarding assessments, one official stated that, in place of operational analyses, the responsible bureau reviews the status of the previous month's activities for the development, integration, modification, and procurement to report issues to management. However, this monthly process does not include all of the key elements of an operational analysis. Until agencies ensure that their O&M investments are fully

¹⁹The public portion of the IT Dashboard is not updated during the formulation of President's Budget.

reviewed, the government's oversight of old and vulnerable investments will be impaired and the associated spending could be wasteful.

IT Investments Are Becoming Obsolete and Agencies Are Not Required to Identify Investments That Need Attention

Legacy IT investments across the federal government are becoming increasingly obsolete. Specifically, many use outdated languages and old parts. Numerous old investments are using obsolete programming languages. Several agencies, such as the Department of Agriculture (USDA), DHS, HHS, Justice, Treasury, and VA, reported using Common Business Oriented Language (COBOL)—a programming language developed in the late 1950s and early 1960s—to program their legacy systems. It is widely known that agencies need to move to more modern, maintainable languages, as appropriate and feasible. For example, the Gartner Group, a leading IT research and advisory company, has reported that organizations using COBOL should consider replacing the language and in 2010 noted that there should be a shift in focus to using more modern languages for new products.²⁰

In addition, some legacy systems may use parts that are obsolete and more difficult to find. For instance, Defense is still using 8-inch floppy disks in a legacy system that coordinates the operational functions of the United States' nuclear forces.²¹ (See figure 4.)

²⁰Gartner, *IT Market Clock for Application Development*, August 2010.

²¹Introduced in the 1970s, the 8-inch floppy disk is a disk-based storage medium that holds 80 kilobytes of data. In comparison, a single modern flash drive can contain data from the equivalent of more than 3.2 million floppy disks.

Figure 4: Example of an 8-Inch Floppy Disk



Source: GAO. | GAO-16-696T

Further, in some cases, the vendors no longer provide support for hardware or software, creating security vulnerabilities and additional costs. For example, each of the 12 selected agencies reported using unsupported operating systems and components in their fiscal year 2014 reports pursuant to the Federal Information Security Management Act of 2002. Commerce, Defense, Treasury, HHS, and VA reported using 1980s and 1990s Microsoft operating systems that stopped being supported by the vendor more than a decade ago.

Lastly, legacy systems may become increasingly more expensive as agencies have to deal with the previously mentioned issues and may pay a premium to hire staff or contractors with the knowledge to maintain outdated systems. For example, one agency (SSA) reported re-hiring retired employees to maintain its COBOL systems.

Selected agencies reported that they continue to maintain old investments in O&M. For example, Treasury reported systems that were about 56 years old.

Table 4 shows the 10 oldest investments and/or systems, as reported by selected agencies.²² Agencies reported having plans to modernize or replace each of these investments and systems. However, the plans for five of those were general or tentative in that the agencies did not provide specific time frames, activities to be performed, or functions to be replaced or enhanced.

Table 4: Ten Oldest IT Investments or Systems as Reported by 12 Selected Agencies

Agency	Investment or system	Description	Agency-reported age	Specific, defined plans for modernization or replacement
Department of the Treasury	Individual Master File	This investment is the authoritative data source for individual taxpayer accounts where accounts are updated, taxes are assessed, and refunds are generated during the tax filing period. It is written in assembly language code—a low-level computer code, initially used in the 1950s, that is difficult to write and maintain and is typically tied to the hardware for which it was developed.	~56	No - A new investment will eventually replace this investment, but there is no firm date associated with the transition.
Department of the Treasury	Business Master File	This investment retains all tax data pertaining to individual business income taxpayers and reflects a continuously updated and current record of each taxpayer's account. It is also written in assembly language code and operates on an IBM mainframe.	~56	No - The agency has general plans to update this system, but there is no date associated with this update.
Department of Defense	Strategic Automated Command and Control System	This system coordinates the operational functions of the United States' nuclear forces, such as intercontinental ballistic missiles, nuclear bombers, and tanker support aircrafts. It runs on an IBM Series/1 Computer—a 1970s computing system—and uses 8-inch floppy disks.	53	Yes - The agency is planning to update data storage solutions, port expansion processors, portable terminals, and desktop terminals, which are all scheduled to be completed by the end of fiscal year 2017.

²²Not all agencies track systems and their associated ages in the same manner—some track individual systems and others track by investment. An investment may be made up of several systems and infrastructure. In some cases, agencies were unsure of the actual age of the system or investment and had to approximate the initiation date.

Department of Veterans Affairs	Personnel and Accounting Integrated Data	This system automates time and attendance for employees, timekeepers, payroll, and supervisors. It is written in COBOL—a programming language developed in the 1950s and 1960s—and runs on IBM mainframes.	53	Yes - The agency plans to replace it with a project called Human Resources Information System Shared Service Center in 2017.
Department of Defense	Compass	This system is a command and control system that is used for deliberate and crisis action planning, strategic mobility analysis, and mobilization and deployment movement execution. It runs on a Windows 2008 server and is programmed in Java—a programming language first released in 1995. It also uses a 2009 Oracle 11g database.	52	Yes - The system is currently using an Oracle 11g database, but the agency plans to migrate it a 2012 SQL server by the end of the year.
Department of Veterans Affairs	Benefits Delivery Network	This system tracks claims filed by veterans for benefits, eligibility, and dates of death. It is a suite of COBOL mainframe applications.	51	No - The agency has general plans to roll capabilities into another system, but there is no firm date associated with this transition.
Department of Transportation	Hazardous Materials Information System at the Pipeline and Hazardous Materials Safety Administration	This system allows the agency to maintain comprehensive information on hazardous materials incidents. The software applications and processes used by the system, such as Classic Active Server Pages and Microsoft.NET, have become outdated and costly to maintain. In addition, the system uses an application that is no longer supported by the manufacturer, which can cause security risks, among other issues.	~46	Yes - All legacy components within this system are scheduled to be replaced by 2018.
Department of Commerce	National Oceanic and Atmospheric Administration/ National Weather Service Dissemination Systems	This investment includes three information dissemination systems used to provide the U.S. public and emergency managers warnings of severe weather events. It runs a variety of operating systems and software, including Windows Server 2003, which is no longer supported by the vendor, and uses a variety of programming languages including FORTRAN—a high-level programming language developed in the 1950s for scientific and engineering applications.	46	No - The agency has general plans to continuously update system components.
Department of Commerce	National Oceanic and Atmospheric Administration/ National Weather Service / National Data Buoy Center Ocean Observing System of Systems	This investment supports systems that include meteorological, oceanographic, tsunami, and climate observing platforms. It runs on both Windows and Linux operating systems, including Windows Server 2003, which is no longer supported by the vendor. In addition, it uses a version of Oracle that is also no longer fully supported by the vendor. This investment also uses a variety of programming languages, including FORTRAN.	46	No - The agency has general plans for continuous incremental upgrades to this investment.

Department of Homeland Security	Immigration and Customs Enforcement - Hiring Tracking Systems	This system is used by the agency to track current and prior hiring actions and maintains information about individuals who are selected for vacant positions. It runs on a 2008 IBM z10 mainframe using COBOL, among other languages. The web component runs on a Windows 2012 server using Java.	39	Yes - The agency plans to replace the existing mainframe with a service-oriented architecture to allow for integration with new systems beginning in fiscal year 2016, contingent upon receiving funding.
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Source: GAO analysis of agency data. | GAO-16-696T

Note: Systems and investments may have selected components newer than the reported age.

Separately, in our related report, we profiled one system or investment from each of the 12 selected agencies. The selected systems and investments range from 11 to approximately 56 years old, and serve a variety of purposes. Of the 12 investments or systems, agencies had plans to replace or modernize 11 of these. However, the plans for 3 of those were general or tentative in that the agencies did not provide specificity on time frames, activities to be performed, or functions to be replaced or enhanced. Further, there were no plans to replace or modernize 1 investment.

Table 5: Summary of Investments and Systems Profiled in Related Report

Agency	Investment or system	Description	Agency-reported age	Specific, defined plans for modernization or replacement
Department of Commerce	National Weather Service Telecommunication Gateway	This investment is the nation's hub for the collection and distribution of weather data and products. The agency replaced its hardware and software with Power7 IBM servers and Unix operating systems; however, the investment still lacks full backup capability for 26 percent of its functions.	31	Yes - The agency plans to retire the system in fiscal year 2017 and replace it with a new system.
Department of Defense	Strategic Automated Command and Control System	This system coordinates the operational functions of the nation's nuclear forces. This system is running on an IBM Series/1 Computer—a 1970s computing system—and uses 8-inch floppy disks.	53	Yes - The agency is planning to update data storage solutions, port expansion processors, portable terminals, and desktop terminals by the end of fiscal year 2017. A full system replacement is scheduled to be completed in fiscal year 2020.

Department of Homeland Security	Core Accounting System Suite	This investment is the primary financial management system for the Coast Guard and other Department of Homeland Security agencies. The system relies on outdated and heavily customized Oracle Federal Financials software that was first available in 2004 and the extended vendor support for the software ended in November 2013. As a result it has become expensive to support. Further, it relies on Windows 2003 servers and any changes would require recoding of many functions within its suite. In some cases, Coast Guard is unable to upgrade the system to the newest version of software because it is dependent on older versions of supporting software.	18	Yes - The agency plans to transition to federal shared services in fiscal year 2018.
Department of Transportation	Hazardous Material Information System	This system maintains and provides access to comprehensive information on hazardous materials incidents, among other things. The software applications and processes used by the system, such as Classic Active Server Pages and Microsoft.NET, have become outdated and costly to maintain. In addition, the system uses an application that is no longer supported by the manufacturer, which can cause security risks, among other issues.	~46	Yes - The agency is developing a new system to replace legacy modules and plans to retire the legacy modules by the end of fiscal year 2018.
Department of Energy	Contractor Business Financial and Administrative Systems	This investment is the business and administrative systems for a management and operating contractor, liquid waste contractor, and the site security contractor to manage human resources, financial reporting, supply chain, and project management. It runs on Windows and Unix servers and uses Oracle's PeopleSoft applications. The investment has gone through several updates, with the last including the retirement of 16 associated legacy applications in 2011.	12	No - The agency does not have future plans for retirement or modernization.
Department of Health and Human Services	Medicare Appeals System	This system facilitates the maintenance and transfer of case-specific data with regard to Medicare appeals through multiple levels of the appeal process. The system runs on a Solaris 10 operating system and uses commercial-off-the-shelf systems for case management and reporting.	11	No - The agency has general plans to continuously update the system.
Department of Justice	Sentry	This system provides information regarding security and custody levels, inmate program and work assignments, and other pertinent information about the inmate population. When the system was first deployed, it was comprised of approximately 700 program routines written in COBOL and ran on a mainframe platform. Over the years, the agency has updated the system to allow for web accessibility.	35	Yes – The agency plans to update the user interface and integrate system data through September 2016.
Social Security Administration	Title II Systems	These systems determine retirement benefits eligibility and amounts. The investment is comprised of 162 subsystems and some are still written in COBOL.	31	Yes - The agency has ongoing modernization efforts, including one that is experiencing cost and schedule challenges due to the complexities of the legacy software.

Department of State	Diversity Visa Information System	This system is an electronic case management system to track and validate application information submitted by foreign nationals under the Diversity Visa immigration program. The interface software, PowerBuilder, is no longer supported by the vendor.	~26	No - The agency plans to replace the investment at an unknown date and has general plans to upgrade unsupported software to a new version, which is also not supported.
Department of the Treasury	Individual Master File	This investment is the authoritative data source for individual taxpayer accounts where accounts are updated, taxes are assessed, and refunds are generated during the tax filing period. This investment is written in assembly language code—a low-level computer code that is difficult to write and maintain—and operates on an IBM mainframe.	~56	No - The agency plans to replace the investment at an unknown date.
Department of Agriculture	Resource Ordering and Status System	This investment mobilizes and deploys a multitude of resources, including qualified individuals, teams, aircraft, equipment, and supplies to fight wildland fires and respond to all hazard incidents. One of the applications the system uses is no longer supported by the vendor, creating vulnerability issues.	18	Yes - The agency plans to replace the system in 2018.
Department of Veterans Affairs	Personnel and Accounting Integrated Data	This system automates time and attendance for employees, timekeepers, payroll, and supervisors. This system is written in COBOL—a programming language developed in the 1950s and 1960s—and runs on IBM mainframes.	53	Yes - The agency plans to replace most of the system's functionality in 2017.

Source: GAO analysis of agency documentation and interviews. | GAO-16-696T

Note: Systems and investments may have components newer than the reported age.

We have previously provided guidance that organizations should periodically identify, evaluate, and prioritize their investments, including those that are in O&M; at, near, or exceeding their planned life cycles; and/or are based on technology that is now obsolete, to determine whether the investment should be kept as-is, modernized, replaced, or retired.²³ This critical process allows the agency to identify and address high-cost or low-value investments in need of update, replacement, or retirement.

Agencies are, in part, maintaining obsolete investments because they are not required to identify, evaluate, and prioritize their O&M investments to determine whether they should be kept as-is, modernized, replaced, or

²³GAO, *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity*, Version 1.1, [GAO-04-394G](#) (Washington, D.C.: March 2004).

retired. According to OMB staff from the Office of E-Government and Information Technology, OMB has created draft guidance that will require agencies to identify and prioritize legacy information systems that are in need of replacement or modernization. Specifically, the guidance is intended to develop criteria through which agencies can identify the highest priority legacy systems, evaluate and prioritize their portfolio of existing IT systems, and develop modernization plans that will guide agencies' efforts to streamline and improve their IT systems. The draft guidance includes time frames for the efforts regarding developing criteria, identifying and prioritizing systems, and planning for modernization. However, OMB did not commit to a firm time frame for when the policy would be issued. Until this policy is finalized and carried out, the federal government runs the risk of continuing to maintain investments that have outlived their effectiveness and are consuming resources that outweigh their benefits.

Regarding upgrading obsolete investments, in April 2016, the IT Modernization Act²⁴ was introduced into the U.S. House of Representatives. If enacted, it would establish a revolving fund of \$3 billion that could be used to retire, replace, or upgrade legacy IT systems to transition to new, more secure, efficient, modern IT systems. It also would establish processes to evaluate proposals for modernization submitted by agencies and monitor progress and performance in executing approved projects.

Implementation of Our Recommendations Should Allow Federal Agencies to Better Manage Legacy Systems and Investments

Our report that is being released today contains 2 recommendations to OMB and 14 to selected federal agencies. Among other things, we recommend that the Director of OMB commit to a firm date by which its draft guidance on legacy systems will be issued, and subsequently direct agencies to identify legacy systems and/or investments needing to be modernized or replaced and that the selected agency heads direct their respective agency CIOs to identify and plan to modernize or replace legacy systems as needed and consistent with OMB's draft guidance. If agencies implement our recommendations, they will be positioned to better manage legacy systems and investments.

²⁴*Information Technology Modernization Act*, H.R. 4897, 114th Cong. (2016).

In commenting on a draft of the report, eight agencies (USDA, Commerce, HHS, DHS, State, Transportation, VA, and SSA) and OMB agreed with our recommendations. Defense and Energy partially agreed with our recommendation. Defense stated that it planned to continue to identify, prioritize, and manage legacy systems, based on existing department policies and processes, and consistent to the extent practicable with OMB's draft guidance. Energy stated that while the department continues to take steps to modernize its legacy investments and systems, it could not agree fully with our recommendation because OMB's guidance is in draft and the department has not had an opportunity to review it. Defense and Energy's comments are consistent with the intent of our recommendation. Upon finalization of OMB's guidance, we encourage both agencies to implement OMB's guidance. In addition, Justice and the Treasury stated that they had no comment on their recommendations.

In summary, O&M spending has steadily increased over the past 7 years and as a result, key agencies are devoting a smaller amount of IT spending to DME activities. Further, legacy federal IT investments are becoming obsolete and several aging investments are using unsupported components, many of which did not have specific plans for modernization or replacement. This O&M spending has steadily increased and as a result, key agencies are devoting a smaller amount of IT spending to DME activities. To its credit, OMB has developed a draft initiative that calls for agencies to analyze and review O&M investments. However, it has not finalized its policy. Until it does so, the federal government runs the risk of continuing to maintain investments that have outlived their effectiveness and are consuming resources that outweigh their benefits.

Chairman Chaffetz, Ranking Member Cummings, and Members of the Committee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

GAO Contact and Staff Acknowledgments

If you have any questions on matters discussed in this testimony, please contact David A. Powner at (202) 512-9286 or at pownerd@gao.gov. Other key contributors include Gary Mountjoy (assistant director), Kevin Walsh (assistant director), Scott Borre, Rebecca Eyer, Tina Torabi, and Jessica Waselkow.

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